Hazard Mitigation Plan
Genesee County, MI

January 2015

This document was prepared by the GLS Region V Planning and Development Commission staff in collaboration with the Office of the Genesee County Sheriff's Emergency Management and Homeland Security Division.

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INTRODUCTION

Genesee County is vulnerable to a wide range of natural, technological and human-related hazards. The intent of this hazard mitigation plan update is to educate local policy makers and emergency service organizations on the hazards of the area, providing a comprehensive reference document for planning and mitigation activities. The plan provides an update of hazard data and includes mitigation activities that have changed since the last plan was updated. This document will also help identify the vulnerability of Genesee County to natural, technological and human-related hazards. Managing these many varied threats, and protecting life and property, are the challenges faced by emergency management officials at all levels of government.

In order to attain an effective emergency management capability to mitigate, prepare for, respond to, and recover from all types of hazards, an understanding of the multitude of hazards that confront the county must first be obtained. To accomplish this, the hazard mitigation plan was developed to provide an understanding of those threats. It identifies important local features, the hazards affecting the area, and discusses the county's vulnerability to the identified hazards. This is created and adopted by the community, describing the ways the community will be protected from the hazards that may affect it. The plan update includes strategies to achieve the agreed-upon mitigation goals and objectives. The hazard mitigation plan is a powerful tool that enables emergency management officials to set priorities and goals for resource allocation and mitigation and preparedness activities.

In Genesee County, the Office of Genesee County Sheriff Department of Emergency Management and Homeland Security is the coordinating agency for all emergency management activities. The office is responsible for continually monitoring and updating the Emergency Action Guidelines, as well as many other disaster related activities.

Questions and comments concerning this document should be addressed to the Genesee County Sheriff's Emergency Management and Homeland Security Division,
1002 N. Saginaw Street, Flint MI 48502.
Telephone (810) 257-3064
Fax (810) 768-7955
For more information on Genesee County's Emergency Management program, please visit their website at:
www.co.genesee.mi.us/emergency/emergencyhome.htm

Staff of the Genesee, Lapeer, Shiawassee Region V Planning and Development Commission worked in conjunction with the Office of the Genesee County Sheriff's Emergency Management and Homeland Security Division to produce the update to the Genesee County Hazard Mitigation Plan.

Communities Represented by the Genesee County Hazard Mitigation Plan

The Genesee County Hazard Mitigation Plan includes eleven cities, seventeen townships, and five villages. (See list below.) When the Hazard Mitigation Plan was developed in 2006, staff contacted each local unit of government and asked if they would consider including recommendations from the Genesee County Hazard Mitigation Plan into the next update of their master and zoning plans. Each one of the local units of government in Genesee County agreed to consider this request. See page 232 for a table listing the local units of government that submitted projects and signed forms.

City of Burton
City of Clio
City of Davison
City of Fenton
City of Flint
City of Flushing
City of Grand Blanc
City of Linden
City of Montrose
City of Mt. Morris
City of Swartz Creek

Village of Gaines
Village of Goodrich
Village of Lennon
Village of Otisville
Village of Otter Lake

Argentine Township
Atlas Township
Clayton Charter Township
Davison Township
Fenton Charter Township
Flint Charter Township
Flushing Charter Township
Forest Township
Gaines Township
Genesee Charter Township
Grand Blanc Charter Township
Montrose Charter Township
Mt. Morris Charter Township
Mundy Charter Township
Richfield Township
Thetford Township
Vienna Charter Township

Plan Development and Oversight

The Genesee County Local Emergency Planning Committee (LEPC) has the following responsibilities in Genesee County:

1. Develop emergency response plans for 302 sites in Genesee County listed on the DEQ list under S.A.R.A Title III.
2. Community outreach information on hazardous materials spills.
3. Inform the public on how to access information through the Michigan Community Right to Know Act.
4. File Tier II reports and make them available to the public upon request or through the Freedom of Information Act.

LEPC membership consists of representative from each of the following categories:

1. Elected Officials
2. Local Government
3. Law Enforcement
4. Emergency Management
5. Health
6. EMS
7. Environmental Organization
8. Hospitals
9. Transportation
10. Agriculture
11. Media
12. Communications
13. Fire
14. Human Services
15. Facility Operators
16. Organized Labor
17. Education
18. Citizen-at-Large

Part of the mission of the LEPC is to enhance public safety. It was designed to be inclusive of many agencies, and there are currently 45 LEPC members in Genesee County. The Genesee County Hazard Mitigation Advisory Committee was formed to guide the development of the Genesee County Hazard Mitigation Plan. One of the goals of the Genesee County Hazard Mitigation Advisory Committee is to protect public safety, so there is overlap between the two committees. There is also shared membership. For example, the Manager of the Genesee County Emergency Management and Homeland Security Division is on both committees. Following is a description of the work items and meetings that the Genesee County Hazard Mitigation Advisory Committee has overseen in the development of the Plan.

Plan Development Work Items and Meetings

Please note that work items and meetings are listed in chronological order.

1. On May 9, 2013, staff held the first of five meetings of the Genesee County Hazard Mitigation Advisory Committee. The purpose of the Hazard Mitigation Plan update was discussed, along with timelines, hazard identification and the Committee

reviewed and ranked the list of hazards identified in the previous plan. Staff began collecting data related to Genesee County hazards from various local, county and state agencies.

2. On June 4, 2013 staff held the second meeting of the Genesee County Hazard Mitigation Advisory Committee (HMAC). Staff reviewed the updated hazard ranking list and determined a weighted ranking for those hazards. Staff also presented the mapping data gathered for the plan. Please see Appendix A for documentation regarding this meeting.

3. A public meeting notice was placed in the Flint Journal on June 16, 2013 for a Genesee County Hazard Mitigation Plan Update public meeting.

4. On June 27, 2013 staff held a Genesee County Hazard Mitigation Plan Public Meeting. Invitations were sent to all Genesee County municipalities and staff published a public notice inviting the public to provide comment at the meeting. Information about resources related to the plan update will be sent to the Genesee Public Involvement Mailing List. This mailing list has approximately 1,400 entries and its breakdown can be summed up by the following categories:

    7% of the list represents community organizations (101)
    6% of the list represents concerned citizens (81)
    <1% of the list represents organizations for the disabled (7)
    8% of the list represents educational organizations (116)
    20% of the list represents elected officials (280)
    17% of the list represents governmental organizations (241)
    6% of the list represents neighborhood associations (78)
    20% of the list represents other businesses (287)
    8% of the list represents religious organizations (120)
    2% of the list represents senior citizen organizations (24)
    6% of the list represents transportation-related businesses (88)

5. On July 16, 2013, staff held a third Genesee County Hazard Mitigation Advisory Committee meeting (HMAC). Staff worked with committee members to establish goals and objectives for the hazard mitigation plan, and prioritized the list of hazards as they relate to Genesee County. Please see Appendix A for documentation regarding this meeting.

6. A description of the process used to create the prioritized list of hazards begins on page 72. The goals and objectives for the plan have been included on page 75.

7. On July 26, 2013, staff released a call for hazard mitigation projects to all Genesee County municipalities. Projects were to be received no later than August 16, 2013. A copy of the form for requested projects is attached. Please see Appendix B for documentation regarding the projects received.

8. On September 9, 2013 surveys were sent out to government officials, community organizations, and the public to gain input on the challenges that face each individual community within Genesee County. A copy of the survey utilized to collect information about community hazards and priorities is included.

9. Staff reviewed the project applications and surveys that were received and drafted a list of mitigation strategies for each hazard.

10. Using information collected on Genesee County hazards, the goals and objectives, the prioritized list of hazards and mitigating strategies, staff composed a draft of the Genesee County Hazard Mitigation Plan update.

11. Staff held four local meetings around Genesee County to get input from community leaders and first responders. Staff explained the importance of Hazard Mitigation and went over the changes since the previous plan. Staff stressed the importance of community participation to the community representatives and guided them through the participation forms. Please see Appendix A for the agenda and sign in sheets.

PART 1. GENESEE COUNTY COMMUNITY PROFILE

Historical Perspective

Genesee County, Michigan is located in southeastern Michigan. It was organized in 1836 and was named after Genesee County, New York in an effort to attract settlers from there. Genesee means “Beautiful Valley” and is derived from the Seneca language. Jacob Smith, traveling from Quebec, was the first settler in 1819. Flint was a fur trading center, and also a lumber center. Next, the Village of Geneseeville was established. This area is now a large parks and recreation area owned by the county and has many historical sites such as Crossroads Village and Huckleberry Railroad. The area quickly grew due to the convenience of the Flint River for the lumber industry. Lumber was a predominant industry, and the county had a large sorting and processing business.

Jacob Smith and his Chippewa wife opened a trading post in 1819. He named the area Grand Traverse. In 1825, Jacob Stevens from New York State became the first settler. Flint went through many name changes over the next few years, including “Todd’s Crossing”, “Sidney”,

and “Flint River” after the Ojibwa name Pawanunking. The name was shortened to Flint in 1836 and incorporated as a city in 1855.

One of the key players in the development of Genesee County was William Durant, who started a carriage factory, and later invested in a struggling auto company by the name of Buick. In 1909, he mass-produced a car designed by Louis Chevrolet, and the merger of General Motors began. The main industry in Flint became, and still remains today, the auto industry.

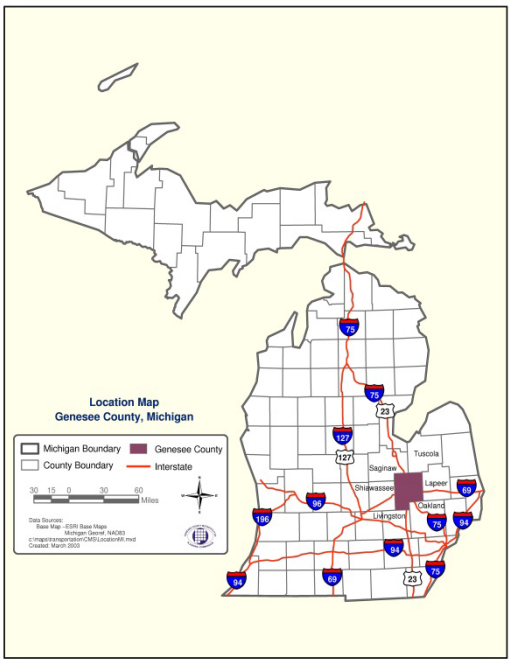


Figure 1-1

Regional Setting

Genesee County is situated near the southeastern portion of Michigan’s Lower Peninsula, approximately fifty miles northwest of Detroit. **Figure 1-1** illustrates the county’s location within the State of Michigan. The county is approximately 649 square miles in area, and includes eleven cities, seventeen townships, and five villages. It is the 5th most populous county in the state, with 425,790 residents according to the 2010 U.S. Census. Genesee County is bordered by six neighboring counties: to the north are Saginaw and Tuscola Counties, Lapeer County is to the east, to the south are Oakland and Livingston Counties, and to the west are Shiawassee and Saginaw Counties. See **Figure 1-2** for a map of Genesee County.

Government

The governing board and policy-making body of the county is the Genesee County Board of Commissioners. While many of its powers, duties and responsibilities are prescribed by law, and diffused through the wide-spread use of commissions, boards, committees, and independently elected county officers, the Board is in charge of developing and approving county policy setting the budget.

The Board Coordinator provides general administrative and liaison support for the Board of Commissioner, coordinates Board Committee Meetings, and maintains committee files. The Coordinator assists the Board and County departments with analysis of legislative matters at the state and federal level. In addition, the Board Coordinator serves as the Freedom of Information Act (FOIA) Coordinator for Genesee County.

There are nine districts in the county with one commissioner from each district elected every two years. Each year a Commissioner is chosen among the nine to serve as Chairperson. There

are six other elected local officials in the county. They are the County Clerk, the Prosecutor, the Register of Deeds, the Sheriff, the Treasurer, and the Drain Commissioner, in addition to judges from Probate, Circuit, and District Courts. There are twenty-three appointed positions in the county government filled by the Board of Commissioners.

Transportation

There are approximately 2,540 total roadway miles in Genesee County with about 70 of those miles being interstate roadway. Genesee County is served by three interstates: I-69, running east/west, I-75 running north/south, and I-475, passing north/south through the City of Flint.

Splitting off of I-75, there is also US-23 running north/south. The I-69 corridor is a major trade route from Toronto, Canada to Michigan, Chicago, Illinois, and other Midwest destinations. Recent traffic counts on I-69 show approximately 67,100 vehicles per day, between Center Street and Belsay Road. . I-75 is a popular route to northern Michigan and the Upper Peninsula, and serves Automation Alley. Recent traffic counts on I-75 show approximately 85,600 vehicles per day between Miller Road and the M-21 junction. US-23 heads south to Ohio.

Trucking

Several trucking firms operate in the county, with daily trips ranging from 1 to 500, depending on the fleet size of the company. Over 16,000 trucks travel daily on I-69 and I-75 in Genesee County. The passage of the North American Free Trade Agreement (NAFTA) has resulted in more cargo and freight movement into and out of Genesee County, as trade barriers dissolve between the U.S., Canada and Mexico.

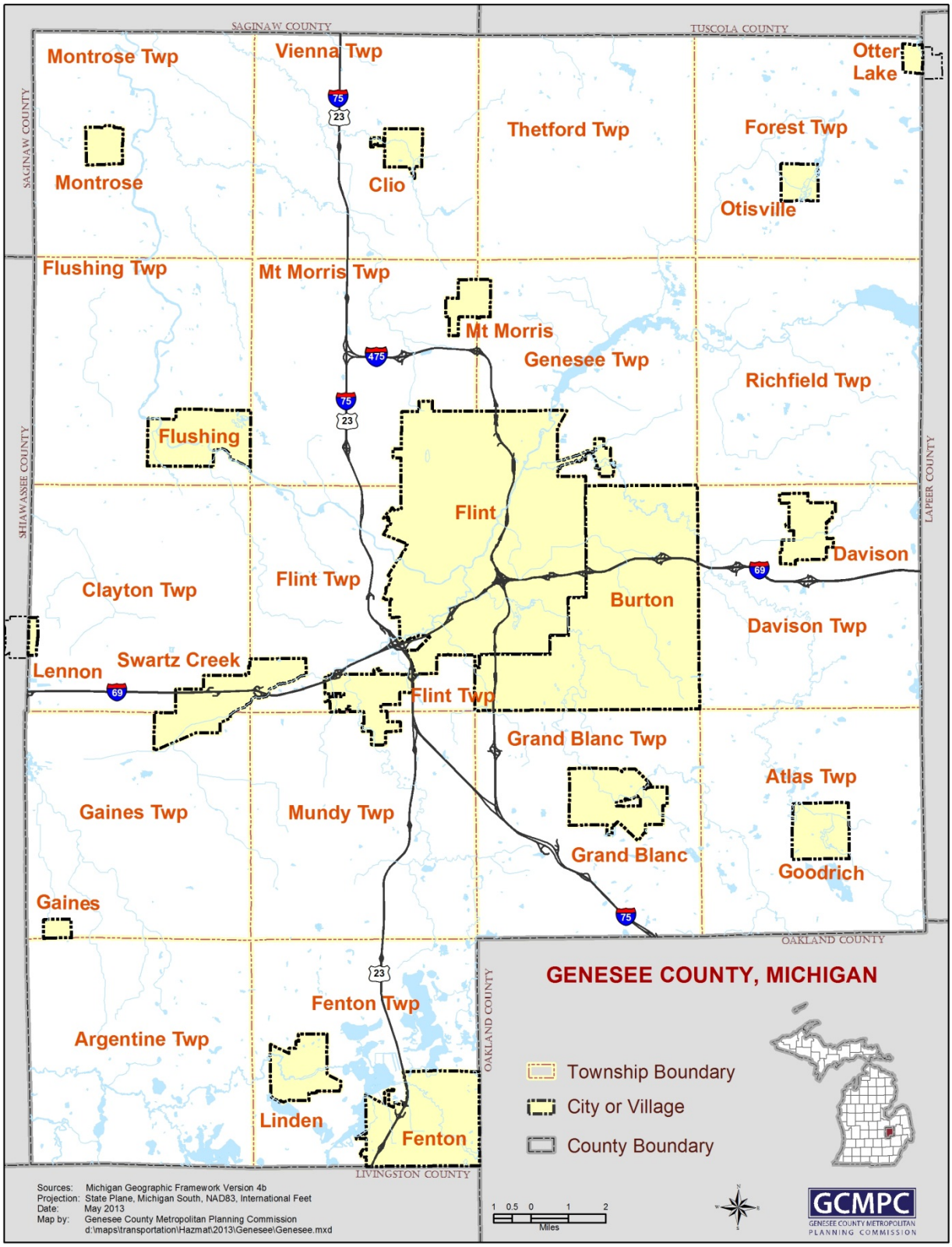

SAGINAW COUNTY
TUSCOLA COUNTY
SAGINAW COUNTY
SHIAWASSEE COUNTY
LAPEER COUNTY
OAKLAND COUNTY
OAKLAND COUNTY
LIVINGSTON COUNTY
Montrose Twp
Vienna Twp
Otter Lake
Thetford Twp
Forest Twp
Montrose
Clio
Otisville
Flushing Twp
Mt Morris Twp
Mt Morris
Genesee Twp
Richfield Twp
Flushing
Flint
Davison
Clayton Twp
Flint Twp
Burton
Davison Twp
Lennon
Swartz Creek
Flint Twp
Grand Blanc Twp
Atlas Twp
Gaines Twp
Mundy Twp
Grand Blanc
Goodrich
Gaines
Fenton Twp
Argentine Twp
Linden
Fenton
GENESEE COUNTY, MICHIGAN
Township Boundary
City or Village
County Boundary
Sources: Michigan Geographic Framework Version 4b
Projection: State Plane, Michigan South, NAD83, International Feet
Date: May 2013
Map by: Genesee County Metropolitan Planning Commission
d:\maps\transportation\Hazmat\2013\Genesee\Genesee.mxd
1 0.5 0 1 2
Miles
GCMPC
GENESEE COUNTY METROPOLITAN PLANNING COMMISSION

Figure 1-2

Railroad

The Canadian National from Toronto, CSX, and Central Michigan railroad companies operate freight routes through Genesee County. They serve the automotive industry and rail/highway transfer operations by providing both "piggyback" and flow-through rail/truck distribution facilities. Amtrak provides passenger services from Port Huron through Genesee County to Chicago, Illinois on the CN line. There is also one recreational railroad operated by the Genesee County Parks and Recreation Commission. It is 1.4 miles long, crossing one minor arterial highway on its route.

Airplane

The county's largest and busiest airport is Bishop International Airport (BIA), which is centrally located with direct access to I-69, I-75, and US-23 at the Bristol Road exit. BIA is located within a Foreign Trade Zone, which has international import/export implications for Genesee County. Fed Ex has a large presence and Bishop is the regional hub site of Fed Ex shipments for the state outside of Detroit. Strategies are in progress to further develop the Foreign Trade Zone so that local businesses can pursue additional international import/export opportunities. In 2011, BIA served over 900,000 passengers and shipped over 35 million pounds of cargo. Genesee County also has several smaller general use airports as well.

Bus Routes

Genesee County has a public transportation system, the Mass Transportation Authority (MTA). The MTA provides local citizens with county-wide service. It provides not only county-wide transportation service, but also service to five surrounding counties. There are also several charter transit services in Genesee County, which offer service to the public either daily or on an on-call basis. In addition, there are taxicab and limousine services in the county. Bus routes are represented in **Figure 1-3**.

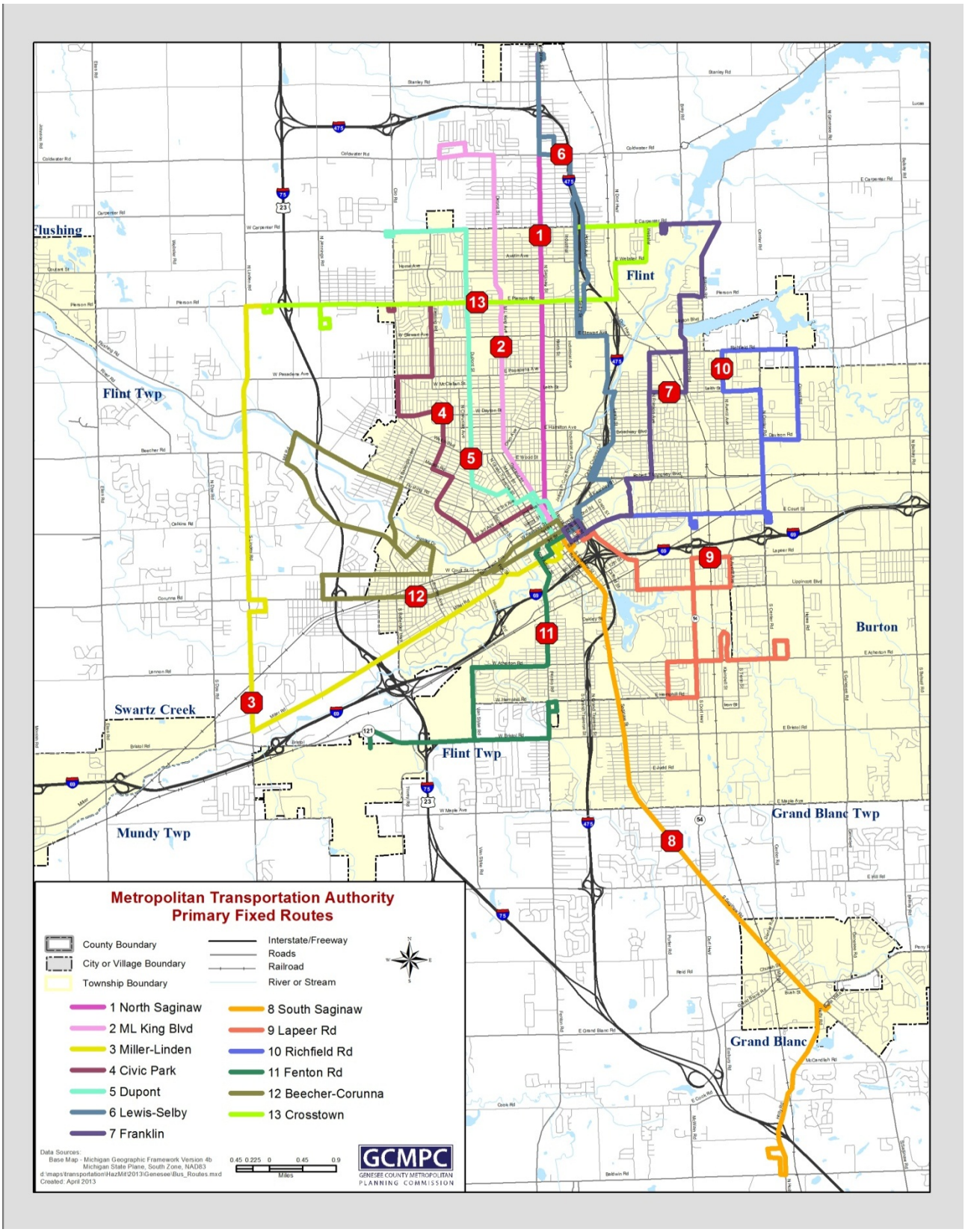
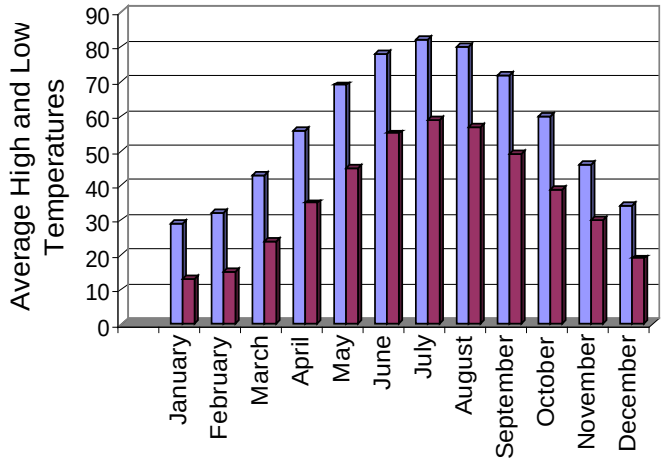

Metropolitan Transportation Authority
Primary Fixed Routes
County Boundary
City or Village Boundary
Township Boundary
Interstate/Freeway
Roads
Railroad
River or Stream
1 North Saginaw
2 ML King Blvd
3 Miller-Linden
4 Civic Park
5 Dupont
6 Lewis-Selby
7 Franklin
8 South Saginaw
9 Lapeer Rd
10 Richfield Rd
11 Fenton Rd
12 Beecher-Corunna
13 Crosstown
Flushing
Flint
Flint Twp
Swartz Creek
Mundy Twp
Burton
Grand Blanc Twp
Grand Blanc
GCMPC
GENESEE COUNTY METROPOLITAN PLANNING COMMISSION

Figure 1-3

Climate

Genesee County is situated in southeastern Michigan, where the lake effect is not as pronounced as in other counties. The main lake effect noticed in the county is the increased cloudiness late in fall and early winter when the prevailing winds move cold air across the warmer lake water. Genesee County is subject to a wide variety of weather characteristics. There is a wide range of seasonal temperatures that may occur, and frequent weather changes are very common. **Table 1-1** indicates the temperatures that Genesee County may experience in any given year. Annual precipitation is about 31 inches, and the county receives approximately 37 inches of snowfall yearly. The growing season averages about 148 days.

Table 1-1. Average Temperatures in Flint, Michigan



Soils/Topography

The prevalent parent material in Genesee County is Glacial Overburden. A generalized soils survey has been completed for Genesee County by the United States Soil Conservation Service. Over fifty types of soils have been identified within the county. The survey classifies soils by characteristics and slopes, and provided an assessment of their suitability for various uses.

Relief of Genesee County ranges from nearly level to steep. About one-third of the county is nearly level and slightly undulating, and steep banks cut this landscape along the Flint River and its tributaries. The level or nearly level land is mostly in the western and central parts of the county. The extreme southwestern part is somewhat hilly or rolling, and the northeastern, southeastern and extreme eastern parts have a generally rolling landscape that rises to low hills in some areas. Steep banks border local depressions and streams. Elevations within the county range from 580 feet in the northwestern corner of Montrose Township to about 1,000 feet in the southern and southeastern parts of the county. Genesee County has also had its floodplains mapped.

Population & Housing

According to Census 2010 figures, Genesee County had a population of 425,790 persons. With a land area of 639.6 square miles, Genesee County has approximately 665 persons per square mile. The county has 90 large apartment buildings and 75 mobile home parks. Highlights from the U.S. Census 2010 are included here in **Table 1-2** for a demographic profile of the county. The City of Flint is the largest political jurisdiction in the county, with a population of 102,434 people according to the 2010 Census. See **Figure 2-6** for a map showing the population density of Genesee County.

Table 1-2. Census 2010 Demographic Highlights

General Characteristics	Number	Percent	U.S.
Total population	**425,790**	**100.0**	**100%**
Male	205,271	48.2	49.2
Female	220,519	51.8	50.8
Median age (years)	**38.5**	**(X)**	**(X)**
Under 5 years	27,319	6.4	6.5
18 years and over	319,211	75.0	76
65 years and over	58,189	13.7	13
One race	**414,774**	**97.41**	
White	317,393	74.54	72.4
Black or African American	88,127	20.70	12.6
American Indian and Alaska Native	2,252	0.53	.9
Asian	3,879	0.91	4.8
Native Hawaiian and Other Pacific Islander	79	0.02	.2
Some other race	3,044	0.71	
Two or more races	11,016	2.59	
Hispanic or Latino (of any race)	12,983	3.05	16.3
Average household size	**2.48**	**(X)**	
Average family size	3.03	(X)	(X)
Total housing units	192,180	100.0	100.0%
Occupied housing units	169,202		
Social Characteristics	**Number**	**Percent**	**U.S.**
Population 25 years and over		100.0	
High school graduate or higher			
Bachelor's degree or higher			
Civilian veterans (civilian population 18 years & over)			
Disability status (population 21 to 64 years)			
Housing Characteristics	**Number**	**Percent**	**U.S.**
Single-family owner-occupied homes		100.0	
Median value (dollars)		(X)	

(X) Not applicable. Source: U.S. Census Bureau, 2010 Census Summary File 1 (SF 1) and Summary File 3 (SF 3)

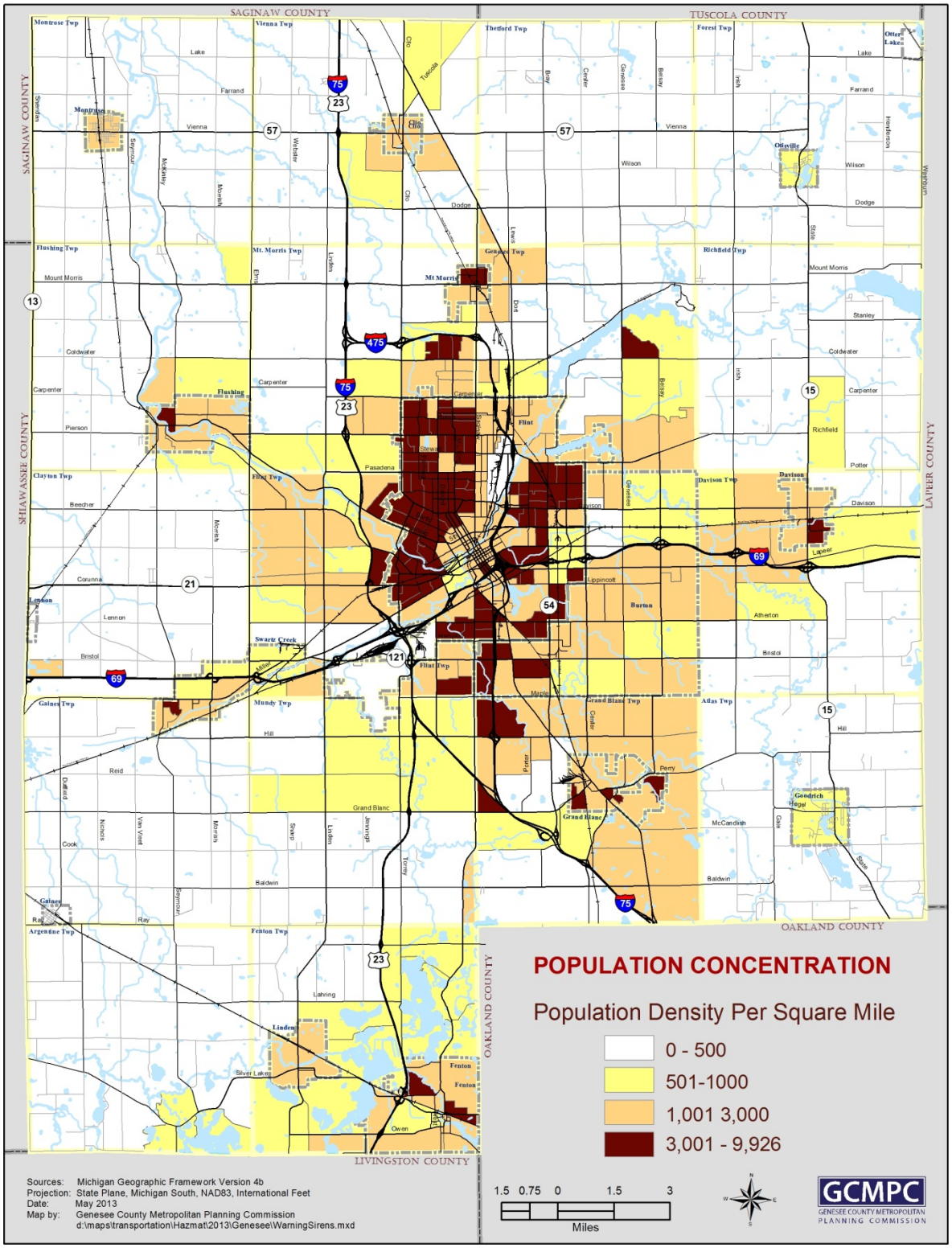

SAGINAW COUNTY
TUSCOLA COUNTY
SHIAWASSEE COUNTY
LAPEER COUNTY
OAKLAND COUNTY
LIVINGSTON COUNTY
POPULATION CONCENTRATION
Population Density Per Square Mile
0 - 500
501-1000
1,001 3,000
3,001 - 9,926
Sources: Michigan Geographic Framework Version 4b
Projection: State Plane, Michigan South, NAD83, International Feet
Date: May 2013
Map by: Genesee County Metropolitan Planning Commission
d:\maps\transportation\Hazmat\2013\Genesee\WarningSirens.mxd
1.5 0.75 0 1.5 3
Miles
GCMPC
GENESEE COUNTY METROPOLITAN PLANNING COMMISSION

Figure 1-4

Economy

Genesee County can offer businesses many advantages when they choose to do business here. Genesee County is intersected by I-69, I-75 and US-23, making a variety of transportation options available for area businesses. The North American Free Trade Agreement (NAFTA) has widened commerce with Canada and Mexico, and I-69 has had an increase in truck traffic. Combined with local sports venues, tourist areas, and recreational areas, Genesee County has the potential to attract new growth. In addition, many Oakland County workers are relocating to the southern portion of Genesee County, as they seek the more affordable housing available here.

There are many other incentive programs available through the Michigan Economic Development Corporation, Community Development Block Grants (CDBG), Industrial tax incentives and through new initiatives such as the I-69 International Trade Corridor. The corridor aids economic development by promoting the corridors multi-modal transportation infrastructure including Bishop International Airport, access to major freeways, the connection to the Blue Water Bridge, and multiple large rail providers.

In addition, there are workforce training incentives available to employers who hire unemployed, displaced or disabled workers. See **Table 1-3** for 2000 U.S. Census Bureau statistics on economic characteristics.

Table 1-3. Economic Characteristics	Number	Percent	U.S.
In labor force (population 16 years and over)	207,808	63.1	63.9%
Mean travel time to work in minutes (population 16 years and over)	25.6	(X)	25.5
Median household income (dollars)	41,951	(X)	41,994
Median family income (dollars)	50,090	(X)	50,046
Per capita income (dollars)	20,883	(X)	21,587
Families below poverty level	11,930	10.2	9.2%
Individuals below poverty level	56,480	13.1	12.4%

(X) Not applicable. Source: U.S. Census Bureau, Summary File 1 (SF 1) and Summary File 3 (SF 3)

Land Use Characteristics

Genesee County can be divided into three land use categories: urban, rural and unpopulated. The urban category includes residential, commercial, office and industrial. The rural category is defined as agriculture, communications and extractive. The unpopulated category contains wetlands, woodlands, and grasslands. See **Table 1-4** for a breakdown of Genesee County land use based on these groups. In recent years, local manufacturers downsized and moved out of the area. This not only cost Genesee County thousands of manufacturing jobs, but left many Brownfields in its wake.

A Brownfield is an abandoned, idled, or under-used industrial and commercial facility where expansion or redevelopment is complicated by real or perceived environmental contamination. Also, according to the 2010 Census Bureau statistics, more than 20% of the City of Flint's housing stock is empty. Flint has many abandoned houses and empty lots, and suffers from aging infrastructure such as water main breaks. Since 2010, over 2,000 homes have been demolished in Flint and Genesee County.

Table 1-4. Land Use Characteristics

Type	Acres	% of Total Acres
Urban	98,150	24%
Rural	168,159	40%
Unpopulated	149,097	36%
Totals	**415,406**	**100%**

Changes in Local Land Development

Since the last plan was completed, development in Genesee County has declined in comparison to previous years. The lack of a significant level of new development throughout the County will not impact current or planned Hazard Mitigation actions. There were 2,390 demolitions in the County from 2010-2012, mostly within the City of Flint. The demolitions were of blighted structures that posed a health or safety risk. The demolitions have not affected the way that hazards are dealt with, but they have made neighborhoods safer and less susceptible to structure fires and other man-made hazards.

The automotive industry continues to be the major employer for the county, and still has several large manufacturing facilities here. Adjacent Oakland County is a hub of economic activity, and many of its employees come to Genesee County to take advantage of the more affordable homes here. As a result, many Genesee County residents work in Oakland County and commute on a daily basis. In 2012, there were approximately 28 residential building permits for new housing starts issued in Genesee County.

Community Facilities

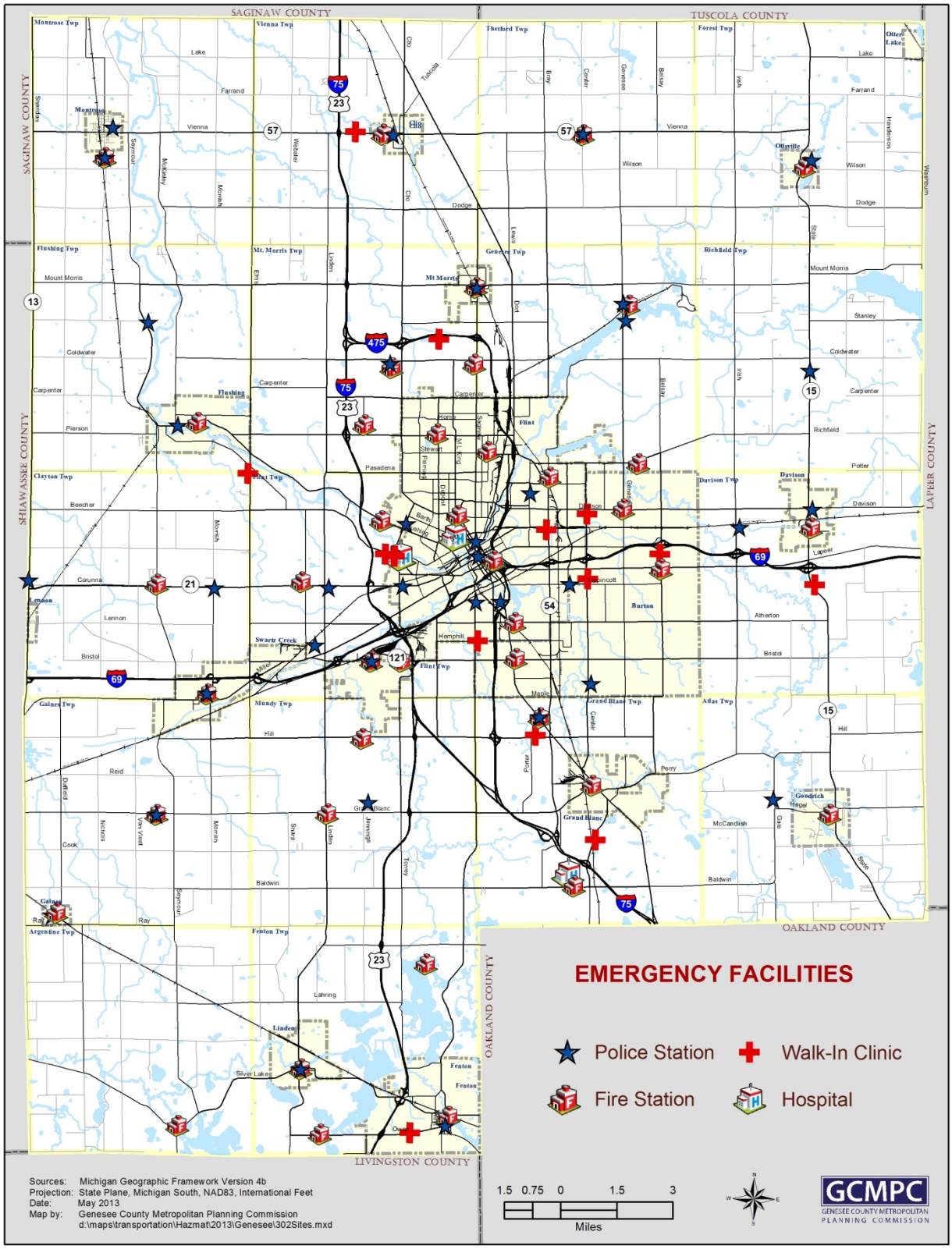
Hospitals/Health Facilities

Genesee County has three large hospitals, McLaren Regional Medical Center, Hurley Medical Center, and Genesys Regional Medical Center. The Genesee County Health Department offers health-related services to the community. There are also many clinics available throughout the county, as well as, nursing homes and adult care facilities.

Police and Fire Stations

Genesee County has 40 police stations, 40 fire stations, a Michigan State Police post, a National Guard Armory, the Genesee County Sheriff's Department, and three 911 Centers. The cities of Flint and Fenton each have their own dispatch center, and there is one county 911 center. See

Figure 1-4 for a map of the county's emergency facilities. There is also a Michigan Urban Search and Rescue (MUSAR) regional team located at the Grand Blanc Fire Department.


SAGINAW COUNTY
TUSCOLA COUNTY
SHIAWASSEE COUNTY
LAPEER COUNTY
OAKLAND COUNTY
LIVINGSTON COUNTY
EMERGENCY FACILITIES
Police Station
Walk-In Clinic
Fire Station
Hospital
Sources: Michigan Geographic Framework Version 4b
Projection: State Plane, Michigan South, NAD83, International Feet
Date: May 2013
Map by: Genesee County Metropolitan Planning Commission
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1.5 0.75 0 1.5 3
Miles
GCMPC
GENESEE COUNTY METROPOLITAN PLANNING COMMISSION

Figure 1-5

Emergency Management and Homeland Security

The Office of Genesee County Sheriff's Emergency Management and Homeland Security Division serves as the disaster services coordination office for the county, and has an Emergency Operations Center located in the Genesee County Administration Building in downtown Flint. There is also an alternate Emergency Operations Center located in Grand Blanc.

The Emergency Management and Homeland Security Division is responsible for continually monitoring and updating the County's Emergency Response Plan, as well as many other disaster related activities:

> Mitigation: Eliminate, reduce or prevent long-term risk to human life and property from natural and man-made hazards.
>
> Emergency Preparedness: Advance emergency planning that develops operational capabilities and facilitates an effective response in the event an emergency occurs.
>
> Emergency Response: Action taken immediately before, during or directly after an emergency to save lives, minimize damage to property and enhance the effectiveness of recovery.
>
> Recovery: Short-term activity to return vital life support systems to minimum operating standards and long term activity designed to return life to normal or improved levels.

The Emergency Management and Homeland Security Division hosted a Public Officials Conference on March 14, 2013 in which information was shared regarding the Genesee County Hazard Mitigation Plan. The following agencies attended (totaling 22 agencies and 56 individuals):

Atlas Township
Clayton Township
Davison Township
Fenton Township
Flint Township
Flushing Township
Gaines Township
Genesee Township
Grand Blanc Township
Montrose Township
Mt. Morris Township
Mundy Township
Richfield Township
City of Burton
City of Clio
City of Flint
City of Grand Blanc
City of Mt. Morris
Village of Goodrich
Village of Lennon

Genesee County Board of Commissioners
Mass Transportation Agency (MTA)

The Emergency Management and Homeland Security Division works closely each year with the National Weather Service and Amateur Radio to provide SKYWARN classes twice a year, free to the public. Between 2010 and 2013, 513 residents have attended these trainings. These trainings provide valuable information about severe weather, how to spot severe weather and when to seek shelter. Every three years, Winter Weather Awareness Training is also hosted in Genesee County in coordination with the above agencies bringing more public education to the residents regarding the threats and hazards in Genesee County.

Throughout the year Genesee County Emergency Management participates in preparedness events and public speaking engagements which educate residents on the threat of severe weather, flooding, promotes NOAA weather radios, NFIP, and family disaster plans and kits.

In 2011 Genesee County Emergency Management Division secured a Homeland Security Grant to reprogram all 81 sirens at the time within the county to meet FCC compliancy.

In May of 2013 Genesee County experienced a tornado outbreak that affected 4 jurisdictions. Since that time, 7 jurisdictions have submitted grant applications for additional sirens within their areas. Some of the jurisdictions are partnering on projects to cover jurisdictional boarders with heavy populations.

Due to the significant reduction (60% reduction) and turnover (100) in staff since 2010, it has been more challenging to keep residents and local jurisdictions engaged in preparedness, mitigation, response, and recovery.

With the history of flooding in Genesee County and the number of dams that exist, it is important that going forward key individuals at local jurisdictions and at the county level become Certified Floodplain Managers to continue the important mitigation planning that needs to be continued forward.

The Federal Emergency Management Agency (FEMA) requires that each community have a FEMA approved hazard mitigation plan to be eligible for future FEMA hazard mitigation funding. The Genesee County Hazard Mitigation Plan complies with the requirements of a multi-jurisdictional hazard mitigation plan as outlined by FEMA. Communities within Genesee County that have adopted this plan also comply with the FEMA requirement.

Shelters

Genesee County has community shelters that can be used to serve residents after a hazardous event has occurred. Many of these are schools, churches, or community centers.

Early Warning Sirens

The county currently has 88 installed early warning sirens. See **Figure 1-5** for a map showing the early warning sirens. The map includes a one-mile buffer zone around each siren, because

one mile is the approximate range the siren can be heard. These buffer zones indicate areas of early warning coverage in the county. Approximately 68% of the population is covered by a siren, leaving 32% of the population outside the estimated range of a siren.

Dams and Bridges

A total of 33 dams can be found in the county, with 3 of those dams classified as a "High Hazard" and another 7 classified as a "Significant Hazard". In addition, there are 133 bridges included in the county's infrastructure. See **Figure 1-6** for a map of Genesee County dams and **Figure 1-7** for Genesee County bridges.

Educational Facilities

The Genesee Intermediate School District (GISD) had a head count enrollment of 75,000 students for the 2012-2013 year. That number includes kindergarten through 12th grade, chartered academy, alternative education, special education, and adult education students. The GISD has buildings located in21 school districts. Genesee County is also home to five large colleges: The University of Michigan at Flint, Kettering University, Mott Community College, Baker College, and Davenport University.

Utilities/Solid Waste

Genesee County has 29 oil wells, 1 natural gas well and 2 brine disposal wells. (See "Oil or Natural Gas Well/Pipeline Accidents" for more information on wells.) Consumers Energy, the local power supplier, has five substations. In addition, there are nine water power stations. Genesee County has approximately 17 locations for recycling household waste, and 3 privately-owned landfills. In 2012, 3,954,355 cubic yards of waste were disposed of in Genesee County landfills. Area phone companies include SBC, Century, AT&T, and Sprint. Consumers Energy supplies electricity and gas to the area, and Detroit Edison is another energy provider.

Groundbreaking for the construction of the Karegnondi Water Pipeline occurred in June of 2013. The waterline will distribute water from Lake Huron to communities along the I-69 corridor to Genesee County. The water supply will encompass over 2,400 square miles and serve over half a million people including residents, industrial customers, and agribusiness. The pipeline is expected to be completed within 3 years.

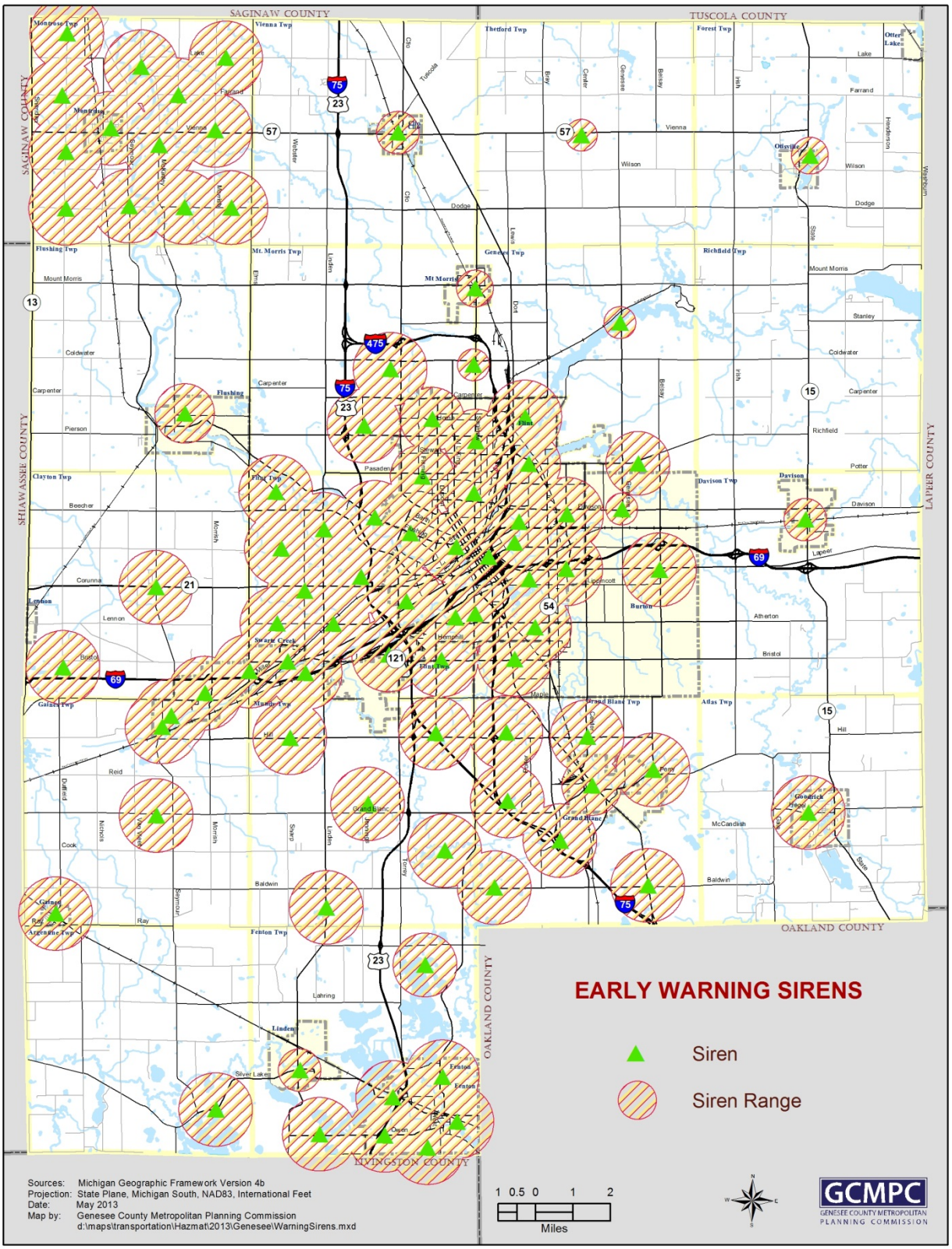

SAGINAW COUNTY
TUSCOLA COUNTY
SHIAWASSEE COUNTY
LAPEER COUNTY
OAKLAND COUNTY
LIVINGSTON COUNTY
EARLY WARNING SIRENS
Siren
Siren Range
Sources: Michigan Geographic Framework Version 4b
Projection: State Plane, Michigan South, NAD83, International Feet
Date: May 2013
Map by: Genesee County Metropolitan Planning Commission
d:\maps\transportation\Hazmat\2013\Genesee\WarningSirens.mxd
1 0.5 0 1 2
Miles
GCMPC
GENESEE COUNTY METROPOLITAN PLANNING COMMISSION

Figure 1-6

Cultural Facilities

The Flint Cultural Center includes nine major fine arts institutions that reach over 600,000 residents, students, and visitors each year. At the Center, residents can enjoy theater venues, art galleries, an orchestra, and a planetarium. In addition, there are many more art galleries scattered across the county. See the listing below for the major attractions available at the Flint Cultural Center.

- The Flint Institute of Arts (DeWaters Art Center)
- The Flint Institute of Music (Dort Music Center)
- Flint Symphony Orchestra
- Flint School of Performing Arts
- The Flint Youth Theatre
- Longway Planetarium
- Alfred P. Sloan Museum
- The Whiting Auditorium
- F.A. Bower Theater
- Flint Public Library
- Applewood

Recreational Facilities

The Genesee County Parks system contains seven major parks and provides recreational facilities and attractions such as beaches, boat ramps, fishing sites, campgrounds and equestrian areas. One of the main attractions is Crossroads Village, a "living village" that offers a glimpse of Michigan village life in the 1860 to 1880 historical period. The Huckleberry Railroad is a steam-powered train that winds through the Village for eight miles providing scenic rides to visitors. Another attraction is the Genesee Belle Riverboat, which provides cruises. Nature enthusiasts can enjoy For-Mar Nature Preserve and Arboretum, which has almost 400 acres for citizens to enjoy.

The Mounds Off-Road Vehicle Area is available for off-road vehicle enthusiasts to use. See the listing below for the major parks and regional recreational facilities and attractions.

Major Parks

- Bluebell Beach - Genesee Township
- Linden County Park - Fenton Township
- Flushing County Park - Flushing Township
- Buell Lake County Park - Thetford Township
- For-Mar Nature Preserve and Arboretum - Burton
- Richfield County Park - Richfield Township
- Davison Roadside Park – Burton

Figure 1-7

Figure 1-8

Regional Recreational Facilities/Attractions

- Holloway Reservoir Regional Park - Genesee and Lapeer Counties
- Genesee Recreation Area - Richfield Township and Genesee Township
- Mounds Off-Road Vehicle Area - Genesee Township
- Crossroads Village and the Huckleberry Railroad – Genesee Township
- Stepping Stone Falls - Genesee Township
- Everett A. Cummings Center - Genesee Township
- Timber Wolf Campground - Richfield Township
- Wolverine Campground and Buttercup Beach - Richfield Township
- Goldenrod Disc Golf Course
- Elba Equestrian Complex
- Hogbacks Area
- Zemmer Park

Hazardous Material Sites

There are currently 69 Sites in Genesee County designated SARA Title III, Section 302 Sites. These are sites where hazardous materials are stored. (See "Hazardous Materials Incidents at Fixed Sites" for more details regarding 302 Sites.) These sites are required to have an emergency plan on file with the Emergency Management and Homeland Security Office, Fire Department, and their own facility. See **Figure 1-8** for a map of the 302 Sites.

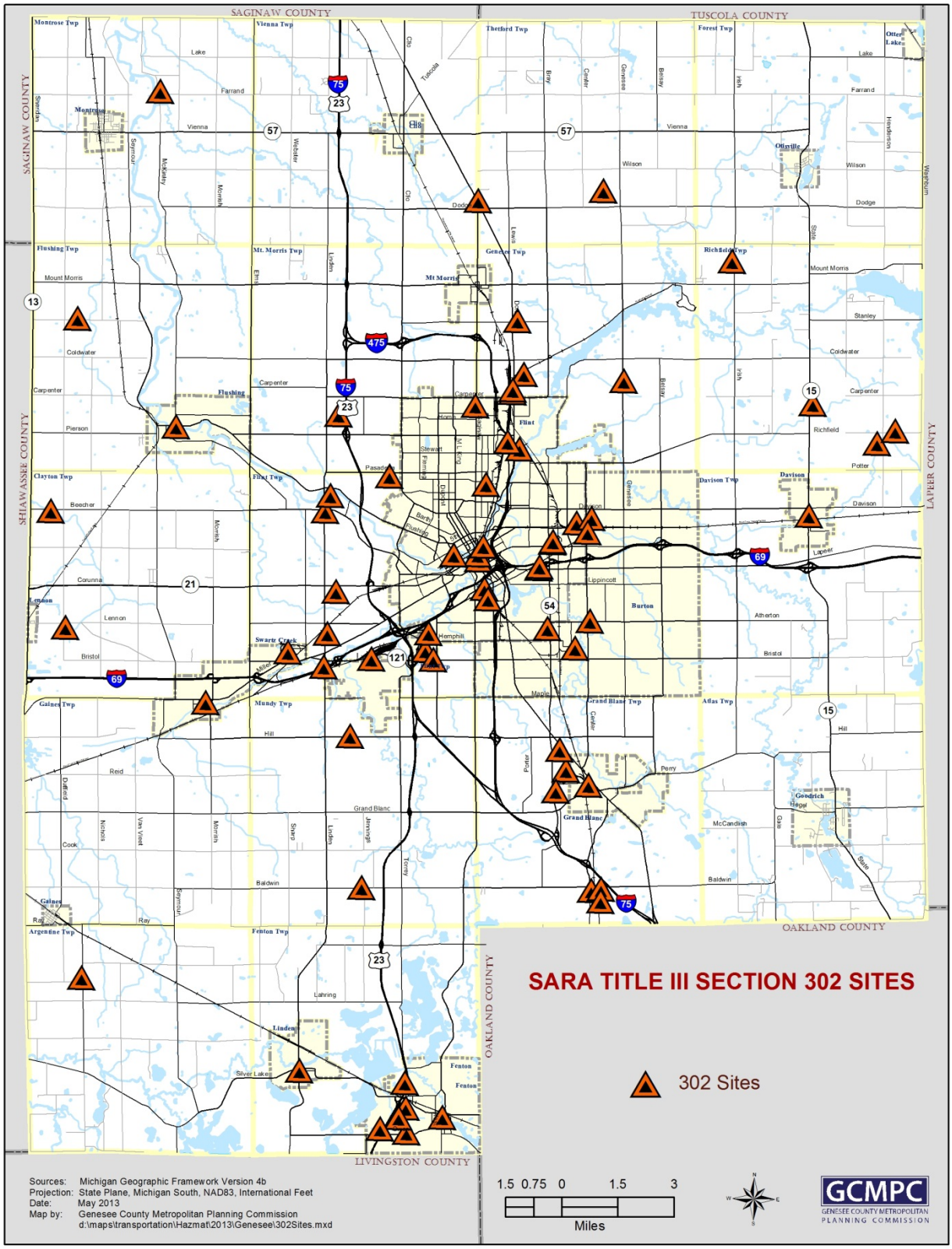

SAGINAW COUNTY
TUSCOLA COUNTY
SHIAWASSEE COUNTY
LAPEER COUNTY
OAKLAND COUNTY
LIVINGSTON COUNTY
SARA TITLE III SECTION 302 SITES
302 Sites
Sources: Michigan Geographic Framework Version 4b
Projection: State Plane, Michigan South, NAD83, International Feet
Date: May 2013
Map by: Genesee County Metropolitan Planning Commission
d:\maps\transportation\Hazmat\2013\Genesee\302Sites.mxd
1.5 0.75 0 1.5 3
Miles
GCMPC
GENESEE COUNTY METROPOLITAN PLANNING COMMISSION

Figure 1-9

GENESEE COUNTY
COMMUNITY PROFILES

NOTE:
The Community Profiles provide basic characteristics of each local unit of government. The Hazard Priorities and Hazard Mitigation Strategies for the individual local units are included where available, as well as public and governmental input. Several attempts were made to gather input from all local units, including: local meetings, surveys, participation forms, memos, phone calls and emails.

In order to gain the participation of the local units, staff held local meetings throughout the County, sent out surveys, participation forms, requested input from the public and community organizations, called and emailed each local government. In addition, the Genesee County Hazard Mitigation Advisory Committee, made up of experts involved in local government, emergency response, fire, education, health, and law enforcement from around the County was an integral part of the update. After requests using each method of outreach, some jurisdictions still did not provide information. The information that was gathered by staff, or received from the local units, is included in the individual Community Profiles, as well as under the Hazard sections, where applicable.

In an effort to include not only the elected and local officials, staff sent a Public Participation Survey (Please see Appendix A) to the public participation list that includes neighboring agencies, businesses, universities and school districts, nonprofits, and citizens. The Genesee County Hazard Mitigation Advisory Committee (consisting of experts involved in local government, emergency response, fire, education, health, and law enforcement, etc.) was a very large part of the update. Staff held Public Input Sessions open to anyone who was interested in learning more about the Plan and making comments or suggestions. The Plan was sent to neighboring communities, all of the local units within Genesee County, posted on Genesee County Metropolitan Planning Commission's website, and advertised as a public notice in the Flint Journal.

Staff requested information from each jurisdiction regarding the existing authorities, policies, programs, and resources to accomplish hazard mitigation at the local level (the information that was provided can be found in Appendix A, under "Hazard Mitigation Plan Update Emergency Management Coordinators Survey"). Many of the communities intend to put policies in place and staff will continue to encourage the communities to make those changes.

In the previous plan, the communities agreed to incorporate Hazard Mitigation in the update of their Master Plans. Some of the local units have not had a Master Plan update since the completion of the previous Hazard Mitigation Plan. Staff has reminded the local units of their commitment to include Hazard Mitigation in their next update. Staff will continue to impress upon the local units the importance of incorporating Hazard Mitigation into their master plans and other important planning tools.

Staff has emphasized to local officials the importance of integrating pre-hazard mitigation into other planning mechanisms. Each local unit is encouraged to consider the importance of being prepared for natural or man-made hazards when adopting policy and programs for their community. After the recent extreme winter weather storms, local officials held a public meeting at the Genesee County Administration Building to address recent severe weather emergencies and have the public weigh in on how similar events can be better handled in the future. In attendance to talk about their experiences with the aftermath of the storms and to make suggestions were people from community groups and local agencies, as well as representatives from Consumer's Energy, County Commissioners, and the Emergency Management Manager.

Community Profiles

Argentine Township
2010 Population: 6,913 (up 6% from 2000). (U.S. Census Bureau, Northwest Michigan Council of Governments). Argentine Township is a continuing participant in the updated plan.
NFIP Participant
Hazard Priorities:

Hazard
Tornadoes
Riverine Flooding
Snow and Ice Storms
Inclement Weather
Dam Failure
Hazardous Material Incidents (Transportation)

Prioritized Hazard Mitigation Strategies:
As of January 13, 2014, this information has not been submitted to staff.

Argentine Township has four dams and 265 potential structures in the floodplain, with 30 flood insurance policies. There is one mobile home park. Argentine Township has one warning siren. There is one "302" site and it contains a hazardous materials transport route. There are no community shelters.

Since the previous plan, Argentine Township has put policies into place to mitigate hazards; they have changed their building permit forms to ask about location relating to the floodplains in order to prevent building in the floodplain. The Township is working with residents within the floodplain, according to the new maps, to prevent flood damage. The Township Building Inspector attends Hazard Mitigation Training.

Argentine Township is willing to incorporate Hazard Mitigation planning techniques into future community plans.

In order to improve and expand upon existing community policies and programs to accomplish hazard mitigation, Argentine Township would like to include first-responders and citizens in the trainings that are already held for fire and police staff.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from Argentine Township showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster. In the past five years, Argentine Township residents say they have been most affected by tornadoes in the area. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, Argentine Township residents responded with:

- Great communication between the police, fire, and EMS services

- The installation of additional sirens in central rural locations
- Inform residents and businesses of the availability of NOAA weather applications for smartphones
- Education on the hazards

Atlas Township

2010 Population: 7,993 (up 10% from 2000), (U.S. Census Bureau, Northwest Michigan Council of Governments). Atlas Township is a continuing participant of the updated plan.

NFIP Participant

Hazard Priorities:

Hazard
Snow and Ice Storms
Tornadoes
Oil or Natural Gas Well Accidents
Wildfires
Dam Failure
Major Transportation Accidents
Structure Fires

Prioritized Hazard Mitigation Strategies:

As of January 13, 2014, this information has not been submitted to staff.

Mitigation Projects:

1. Project: Natural gas backup generator for Atlas Township Office/Hall which also serves as a Community Room and sub-station for Genesee County Sheriff Department.
Project Description: To allow use as a safe haven room year round for residents needing shelter. Location of generator would be: 7386 S. Gale Road, Grand Blanc, MI. Proposed timeframe for implementation is 1-5 years.
Budget: $31,000.00 (Have currently received quote from Consumers Energy - waiting for quotes from 2 private contractors).

2. Project: Dead Ash tree removal.
Project Description: Dead ash trees affect road safety throughout the entire township, along various roads, streets, and neighborhoods.
Budget: $80,000.00

3. Project: Drainage improvements to reduce risk of flooding to residential structures.
Project Description: Location: Catherwood/Farnsworth, Hill Road, Washburn Road between County Line (Ray Road) and Kipp Road. Proposed timeframe for implementation: 1-5 years.
Budget: $500,000.00

4. Project: High pressure 10 inch water wells (electric).
Project Description: To be used by the Fire Department to fight fires in various Township locations. Township would like eight wells. Proposed timeframe for implementation: 1-5 years.
Budget: Approximately $28,000.00 per well

5. Project: Boat for water or ice rescue
Project Description: For Fire Department to help with evacuation in the event of floods or dam failure within the Village of Goodrich. Proposed timeframe for implementation: 1-5 years.
Budget: $5,000.00

6. Project: Emergency warning sirens
Project Description: Emergency warning sirens placed in various locations within Atlas Township to be audible by all residents in all sections. Township would like eight sirens. Proposed timeframe for implementation: 1-5 years. Map included.
Budget: Approximately $25,000.00 per siren

Atlas Township has three dams and 43 potential structures in the floodplain, with 14 flood insurance policies. There are no mobile home parks in Atlas Township. There is a warning siren located in the Village of Goodrich that serves a portion of the Township. Atlas Township has no "302" sites but it does have a hazardous materials transport route. The Township has an emergency shelter available during emergency situations.

Since the previous plan, Atlas Township has not put any additional policies or programs in place to mitigate hazards.

Atlas Township is willing to incorporate Hazard Mitigation planning techniques into future community plans.

Atlas Township would like to add a new warning siren. They are also trying to bring the community together to plan hazard mitigation actions and educate the citizens on what to do when a hazard occurs.

In order to improve and expand upon existing community policies and programs to accomplish hazard mitigation, Atlas Township would like to provide training to improve preparedness of citizens by hosting a "What Would We do in a Major Disaster?" Event with the Village of Goodrich and local schools.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from Atlas Township showed that the citizens are moderately concerned to extremely concerned about the possibility of their community being impacted by a disaster. In the past five years, Atlas Township residents say they have been most affected by floods and tornadoes in the area. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, Atlas Township residents responded with:

- Upgrade sirens
- More wells to fill tankers
- Better emergency warning system and response systems

City of Burton

2010 Population: 29,999 (down 1% from 2000). (U.S. Census Bureau, Data Driven Detroit)

The City of Burton is a continuing participant of the updated plan.

NFIP Participant

Hazard Priorities:

Hazard
Inclement Weather
Snow and Ice Storms
Tornadoes
Public Health Emergencies
Infrastructure Failure
Structure Fires
Hazardous Material Incidents (Transportation)
Extreme Temperatures
Civil Disturbance
Subsidence (Sinkholes)
Hazardous Material Incidents (Fixed Sites)
Scrap Tire Fires
Riverine Flooding
Major Transportation Accidents
Oil or Natural Gas Well Accidents
Drought

Prioritized Hazard Mitigation Strategies:

Continuing with our proactive evaluations and training to meet any new criteria, standards, and methodologies. Seek grant funding to assist us with accelerating our ditching program to better expedite on-going drainage improvements; replacement of water and sewer infrastructure that has exceeded service life; accelerating demolitions of blighted structures and cleanup of vacant lots; and implementing the Citizen Emergency Response Training (CERT) and emergency personnel preparedness plans.

The City of Burton does not have any dams, but it does have 244 potential structures in the floodplain, six repetitive loss structures, and 58 flood insurance policies. There has been past flooding in the City of Burton. There are eight mobile home parks. The City of Burton has five warning sirens, six “302” sites, and contains a hazardous transport route. The City of Burton has identified community shelters in case of an emergency.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from the City of Burton showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster. In the past five years, City of Burton residents say they have been most affected by flooding, high winds, heat outages, tornadoes, severe storms, pandemic influenza, and the economy. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, City of Burton residents responded with:

- A plan for what the public should do in case of an emergency - where to get safe supplies, etc. Increase efforts to encourage individuals and families to have personal emergency preparedness plans.
- Increase ability to handle large amounts of snow and other precipitation
- Tear down abandoned homes
- Better public awareness
- Training for City and County employees outside of the scope of their daily duties
- Educate the public on emergencies and working together
- Identify people in the community who may have skills to help in different situations
- More collaboration
- Better and more accurate weather forecasts

City of Clio

2010 Population: 2,646 (up 6.6% from 2000). (U.S. Census Bureau, Data Driven Detroit)

The City of Clio is a continuing participant of the updated plan.

NFIP Participant

Hazard Priorities:

Hazard
Inclement Weather
Tornadoes
Public Health Emergencies
Hazardous Material Incidents (Transportation)
Snow and Ice Storms
Infrastructure Failure
Structure Fires
Extreme Temperatures
Oil or Natural Gas Well Accidents
Major Transportation Accidents

Prioritized Hazard Mitigation Strategies:

As of January 13, 2014, this information has not been submitted to staff.

The City of Clio does not have any dams or flood insurance policies, but it does have two potential structures in the flood plain. The City of Clio has four mobile home parks. There is one warning siren. There are no "302" sites but the City of Clio is located near a hazardous materials transport route. The City of Clio has identified community shelters in case of an emergency.

Since the previous plan, the City of Clio has put policies and programs in place to mitigate hazards; the fire authority updated the Emergency Response Plan and the Clio Area Local Emergency Operations Plan.

The City could consider including a chapter on Hazard Mitigation in its Master Plan, or other plans. It could also consider some new construction projects.

In order to improve and expand upon existing community policies and programs to accomplish hazard mitigation, the City of Clio would like to raise hazard awareness of citizens and to provide additional hazard safety education.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from the City of Clio showed that the citizens are split between not concerned, moderately concerned, and extremely concerned about the possibility of their community being impacted by a disaster. In the past five years, City of Clio residents say they have been most affected by severe storms, tornadoes, and power outages. When asked for their opinion on steps that

could be taken to reduce or eliminate the risk of future hazard damages in the community, City of Clio residents responded with:

- Better backup for main electric sub-station failure
- Better cleanup of roads after snow and ice storms

City of Davison

2010 Population: 5,173 (down 6.6% from 2000). (U.S. Census Bureau, Data Driven Detroit)
The City of Davison is a continuing participant of the updated plan.
NFIP Participant
Hazard Priorities:

Hazard
Tornadoes
Snow and Ice Storms
Inclement Weather
Hazardous Material Incidents (Transportation)
Extreme Temperatures
Civil Disturbance
Public Health Emergencies
Riverine Flooding
Infrastructure Failure
Major Transportation Accidents
Hazardous Material Incidents (Fixed Sites)
Structure Fires

Prioritized Hazard Mitigation Strategies:
To build an emergency shelter for citizens to use during tornadoes, snowstorms, flooding and/or rail accidents.

The City of Davison does not have any dams, but it does have 25 potential structures in the floodplain and four flood insurance policies. There are two mobile home parks. The City of Davison has one warning siren, one "30" site, and is located near a hazardous materials transport route. The City of Davison has identified community shelters in case of an emergency.

Since the previous plan, the City of Davison has put policies and projects in place to mitigate hazards; they have been reviewed as a municipality by the State for operations and preparation and received a high ranking. They added a fire station that covers the entire City. The City of Davison officials feel that the City is very well-prepared. There are intra-local agreements between three police departments to help share information and services between the Crash Department, Accident Investigation, and Detective Services.

The City of Davison is willing to incorporate Hazard Mitigation planning techniques into future community plans.

In order to improve and expand upon existing community policies and programs to accomplish hazard mitigation, the City of Davison would like to continue and expand cooperation and communication with other local municipalities and the school district.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from the City of Davison showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster. In the past five years, City of Davison residents say they have been affected by hazards in their area. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, City of Davison residents responded with:

- Have a place that is designated for people to go in case of an emergency, such as a shelter and have it known by all
- Planning

City of Fenton
2010 Population: 11,756 (up 11.1% from 2000). (U.S. Census Bureau, Data Driven Detroit)
The City of Fenton is a continuing participant of the updated plan.
NFIP Participant
Hazard Priorities:

Hazard
Tornadoes
Inclement Weather
Snow and Ice Storms
Fires/Public Health Emergencies
Infrastructure Failure
Extreme Temperatures
Hazardous Material Incidents (Transportation)

Prioritized Hazard Mitigation Strategies:
Continue to maintain and improve our severe weather notification system; continuous improvements to our Emergency Operations Support Plan; Training for our Police and Fire departments in Hazardous Materials; maintain/replace/upgrade our infrastructure.

The City of Fenton has one dam, 6 potential structures in the floodplain, and 39 flood insurance policies. There is one mobile home park. The City of Fenton has five warning sirens, six "302" sites, and is located along a hazardous materials transport route. The City of Fenton has identified community shelters in case of an emergency.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from the City of Fenton showed that the citizens are not concerned about the possibility of their community being impacted by a disaster. In the past five years, City of Fenton residents say they have been most affected by severe wind storms, tornadoes, floods, and power outages. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, City of Fenton residents responded with:

- Warnings of severe weather provided as early as possible
- Make alerts more specific so that they are taken more seriously
- Better disseminate hazardous traffic reports
- Fix infrastructure
- Concerted coordination between all local, state, and federal responders

City of Flint

2010 Population: 102,434 (down 18% from 2000). (U.S. Census Bureau, Data Driven Detroit)

The City of Flint is a continuing participant of the updated plan.

NFIP Participant

Hazard Priorities:

Hazard
Snow and Ice Storms
Tornadoes
Inclement Weather
Public Health Emergencies
Civil Disturbance
Hazardous Material Incidents (Transportation)
Infrastructure Failure
Structure Fires
Major Transportation Accidents
Riverine Flooding
Hazardous Material Incidents (Fixed Site)
Extreme Temperatures
Dam Failure
Terrorism
Scrap Tire Fires
Subsidence (Sinkholes)
Oil or Natural Gas Well Accidents
Wildfires

Prioritized Hazard Mitigation Strategies:

As of January 13, 2014, this information has not been submitted to staff.

The City of Flint has four dams, 433 potential structures in the floodplain, one repetitive loss structure, 100 flood insurance policies, and past flooding. There are 13 mobile home parks in the City of Flint. There are 17 warning sirens, 19 “302” sites, and it contains hazardous material transport routes. The City of Flint has identified community shelters in case of an emergency.

Since the previous plan, the City of Flint has not put additional policies or projects in place to mitigate hazards. The City of Flint would like to identify critical facilities and have the critical facilities’ hazard plans on file.

In order to improve and expand upon existing community policies and programs to accomplish hazard mitigation, the City of Flint would like to update the items that are already in place and provide education to citizens. The City would like to educate business owners and watch-groups through training.

The City of Flint is willing to incorporate Hazard Mitigation planning techniques into future community plans.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from the City of Flint showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster.

In the past five years, City of Flint residents say they have been most affected by flooding, fallen trees, power outages, snow, tornadoes, wind storms, pollution, fires, killings, robberies, violence, the economy, hail, and water backup. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, City of Flint residents responded with:

- Preparedness for inclement weather (for heat waves, have places for cooling stations; for tornadoes, have working early warning systems; etc.) and having and implementing plans for failing infrastructure (such as dam failure) will help to mitigate risk
- Better communication between weather warning systems- satellite fails, radios not participating, and slow computers
- More police officers
- Consistent shoveling of snow/salting roads in the winter
- Tear down abandoned structures
- Keep drainage sewers free of debris and roots
- Allocate funding for infrastructure development and repair- electrical, sewer, roads, bridges, etc.
- Address the level of violent crime
- Educate the public and encourage them to prepare
- Form a CERT
- Increase communication and cooperation between Genesee County Emergency Management and citizens groups
- Make community aware of potential hazards
- Be aware of potential disasters and have the necessary plan to respond
- Robust collaboration in community preparedness planning followed up with training and exercises for businesses, communities, large organizations, etc
- River project involving the elimination of the Hamilton Dam
- Community partnerships that aim to prevent and reduce
- Shelter for the homeless
- Better control of the drains and river that cause flooding
- Neighborhood watch groups
- Increase law enforcement
- Emergency Preparedness Planning for areas with major transportation egress (i.e. air, train, and highway)
- Government needs to make sure that safeguards are in place and upgraded
- Practice responses to potential natural disasters

- More roadway preparation if inclement weather is anticipated; proper road care in the case of snow and ice (such as salting road), proper public awareness of safe driving habits while driving in ice and snow.
- Preventative maintenance to infrastructure
- Blight elimination- residential and commercial
- Consolidation of 911 and EM response systems. More unified overall cooperation between police, fire, and county government organizations
- Continue to maintain/increase the collaborative community emergency preparedness planning activities and exercises that leverage individual organizations' strengths and resources to be better prepared to response collectively to a major community-wide disaster
- Support efforts to improve Flint River monitoring during potential pre-flood conditions, especially for communities downstream of the Hollowing and Hamilton Dams
- Support and collectively maintain a county hazmat response team
- Greater preparedness and educational synergy between local governments, agencies, and community stakeholders
- Effective communication and enhanced community supports

City of Flushing
2010 Population: 8,389 (up 0.5% from 2000). (U.S. Census Bureau, Data Driven Detroit)
The City of Flushing is a continuing participant of the updated plan.
NFIP Participant
Hazard Priorities:

Hazard
Snow and Ice Storms
Tornadoes
Inclement Weather
Riverine Flooding
Structure Fires
Public Health Emergencies
Hazardous Material Incidents (Transportation)
Dam Failure
Civil Disturbance

Prioritized Hazard Mitigation Strategies:
As of January 13, 2014, this information has not been submitted to staff.

The City of Flushing does not have any dams, but it does have 60 potential structures in the floodplain and 10 flood insurance policies. There is one mobile home park. There is one warning siren and the City is located near hazardous materials transport routes, and there is one "302" site. The City of Flushing has identified community shelters in case of an emergency.

The City of Flushing is willing to incorporate Hazard Mitigation planning techniques into future community plans and would like to include it in the next Master Plan. The City of Flint would like to identify critical facilities and have the critical facilities' hazard plans on file.

In order to improve and expand upon existing community policies and programs to accomplish hazard mitigation, the City of Flushing would like to add a link on the City's website to FEMA's website so that citizens can easily become informed; the City would like to educate the community on possible hazards and prevention.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from the City of Flushing showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster. In the past five years, City of Flushing residents say they have been most affected by flooding. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, City of Flushing residents responded with:

- Hamilton Street Dam remediation
- Publicize the plans that the City and County have for Flushing
- Improve monitoring and notification has already helped, so continue to improve upon it.

- Have a county website for official up-to-date important warning/hazard information

City of Grand Blanc

2010 Population: 8,276 (up 0.4% from 2000). (U.S. Census Bureau, Data Driven Detroit)

The City of Grand Blanc is a continuing participant of the updated plan.

NFIP Participant

Hazard Priorities:

Hazard
Tornadoes
Snow and Ice Storms
Inclement Weather
Riverine Flooding
Infrastructure Failure
Drought
Civil Disturbance
Extreme Temperatures
Major Transportation Accidents
Structure Fires
Hazardous Material Incidents (Transportation)
Terrorism

Prioritized Hazard Mitigation Strategies:

Drainage improvements—continue to improve storm water drainage in the city and maintain city services at a level that allows for proper mitigation service delivery.

The City of Grand Blanc does not have any dams, but it does have 87 potential structures in the flood plain, three repetitive loss structures, 38 flood insurance policies, and has had flooding in the past. There are no mobile home parks in the City of Grand Blanc. There are three warning sirens that cover the city, two "302" sites, and the City is located along a hazardous materials transport route. The City of Grand Blanc has identified community shelters available during emergency situations.

Since the previous plan, the City of Grand Blanc has put emergency preparedness and response policies in place.

The City of Grand Blanc is willing to incorporate Hazard Mitigation planning techniques into future community plans.

In order to improve and expand upon existing community policies and programs to accomplish hazard mitigation, the City of Grand Blanc would like to improve communication between local departments in regard to hazard planning.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from the City of Grand Blanc showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster. In the past five years, City of Grand Blanc residents say they have been most affected by flooding and tornadoes. When asked for

their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, City of Grand Blanc residents responded with:

- County-wide flood mitigation
- Open communication between the various departments and provide support when needed
- Community education on preparedness and reaction
- Early warning system for tornadoes with appropriate shelter information given to communities

City of Linden

2010 Population: 3,991 (up 39.5% from 2000). (U.S. Census Bureau, Data Driven Detroit)

The City of Linden is a continuing participant of the updated plan.

NFIP Participant

Hazard Priorities:

Hazard
Tornadoes
Inclement Weather
Snow and Ice Storms
Hazardous Material Incidents (Transportation)
Riverine Flooding
Structure Fires
Major Transportation Accidents

Prioritized Hazard Mitigation Strategies:

As of January 13, 2014, this information has not been submitted to staff.

Mitigation Projects:

1. Project: Stand-alone generator for City Hall
   Project Description: The City of Linden's Police, Fire, and Department of Public Works are housed at the City Hall. Currently, if the power goes out in the city, the City Hall building loses power as well. This prevents emergency sirens from being turned on and emergency personnel would not be able to operate. City Hall is designated as an Incident Command Post; however, with a loss in power, this would not be possible.
   Proposed timeframe for implementation: 1-5 years.
   Budget: $30,000.00

The City of Linden has one dam, 3 potential structures in the flood plain, and three flood insurance policies. There are no mobile home parks. There is one warning siren, one "302" site, and it is located near a hazardous material transport route. The City of Linden has identified community shelters in case of an emergency.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from the City of Linden showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster. In the past five years, City of Linden residents say they have been most affected by tornadoes. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, City of Linden residents responded with:

- Conduct more area table top exercises dealing with hazards that could impact the community in order to expose needs and weaknesses so that the community can be better prepared

Implemented: the City of Linden has recently conducted an area table top exercise dealing with a tornado that could have gone through the area. It was considered very helpful as it exposed needs and weaknesses. They have begun more planning with the City Manager and other department heads to be better prepared.

City of Montrose
2010 Population: 1,657 (up 2.3% from 2000). (U.S. Census Bureau, Data Driven Detroit)
The City of Montrose is a continuing participant of the updated plan.
NFIP Participant
Hazard Priorities:

Hazard
Snow and Ice Storms
Inclement Weather
Transportation Accidents
Tornadoes
Hazardous Material Incidents (Transportation)

Prioritized Hazard Mitigation Strategies:
Have all county drains cleaned to prevent flooding; have all railroad ties removed from ditches or either side of the railroad tracks to prevent flooding. The City is currently working with the Huron & Eastern Railroad to mitigate drainage issues along the tracks & cleanup of debris which has allowed standing water in certain areas. Perhaps we could conduct a mock disaster drill with other members of Genesee County, simulating a train derailment would help to be better prepared in the event of a derailment.

The City of Montrose has no dams, potential structures in the floodplain, or flood insurance policies. There are no mobile home parks. There is one warning siren and the City of Montrose is located near a hazardous material transport route, but there are no "302" sites.

Since the previous plan, the City of Montrose has installed a warning siren.

The City of Montrose is willing to incorporate Hazard Mitigation planning techniques into future community plans.

The City of Montrose is most concerned about a train-related incident, as active train tracks run through the downtown. The City would like to hold a mock disaster to show residents how to respond to a disaster created by a train derailment. They would also like to improve drainage next to the train tracks to prevent the tracks from flooding.

In order to improve and expand upon existing community policies and programs to accomplish hazard mitigation, the City of Montrose would like to add more detail to their Master Plan and zoning ordinances.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from the City of Montrose showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster. In the past five years, City of Montrose residents say they have been most affected by a 36 hour power outage, wind damage, and tornadoes. When asked for their opinion on steps that could be taken to reduce

or eliminate the risk of future hazard damages in the community, City of Montrose residents responded with:

- Railroad maintenance

City of Mount Morris
2010 Population: 3,086 (down 3.4% from 2000). (U.S. Census Bureau, Data Driven Detroit)
The City of Mount Morris is a continuing participant of the updated plan.
NFIP Participant
Hazard Priorities:

Hazard
Inclement Weather
Hazardous Material Incidents (Transportation)
Tornadoes
Structure Fires
Inclement Weather
Snow and Ice Storms
Major Transportation Accidents
Hazardous Material Incidents (Fixed Site)

Prioritized Hazard Mitigation Strategies:
Write a plan to address our hazard priorities.

The City of Mount Morris has no dams, no potential structures in the floodplain, or flood insurance policies. There are no mobile home parks. There is one warning siren and the City of Mount Morris is located along a hazardous material transport route, but there are no "302" sites. The City of Mount Morris has identified community shelters in case of an emergency.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from the City of Mount Morris showed that the citizens are extremely concerned about the possibility of their community being impacted by a disaster. In the past five years, City of Mount Morris residents say they have been most affected by strong winds, thunderstorms, flooding, and downed trees and wires. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, City of Mount Morris residents responded with:

- Create an Emergency Action Plan

City of Swartz Creek
2010 Population: 5,758 (up 12.9% from 2000). (U.S. Census Bureau, Data Driven Detroit)
The City of Swartz Creek is a continuing participant of the updated plan.
NFIP Participant
Hazard Priorities:

Hazard
Snow and Ice Storms
Inclement Weather
Tornadoes
Riverine Flooding
Civil Disturbance
Hazardous Material Incidents (Transportation)
Public Health Emergencies
Hazardous Material Incidents (Fixed Site)
Terrorism
Nuclear Attack
Subsidence (Sinkholes)

Prioritized Hazard Mitigation Strategies:
Stabilize areas in flood areas and redo flood plain map with new elevations set.

The City of Swartz Creek does not have any dams, but it does have 204 potential structures in the floodplain and 28 flood insurance policies. There are three mobile home parks. The City of Swartz Creek has six warning sirens, one "302" site, and is located along a hazardous material transport route. The City of Swartz Creek has identified community shelters in case of an emergency.

Since the previous plan, the City of Swartz Creek has put policies and programs in place to mitigate hazards; they hold ongoing trainings, have put a strong drainage system in place to prevent future flooding, and maintained their warning sirens.

The City of Swartz Creek is willing to incorporate Hazard Mitigation planning techniques into future community plans.

The City of Swartz Creek would like to disconnect the drainage system from the sewer system which would keep storm water out of the sewer system and prevent overflows.

In order to improve and expand upon existing community policies and programs to accomplish hazard mitigation, the City of Swartz Creek would like to increase public education and distribute information. The City would like to work on prevention and mitigation of flooding, specifically. The City plans to continue to work with the County to make infrastructure improvements.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from the City of Swartz Creek showed that the citizens are moderately concerned to extremely concerned about the possibility of their community being impacted by a disaster. In the past five years, City of Swartz Creek residents say they have been most affected by flooding and a poor sewer system. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, City of Swartz Creek residents responded with:

- Tree trimming
- Education
- Early warning systems
- Preparation
- Fix the sewer system

Clayton Charter Township
2010 Population: 7,581(up 0.5% from 2000). (U.S. Census Bureau, Northwest Michigan Council of Governments) Clayton Charter Township is a continuing participant of the updated plan.
NFIP Participant
Hazard Priorities:

Hazard
Inclement Weather
Riverine Flooding
Snow and Ice Storms
Tornadoes
Terrorism
Hazardous Material Incidents (Transportation)
Nuclear Attack

Prioritized Hazard Mitigation Strategies:
Reduce buildings in flood plain, redo existing flood plain maps, and work with the County on two main drains that run through the Township – Mistygay and Cole Creek – to reduce flooding.

Clayton Township does not have any dams, but it does have 104 potential structures in the floodplain and ten flood insurance policies. There is one mobile home park in the township. Clayton Township has two warning sirens, two "302" sites, and is located near a hazardous material transport route. Clayton Township has identified community shelters in case of an emergency.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from Clayton Charter Township showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster. In the past five years, Clayton Township residents say they have been most affected by flooding. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, Clayton Township residents responded with:

- Effective emergency pre-planning and transportation safety enforcement
- Have a plan for evacuating seniors and people with disabilities and their service animals
- Reduce buildings in the floodplains and relocate buildings with repetitive damage
- For each category of hazard mitigation (prevention, property protection, public education and awareness, natural resources protection, emergency services protection, structural projects) identify an organization that can logically be assigned to lead the effort to implement a specific action

Davison Township

2010 Population: 19,575 (up 10.5% from 2000). (U.S. Census Bureau, Northwest Michigan Council of Governments) Davison Township is a continuing participant of the updated plan.

NFIP Participant

Hazard Priorities:

Hazard
Inclement Weather
Tornadoes
Hazardous Material Incidents (Transportation)
Snow and Ice Storms
Infrastructure Failure
Major Transportation Accidents
Structure Fires
Riverine Flooding
Extreme Temperatures
Public Health Emergencies
Hazardous Material Incidents (Fixed Site)
Civil Disturbance
Drought
Wildfires
Terrorism

Prioritized Hazard Mitigation Strategies:

As of January 13, 2014, this information has not been submitted to staff.

Mitigation Projects:

1. Project: Warning Sirens

   Project Description: The purchase and installation of three advance warning sirens within Davison Township. Proposed timeframe for implementation: 1-5 years. Map included.

   Budget: $60,000

Davison Township does not have any dams, but there are 76 potential structures in the floodplain, 15 flood insurance policies, and there has been flooding in the past. There are five mobile home parks. Davison Township does not have any warning sirens or any "302" sites but it contains a hazardous material transport route. Davison Township has identified community shelters in case of an emergency.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from Davison Township showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster. Below is how residents of Davison Township ranked the hazards for their own community, not Genesee County as a whole.

In the past five years, Davison Township residents say they have been most affected by flooding, tornadoes, high winds, winter storms, power outages, severe thunderstorms, road development, and drought.

When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, Davison Township residents responded with:

- Increased funding on the federal, state, and local levels for infrastructure improvements
- Training, awareness, and education
- Continue to improve public warning systems including awareness of all hazard radios, increased warning sirens.
- Continue to make fire protection a high priority
- Identify and maintain fire hydrants
- Assign emergency shelters
- Deal with abandoned buildings
- Hold community meetings with businesses and first responders to address pre-planning and dealing with major accidents

Fenton Charter Township
2010 Population: 15,552 (up 19.9% from 2000). (U.S. Census Bureau, Northwest Michigan Council of Governments) Fenton Charter Township is a continuing participant of the updated plan.
NFIP Participant
Hazard Priorities:

Hazard
Tornadoes
Inclement Weather
Snow and Ice Storms
Hazardous Material Incidents (Transportation)
Major Transportation Accidents
Extreme Temperatures
Infrastructure Failure
Terrorism
Subsidence (Sinkholes)

Prioritized Hazard Mitigation Strategies:
Emergency siren upgrades, road ditching program, culvert replacements, and a generator installation.

Fenton Township has four dams, 147 potential structures in the floodplain, and 39 flood insurance policies. There are four mobile home parks. Fenton Township has two warning sirens, contains a hazardous material transport route and has one "302" site. The Township has access to community shelters during an emergency situation.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from Fenton Charter Township showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster. In the past five years, Fenton Charter Township residents say they have been most affected by tornadoes. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, Fenton Charter Township residents responded with:

- Bring back the County Hazmat team. Organize and utilize CERT teams
- Improve road conditions
- Work on safety training with people who transport or store hazardous materials
- Training and education

Flint Charter Township

2010 Population: 31,929 (down 5.2% from 2000). (U.S. Census Bureau, Northwest Michigan Council of Governments) Flint Charter Township is a continuing participant of the updated plan.

NFIP Participant

Hazard Priorities:

Hazard
Inclement Weather
Tornadoes
Snow and Ice Storms
Riverine Flooding
Structure Fires
Public Health Emergencies
Infrastructure Failure
Civil Disturbance
Extreme Temperatures
Major Transportation Accidents
Hazardous Material Incidents (Transportation)
Terrorism
Subsidence (Sinkholes)

Prioritized Hazard Mitigation Strategies:

As of January 13, 2014, this information has not been submitted to staff.

Flint Township does not have any dams, but it does have 92 potential structures in the floodplain, five repetitive loss structures, 42 flood insurance policies, and has had flooding in the past. There are five mobile home parks. Flint Township has 11 warning sirens, seven "302" sites, and contains hazardous material transport routes. The Township has access to community shelters during emergency situations.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from Flint Charter Township showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster. In the past five years, Flint Charter Township residents say they have been most affected by tornadoes, flooding, fires, downed trees, severe rain, power outages, and the downturn of the economy. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, Flint Charter Township residents responded with:

- Community preparedness with specific plans, supplies on hand, and quick responses from governmental agencies for acts of nature
- Improve infrastructure/drainage system
- Increase police presence in outlying communities to stop the flow of crime
- Dig out ditches to hold more water and help prevent flooding
- Arson prevention

- Community outreach
- Trim trees
- Health and safety preventative measures
- Improve snow and ice removal
- Education and prevention
- Clean and maintain storm drains

Flushing Charter Township

2010 Population: 10,640 (up 4% from 2000). (U.S. Census Bureau, Northwest Michigan Council of Governments) Flushing Charter Township is a continuing participant of the updated plan.
NFIP Participant
Hazard Priorities:

Hazard
Inclement Weather
Snow and Ice Storms
Tornadoes
Public Health Emergencies
Riverine Flooding
Hazardous Material Incidents (Transportation)
Dam Failure
Wildfires
Scrap Tire Fires
Structure Fires
Hazardous Material Incidents (Fixed Site)
Major Transportation Accidents
Drought
Subsidence (Sinkholes)

Prioritized Hazard Mitigation Strategies:
Install emergency/tornado sirens; install guard rails, or other recommended side controls, on the trestle bridge located between Mt. Morris Road and Frances Road to prevent a derailment; obtain educational information on the Buckeye Pipeline in case of a pipeline disaster.

Mitigation Projects:

1.Project: Tornado Sirens
Project Description: Install tornado warning sirens in the Charter Township of Flushing.
Proposed timeframe of implementation: 1-5 years.
Budget: $10,000-$30,000.

2.Project: Dredge Brent Creek and Cole Creek
Project Description: Dredge creeks to prevent the flooding of roads caused by heavy rainfall. Proposed timeframe for implementation: 1-5 years.
Budget: $10,000-$30,000

3.Project: Back-up Generator
Project Description: Install a back-up generator in the Township Hall. Proposed timeframe for implementation: 1-5 years.
Budget: $80,000

Flushing Township has three dams, 22 potential structures in the floodplain, one repetitive loss structure, and 10 flood insurance policies. There are two mobile home parks. Flushing

Township does not have any warning sirens, but it does have two “302” sites and is located near a hazardous material transport route. The Township has access to community shelters during an emergency situation.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from Flushing Charter Township showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster. In the past five years, Flushing Charter Township residents say they have been affected by hazards. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, Flushing Charter Township residents responded with:

- Emergency Management training and training staff to eliminate potential risks at worksites before they become an emergency
- More hospitals and health care providers
- Annual and regulated inspections

Forest Township

2010 Population: 4,702 (down 0.8% from 2000). (U.S. Census Bureau, Northwest Michigan Council of Governments) Forest Township is a continuing participant of the updated plan.

NFIP Participant

Hazard Priorities:

Hazard
Inclement Weather
Structure Fires
Snow and Ice Storms
Terrorism
Dam Failure
Civil Disturbance
Tornadoes

Prioritized Hazard Mitigation Strategies:

Establish shelter sites within Forest Township, update Emergency Action Plan with Otisville Village, establish plans/relationships with neighboring communities, investigate the placement and funding of more sirens within the Township, and obtain generators for shelter sites and siren site.

Forest Township has one dam, but no flood insurance policies. Forest Township's floodplains have not been mapped. There is one mobile home park in the Township, located in the Village of Otisville. Forest Township has a warning siren located in the Village of Otisville and it is located near a hazardous material transport route. There are no "302" sites. Forest Township has access to community shelters during emergency situations.

Since the previous plan, Forest Township has put policies and programs in place to mitigate hazards. The Township is in the process of updating their Hazard Mitigation Plan and they are looking into policies for warming shelters.

Forest Township is willing to incorporate Hazard Mitigation planning techniques into future community plans.

Forest Township would like to put back-up generators in the Fire Hall and Township Hall to be used during emergencies.

In order to improve and expand upon existing community policies and programs to accomplish hazard mitigation, Forest Township would need more funding. The Township is very willing to make improvements and will do so when funds allow.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from Forest Township showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster. In the past five years, Forest Township residents say they have not been severely impacted by any disasters. When asked for their

opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, Forest Township residents responded with:

- Rebuilding the older infrastructure
- Work on response to hazards

Gaines Township
2010 Population: 6,820 (up 5.1% from 2000). (U.S. Census Bureau, Northwest Michigan Council of Governments) Gaines Township is a continuing participant of the updated plan.
NFIP Participant
Hazard Priorities:

Hazard
Inclement Weather
Tornadoes
Snow and Ice Storms
Public Health Emergencies

Prioritized Hazard Mitigation Strategies:
Get better drainage and map our floodplains.

Gaines Township does not have any dams, but it does have 59 potential structures in the floodplain and 27 flood insurance policies. There is one mobile home park. Gaines Township has two warning sirens and parts of the Township are covered by sirens located in neighboring communities. There are no "302" sites but Gaines Township is located near a hazardous material transport route. There are community shelters in case of an emergency.

Since the previous plan, Gaines Township has installed warning sirens.

Gaines Township is willing to incorporate Hazard Mitigation planning techniques into future community plans.

In order to improve and expand upon existing community policies and programs to accomplish hazard mitigation, Gaines Township would like to work with other communities and organizations to share services and information when possible.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from Gaines Township showed that the citizens are not concerned about the possibility of their community being impacted by a disaster. In the past five years, Gaines Township residents say they have been affected by a disaster. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, Gaines Township residents responded with:

- Communication centers in each area and meeting points when no communication is available by television or telephone.

Genesee Charter Township

2010 Population: 21,581 (down 10.5% from 2000). (U.S. Census Bureau, Northwest Michigan Council of Governments) Genesee Charter Township is a continuing participant of the updated plan.

NFIP Participant

Hazard Priorities:

Hazard
Inclement Weather
Snow and Ice Storms
Dam Failure
Tornadoes
Extreme Temperatures
Public Health Emergencies
Civil Disturbance
Drought
Infrastructure Failure
Terrorism
Wildfires
Riverine Flooding
Oil or Natural Gas Well Incidents
Major Transportation Accidents
Structure Fires
Hazardous Material Incidents (Transportation)

Prioritized Hazard Mitigation Strategies:

Map flood plains, move structures out of the flood plain, mitigate property acquisition and structure demolition, put overhead electric underground for pump stations #1 and #4, and also add stand-alone generators to cut the cost of labor and pumper trucks.

Genesee Township has three dams, 9 potential structures in the floodplain, one repetitive loss structure, four flood insurance policies, and has had flooding in the past. There are eight mobile home parks. Genesee Township has two sirens and parts of the Township are covered by sirens in neighboring communities. There are five “302” sites and it contains a hazardous material transport route. Genesee Township has identified a community shelter in case of emergencies.

Since the previous plan, Genesee Township has not put any additional policies or programs in place to mitigate hazards.

Genesee Township is willing to incorporate Hazard Mitigation planning techniques into future community plans.

Genesee Township would like to make Hazard Mitigation a priority in the Master Plan.

In order to improve and expand upon existing community policies and programs to accomplish hazard mitigation, Genesee Township would like to provide general training and emergency preparedness response training.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from Genesee Charter Township showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster. Below is how residents of Genesee Charter Township ranked the hazards for their own community, not Genesee County as a whole.

In the past five years, Genesee Charter Township residents say they have been most affected by flooding and high winds. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, Genesee Charter Township residents responded with:

- Bury all electrical power lines underground
- Preparedness training

Grand Blanc Charter Township

2010 Population: 37,508 (up 25.8% from 2000). (U.S. Census Bureau, Northwest Michigan Council of Governments) Grand Blanc Charter Township is a continuing participant of the updated plan.

NFIP Participant

Hazard Priorities:

Hazard
Tornadoes
Snow and Ice Storms
Inclement Weather
Extreme Temperatures
Public Health Emergencies
Structure Fires
Major Transportation Accidents
Civil Disturbance
Drought
Riverine Flooding
Hazardous Material Incidents (Fixed Site)
Structure Fires
Infrastructure Failure
Dam Failure
Hazardous Material Incidents (Transportation)
Oil or Natural Gas Well Accidents
Terrorism
Earthquakes
Nuclear Power Plant Accidents
Subsidence (Sinkholes)

Prioritized Hazard Mitigation Strategies:

Our community's prioritized hazard mitigation strategies are adding at least one (1) weather siren and construction of a safe room at the Township Government Center.

Grand Blanc Township has one dam, 108 potential structures in the floodplain, and 36 flood insurance policies. There are six mobile home parks. Grand Blanc Township has six warning sirens and parts of the community are covered by sirens located in neighboring communities. The Township has six "302" sites and contains hazardous material transport routes. There are community shelters identified in case of an emergency.

Since the previous plan, Grand Blanc Township has put policies and programs in place to mitigate hazards. The Township has made drainage improvements as well as added and updated warning sirens.

In order to improve and expand upon existing community policies and programs to accomplish hazard mitigation, Grand Blanc Township would like to coordinate efforts with first responders, other local units, the County, and the State.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from Grand Blanc Charter Township showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster. In the past five years, Grand Blanc Charter Township residents say they have been most affected by flooding, thunderstorms, and tornadoes. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, Grand Blanc Charter Township residents responded with:

- Education and workshops for schools and the public
- Regulate and monitor businesses who transport/store/dispose of hazardous wastes to minimize the risk of exposure to surrounding neighborhoods in the event of an accident.
- Ensure all emergency alert systems are well-maintained and upgraded when more advanced equipment becomes available
- Have a disaster response team identified to respond if there was a natural or man-made disaster, including policies/procedures on what individual and agencies roles would be, how communication occurs to the appropriate state and federal agencies, and how medical emergencies would be handled if there were a large number of individuals requiring urgent care
- Underground power lines
- Communication plans for the public
- Early warning systems
- Adequate infrastructure
- Support the fire department

Montrose Charter Township
2010 Population: 6,224 (down 1.8% from 2000). (U.S. Census Bureau, Northwest Michigan Council of Governments) Montrose Charter Township is a continuing participant of the updated plan.
NFIP Participant
Hazard Priorities:

Hazard
Tornadoes
Snow and Ice Storms
Wildfires
Structure Fires
Public Health Emergencies
Major Transportation Accidents
Hazardous Material Incidents (Transportation)
Hazardous Material Incidents (Fixed Site)

Prioritized Hazard Mitigation Strategies:
As of January 13, 2014, this information has not been submitted to staff.

Montrose Township does not have any dams but it does have one flood insurance policy and three potential structures in the floodplain. There are three mobile home parks. Montrose Township has twelve warning sirens, one "302" site, and is located near a hazardous material transport route.

Since the previous plan, Montrose Township has put policies and programs in place to mitigate hazards. The Township coordinates with the Emergency Manager and has added sirens that they contract with the City of Montrose.

In order to improve and expand upon existing community policies and programs to accomplish hazard mitigation, Montrose Township would like to work with the City of Montrose to train first responders.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from Montrose Charter Township showed that the citizens are not concerned to moderately concerned about the possibility of their community being impacted by a disaster. In the past five years, Montrose Charter Township residents say they have not experienced any disasters. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, Montrose Charter Township residents responded with:

- Make sure there is a viable, practiced emergency plan in place for all contingencies

Mount Morris Township

2010 Population: 21,501 (down 9.4% from 2000). (U.S. Census Bureau, Northwest Michigan Council of Governments) Mount Morris Township is a continuing participant of the updated plan.

NFIP Participant

Hazard Priorities:

Hazard
Snow and Ice Storms
Tornadoes
Inclement Weather
Infrastructure Failure
Public Health Emergencies
Terrorism
Civil Disturbance
Structure Fires
Extreme Temperatures
Dam Failure
Hazardous Material Incidents (Transportation)
Major Transportation Accidents
Hazardous Material Incidents (Fixed Site)
Scrap Tire Fires
Drought
Nuclear Attack
Subsidence (Sinkholes)

Prioritized Hazard Mitigation Strategies:

Work to remove all the dead ash trees in our community in Sections 23, 24, 14, and 13.

Mount Morris Township does not have any dams, but it does have 29 potential structures in the floodplain and five flood insurance policies; it has also had flooding in the past. There are three mobile home parks. Mount Morris Township has four warning sirens and contains hazardous material transport routes, and it has two "302" sites. There is access to a community shelter during emergency situations.

Since the previous plan, Mount Morris Township has not put any new policies or programs in place to mitigate hazards.

Mount Morris Township is willing to incorporate Hazard Mitigation planning techniques into future community plans.

Mount Morris Township would like to have mock disasters and trainings held County-wide and include required procedures.

In order to improve and expand upon existing community policies and programs to accomplish hazard mitigation, Mount Morris Township would like better coordination throughout the County. They would like to have more training activities, but would need a lot more money.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from Mount Morris Township showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster. Below is how residents of Mount Morris Township ranked the hazards for their own community, not Genesee County as a whole.

In the past five years, Mount Morris Township residents say they have been most affected by thunderstorms, wind storms, tornadoes, hail, and snow and ice. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, Mount Morris Township residents responded with:

- Additional training
- Increase emergency response
- Bury telephone and electric wires

Mundy Township

2010 Population: 15,082 (up 23.7% from 2000). (U.S. Census Bureau, Northwest Michigan Council of Governments) Mundy Township is a continuing participant of the updated plan.

NFIP Participant

Hazard Priorities:

Hazard
Tornadoes
Snow and Ice Storms
Inclement Weather
Public Health Emergencies
Extreme Temperatures
Hazardous Material Incidents (Transportation)
Major Transportation Accidents
Riverine Flooding
Structure Fires
Civil Disturbance
Terrorism
Infrastructure Failure
Drought
Nuclear Attack
Subsidence (Sinkholes)
Dam Failure
Oil and Natural Gas Well Accidents
Wildfires
Scrap Tire Fires
Earthquakes

Prioritized Hazard Mitigation Strategies:

Mundy Township monitors activity in the flood plain with digital mapping of flood plains. Mundy Township also adheres to the requirements of the Michigan Building Code for construction in flood plains, as well as the requirements of the Michigan Department of Environmental Quality.

Mundy Township has one dam, 19 potential structures in the floodplain, and 13 flood insurance policies. There is one mobile home park. Mundy Township has four warning sirens, two "302" sites, and contains hazardous material transport routes. There is access to a community shelter during emergency situations.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from Mundy Township showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster. In the past five years, Mundy Township residents say they have been most affected by tornadoes, flooding, heavy rains, high winds, structure fires, vehicle accidents, and hazardous materials. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, Mundy Township residents responded with:

- An emergency plan at the community level that provides for food, shelter, and clothing for those in need, in case of a natural disaster
- Planning, preparation, education, awareness, and training
- Upkeep of infrastructure
- Better public safety
- Communities need to work together for the good of the entire county
- Immunize children to prevent public health emergencies
- Regular training for responders as well as more police presence in public places where there are large numbers of people such as schools, sporting events, and concerts
- Communicate current plans to the public and open forum discussions on possible improvements and costs, etc.
- Deliberate, effective planning with well-coordinated emergency response teams
- Encourage individual households to create and practice plans

Richfield Township

2010 Population: 8,730 (up 6.9% from 2000). (U.S. Census Bureau, Northwest Michigan Council of Governments) Richfield Township is a continuing participant of the updated plan.

NFIP Participant

Hazard Priorities:

Hazard
Tornadoes
Inclement Weather
Snow and Ice Storms
Hazardous Material Incidents (Transportation)
Dam Failure
Extreme Temperatures
Public Health Emergencies
Terrorism
Subsidence (Sinkholes)

Prioritized Hazard Mitigation Strategies:

As of January 13, 2014, this information has not been submitted to staff.

Richfield Township has one dam and five flood insurance policies. There are 54 structures in the floodplain. There are two mobile home parks. Richfield Township does not have any warning sirens, is near a hazardous material transport route, and has two "302" sites.

Since the previous plan, Richfield Township has not put any additional policies or programs in place to mitigate hazards.

Richfield Township is willing to incorporate Hazard Mitigation planning techniques into future community plans.

In order to improve and expand upon existing community policies and programs to accomplish hazard mitigation, Richfield Township would like to improve communication with first responders, educate the public, and hold more training activities.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from Richfield Township showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster. In the past five years, Richfield Township residents say they have been most affected by severe thunderstorms, hail, flooding, and tornadoes. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, Richfield Township residents responded with:

- Increased vigilance in trucking and rail inspections
- Expand pre-disaster steps for winter to go beyond preparation for snow removal efforts, salting/sanding roads, and emergency power backup

- Add a warning siren
- Hire more emergency personnel

Thetford Township

2010 Population: 7,049 (down 14.8% from 2000). (U.S. Census Bureau, Northwest Michigan Council of Governments) Thetford Township is a continuing participant of the updated plan.
NFIP Participant
Hazard Priorities:

Hazard
Tornadoes
Inclement Weather
Snow and Ice Storms
Public Health Emergencies
Oil or Natural Gas Well Accidents
Structure Fires
Hazardous Material Incidents (Transportation)
Major Transportation Accidents
Hazardous Material Incidents (Fixed Site)

Prioritized Hazard Mitigation Strategies:
As of January 13, 2014, this information has not been submitted to staff.

There are no dams but there is one flood insurance policy in Thetford Township. The floodplain has not been mapped. There is one mobile home park. Thetford Township has one warning siren, one "302" site, and is near a hazardous material transport route.

Since the previous plan, Thetford Township has put policies and programs in place to mitigate hazards. The Township is continually reviewing planning and training, and review what can be done to improve. The Township changed their policy so that the Senior Center would remain open, even when the school districts close, so that if there is a generator installed, it can be used as a warming station.

Thetford Township is willing to incorporate Hazard Mitigation planning techniques into future community plans.

Thetford Township would like to put a back-up generator in the Senior Center so that it can be used as a warming center.

In order to improve and expand upon existing community policies and programs to accomplish hazard mitigation, Thetford Township would like to coordinate efforts between municipalities.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from Thetford Township showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster. In the past five years, Thetford Township residents say they have been most affected by excessive strong winds, hail damage, and a tank explosion. When asked for their opinion on steps that could be taken to reduce or

eliminate the risk of future hazard damages in the community, Thetford Township residents responded with:

- Improve activation systems
- Fix infrastructure
- Hire more police officers and firemen

Vienna Township
2010 Population: 13,255 (up 1.1% from 2000). (U.S. Census Bureau, Data Driven Detroit)
Vienna Township is a continuing participant of the updated plan.
NFI Participant
Hazard Priorities:

Hazard
Tornadoes
Inclement Weather
Snow and Ice Storms
Major Transportation Accidents
Hazardous Material Incidents (Transportation)
Oil or Natural Gas Well Accidents
Structure Fires
Riverine Flooding
Infrastructure Failure
Public Health Emergencies
Extreme Temperatures
Drought
Terrorism

Prioritized Hazard Mitigation Strategies:
As of January 13, 2014, this information has not been submitted to staff.

Vienna Township has one dam, three potential structures in the floodplain, and one flood insurance policy. There are two mobile home parks. Vienna Township does not have any warning sirens, but parts of the Township are covered by sirens located in neighboring communities. There is one "302" site and the Township contains hazardous material transport routes. A community shelter has been identified in case of an emergency.

Staff sent out public input surveys as a way to include citizens in the plan update. The input from Vienna Township showed that the citizens are moderately concerned about the possibility of their community being impacted by a disaster.

In the past five years, Vienna Township residents say they have been most affected by hail, tornadoes, flooding, emerald ash borer damage, drought and crop losses, and severe storms. When asked for their opinion on steps that could be taken to reduce or eliminate the risk of future hazard damages in the community, Vienna Township residents responded with:

- Preparedness planning
- Proper maintenance of drains, sewers, and ditches
- Tornado shelters and more working warning sirens
- More accurate weather reporting for hazards with appropriate emergency personnel follow up
- Promotion of disaster preparedness supplies

Village of Gaines

2010 Population: 380 (up 3.8% from 2000). (U.S. Census Bureau, Data Driven Detroit)

The Village of Gaines is a continuing participant of the updated plan.

NFIP Participant

Hazard Priorities:

Hazard
Inclement Weather
Major Transportation Accidents
Terrorism
Structure Fires

Prioritized Hazard Mitigation Strategies:

Our hazards are basically acts of nature and we can deal with them if they happen. The only planning we can do is to have a Hazard Plan in place. We have a warning siren to alert us and a plan in place with the Gaines Township Fire Department and responders, along with our Police Department.

The Village of Gaines does not have any dams, potential structures in the floodplain, or flood insurance policies. There are no mobile home parks. The Village of Gaines has one warning siren and is located near a hazardous material transport route, but there are no "302" sites. There is access to a community shelter in case of emergency.

No public input was received from the Village of Gaines as of January 13, 2014.

Village of Goodrich
2010 Population: 1,860 (up by 37.5% from 2000). (U.S. Cenus Bureau, Data Driven Detroit)
The Village of Goodrich is a continuing participant of the updated plan.
NFIP Participant
Hazard Priorities:

Hazard
Inclement Weather
Dam Failure
Structure Fires
Hazardous Material Incidents (Transportation)
Snow and Ice Storms

Prioritized Hazard Mitigation Strategies:
Updating the Wheelock Drain and improve or replace the Mill Pond Dam.

The Village of Goodrich has one dam, 17 potential structures in the floodplain, and eight flood insurance policies. There are no mobile home parks. The Village of Goodrich has one warning siren. It is located near a hazardous material transport route. There is access to community shelters during emergency situations.

Since the previous plan, the Village of Goodrich has put policies and programs in place to mitigate hazards. The Village drained a portion of Mill Pond to be able to work on the dam. Stabilization improvements were put in place in order to slow deterioration of the dam and to prevent sinkholes that have been happening in recent years.

The Village of Goodrich is willing to incorporate Hazard Mitigation planning techniques into future community plans.

The Village of Goodrich would like to work on digging around the Mill Pond Dam to see if the damage is fixable.

In order to improve and expand upon existing community policies and programs to accomplish hazard mitigation, the Village of Goodrich would like to work on fixing the Mill Pond dam and eventually replace it completely.

No public input was received from the Village of Goodrich as of January 13, 2014.

Village of Lennon
2010 Population: 511 (down 1.2% from 2000). (U.S. Census Bureau, Data Driven Detroit)
The Village of Lennon is a continuing participant of the updated plan.
NFIP Participant
Hazard Priorities:

Hazard
Inclement Weather
Snow and Ice Storms
Tornadoes

Prioritized Hazard Mitigation Strategies:
Map existing storm drains and develop an Asset Management Plan; upgrade snow removal equipment.

The Village of Lennon does not have any dams, potential structures in the floodplain, or any flood insurance policies. There are no mobile home parks. There is one warning siren and the Village of Lennon is located near a hazardous material transport route.

No public input was received from the Village of Lennon as of January 13, 2014.

Village of Otisville

2010 Population: 864 (down 2% from 2000). (U.S. Census Bureau, Data Driven Detroit)

The Village of Otisville is a continuing participant of the updated plan.

NFIP Participant

Hazard Priorities:

Hazard
Tornadoes
Snow and Ice Storms
Inclement Weather
Structure Fires
Dam Failure
Civil Disturbance
Terrorism

Prioritized Hazard Mitigation Strategies:

Retro existing structures to have standby power. We are working with Forest Township on updating our Basic Disaster Plan.

The Village of Otisville has one dam, but no potential structures in the floodplain and no flood insurance policies. There is one mobile home park. The Village of Otisville has one warning siren. It is located near a hazardous materials transport route. There are community shelters identified in case of an emergency.

No public input was received from the Village of Otisville as of January 13, 2014.

Village of Otter Lake
2010 Population: Staff has been unable to find census data for the Village of Otter Lake.
The Village of Otter Lake is a continuing participant of the updated plan.
NFIP
Hazard Priorities:
As of January 13, 2014, this information has not been submitted to staff.

Prioritized Hazard Mitigation Strategies:
As of January 13, 2014, this information has not been submitted to staff.

The Village of Otter Lake does not have any dams, potential structures in the floodplain, or flood insurance policies. There are no mobile home parks. The Village of Otter Lake does not have any warning sirens, but it is located near a hazardous material transport route.

No public input was received from the Village of Otter Lake as of January 13, 2014.

GENESEE COUNTY
HAZARDS SUMMARY

NOTE:
When reading the hazard rankings, please remember they are subjective. It is impossible to rate the likelihood of a hazard occurrence to an exact degree of accuracy. It is also important to remember that the local capability is a community rating, taking into account all facets of response and recovery, and is not limited solely to emergency response.

PART 2. GENESEE COUNTY HAZARDS SUMMARY

Hazard Assessment

Hazard assessment is a process that incorporates historical data, social factors, geographic and climatic factors, population data and public perception to determine a community's vulnerability to specific hazards. Each community must determine which hazards they consider to be a risk. The Emergency Management Division of the Michigan State Police has developed a summary of known hazards, which is found in the Michigan Hazard Analysis document. Staff used this hazard summary as a starting point to identify the hazards that can affect Genesee County.

Meetings were held with the Genesee County Hazard Mitigation Advisory Committee to further the development of the Genesee County Hazard Mitigation Plan. A public meeting was held on June 27, 2013 in the Harris Auditorium of the Genesee County Administration Building. Staff presented an overview of the Hazard Mitigation Plan process to the public and provided information on the known hazards in Genesee County.

During the development of the previous plan, staff developed a hazard matrix that assessed the impact each hazard had on the community. These hazards were then prioritized based on the calculated level of impact. The hazard matrix for Genesee County used the following six variables:

1. Potential to Occur in Genesee County - Has this hazard ever occurred in the past, or could it happen in the future?
2. Frequency of Occurrence - How often has this hazard happened before?
3. Number of People Affected - How many residents have been affected by this hazard in the past, or could be affected by it in the future?
4. Economic Impact - What types of damage did this hazard cause? What was the associated cost in property and lives?
5. Deaths - How many lives were taken by the hazard in past incidents?
6. Ability of Genesee County to Mitigate the Hazard - What can Genesee County do to reduce the hazard's effects the next time it happens?

A scoring system had to be determined for the hazard matrix. Staff developed a system that was simple to fill out and that allowed easy factoring of each variable. Based on these criteria, staff developed the following scoring system:

1. Potential to Occur in Genesee County
   A ranking of 0-5 (5 = Great Potential, 0 = Little to No Potential)

2. Frequency of Occurrence

A ranking of 0-5 (5 = Frequent, 0 = Rare or not Applicable)

3. Number of People Affected
   A ranking of 0-5 (5 = Large Number, 0 = Few People)

4. Economic Impact
   A ranking of 0-5 (5 = Lots of Damage, 0 = Little Damage)

5. Deaths
   A ranking of 0-5 (5 = Large Number of Deaths, 0 = No Deaths)

6. Ability of Genesee County to Mitigate the Hazard
   A ranking of 0-5 (5 = Has Ability to Reduce or Mitigate Hazard,
   0 = No Ability to Reduce or Mitigate Hazard)

At the June 4, 2013 meeting of the Hazard Mitigation Advisory Committee, the committee members reviewed information regarding the frequency and costs associated with the identified Genesee County hazards. After discussing the information, they scored the hazards based on the six variables mentioned above. While the matrix required that the committee members enter scores in the range of 0 to 5, staff calculated the final ranking by factoring each of the variables according to its level of importance in determining the level of impact for each hazard. The following factors were used to calculate rank:

1. Potential to Occur in Genesee County
2. Frequency of Occurrence
3. Number of People Affected
4. Economic Impact
5. Deaths
6. Ability of Genesee County to Mitigate the Hazard

Hazards for Genesee County were selected for inclusion in this plan based upon records of historical occurrence, known risks, and guidance provided by the County Hazard Mitigation Review Committee and by the Michigan State Police Emergency Management and Homeland Security Division.

In order to rank the hazard from most severe threat to least threatening to the area, each of the hazards were assigned evaluation measures; a specific point value of multiplication of 1-6 based on each element's relative severity and negative impacts. The more severe the potential impact an event could have, the more points that hazard was assigned.

Each hazard evaluation measure was then assigned a "weight." The purpose of weighing the hazards was to stress measures that were deemed more important, and thus produce a more valid assessment of the relative significance of each hazard. When the point value of a

particular measure was multiplied by the weight, the measure received more emphasis (points) than measures that had not been assigned such a heavy weight.

The total hazard scores determined each hazard's ranking, with the highest scores for hazards posing the greatest threat to the most people in Genesee County. The ranking process is not intended to discount the threat of any particular hazard, for those hazards elaborated upon in this hazard mitigation plan all present significant elements of threat to Genesee County.

The final hazard rankings are as follows in **Table 2-1**.

Table 2-1. Hazard Rankings	Final Ranking
Inclement Weather (Tornadoes, Thunderstorms, Hail, Lightning & Severe Windstorms, Snowstorms)	1
Structure Fires	2
Riverine Flooding	3
Extreme Temperatures	4
Hazardous Material Incidents (Transportation)	4
Public Health Emergencies	5
Dam Failure	6
Tornadoes	7
Terrorism	7
Hazardous Material Incidents (Fixed Site)	8
Civil Disturbance	9
Infrastructure Failure	9
Oil or Natural Gas Well Accidents	10
Snow and Ice Storms	11
Transportation Accidents	12
Drought	13
Nuclear Attack	14
Scrap Tire Fires	15
Wildfires	16
Earthquakes	17
Nuclear Power Plant Accidents	18
Subsidence (Sinkholes)	19

Each hazard in the above list is defined and described in the following sections, according to its ranking. Recorded incidents, if available, are documented to give the reader a sense of how

often the hazard has occurred in Genesee County, and what the estimated costs were for the hazard. A vulnerability assessment has been developed for each of the top six hazards. In addition, suggested mitigation strategies for all the hazards are included.

Vulnerability Assessment

A vulnerability assessment provides a quantitative estimate of the persons and property in the county that are susceptible to each hazard. A basic method of determining vulnerability is to compare the susceptible area of the county with locations of population, infrastructure and structures to see what kind of overlap will result. The overlap between the area where the hazard may happen, and the affected people and property, is the vulnerable area. Urban and rural areas of the county that experience the same hazard may have different types of damage, and different costs may be assessed accordingly. Also, some hazards, such as snowstorms, may be experienced by the whole county at once. Other hazards, such as riverine flooding will be very localized, determined by the presence of a nearby waterway.

Vulnerability assessments provide information that measures the threats associated with each hazard. Measures would include data such as how many injuries occurred, how many buildings were flooded, how many crops were damaged, the cost of clean-up afterwards, and so on. The vulnerability assessments (based on past history) also give the county an idea of what it can reasonably expect to experience when another hazard of that type occurs. Since the vulnerability assessments give a monetary cost to the hazards, they can be used for cost-benefit comparisons. These comparisons are helpful in justifying the expense of mitigation projects, land use restrictions and other policy decisions. However, it is important to remember that the vulnerability assessments are based on a series of assumptions and estimates, and they should be used as a guide only. Actual hazard events may incur greater losses than what has been developed in the vulnerability assessments. Also, there may be additional costs associated with a hazard event that have not been included in the assessments, as the costs presented are not exhaustive. Vulnerability assessments were developed for each of the top six hazards in Genesee County.

Goals and Objectives

The mission of the Genesee County Hazard Mitigation Plan is to protect the health and safety of the public and to preserve its property by taking action to permanently eliminate or reduce the long-term risk to human life and property from natural and technological hazards. In order to accomplish this mission, goals and objectives were established. These goals and objectives were based on the community's hazard analysis, as well as, input from the public and local agencies.

Goals are general guidelines that explain what the community wants to achieve. They are usually long-term and represent global visions such as "to protect public health and safety." Objectives, on the other hand, define strategies on how to reach the identified goals.

Objectives tend to be more specific and address the details of who will do what and when in order to reach the goals. Communities need to identify clear goals and objectives, which can then be used as a guide for the plans and actions that will help meet the community's needs. The following goals and objectives were outlined at the Genesee County Hazard Mitigation Advisory Committee meeting held on August 16, 2004, during the development of the last plan. These goals and objectives are being reaffirmed for this plan update.

Goals:

1. Prevent loss of life
2. Improve response and recovery for man-made and natural disasters
3. Enhance early warning systems
4. Maintain essential public services
5. Enhance public awareness
6. Protect public health, welfare and safety
7. Reduce losses from man-made and natural disasters
8. Protect the environment
9. Provide resources for effective mitigation of hazardous materials incidents

Objectives:

1. Amend zoning to limit new development in flood plains
2. Enhance coordination between response agencies
3. Increase warning siren coverage and weather radio
4. Provide resources to ensure provision of essential services
5. Provide opportunity for public education
6. Provide additional storm shelters
7. Moving existing homes
8. Enhance early warning systems and education for all hazards
9. Enhance warning systems and notifications for special populations

Mitigation Strategies

The above goals and objectives can be met by various methods called mitigation strategies. Mitigation strategies reduce or eliminate the amount of harm that could be caused in the future by a hazard. There are five basic hazard mitigation approaches:

Approach #1 Modify the Hazard
This approach removes or eliminates the hazard, such as widening a stream to improve water flow and stop flooding.

Approach #2 Segregating the Hazard
This approach keeps the hazard away from people, such as building a floodwall to retain high water levels.

Approach #3 Preventing or Eliminating Development
This approach keeps people away from the hazard, by various land use planning and zoning techniques.

Approach #4 Altering Design or Construction
This approach provides engineering solutions for at-risk structures, such as elevating buildings above the flood level.

Approach #5 Early Warning and Public Education
This approach keeps the public informed of potential hazards, and makes sure that early warning/communication systems are available.

Suggested mitigation strategies are included in each hazard section.

While some of the previous Plan's mitigation activities were completed, others were deferred by the local governments because of cost. Due to changes in officials of the communities in charge of maintaining the Plan between updates, some information was not readily available.

Staff reviewed and collected data from NOAA and LARA as well as contacting other State and local agencies in order to attain the necessary information for the Plan Update.

Expansion of Existing Authorities, Policies, Programs, and Resources

The following information identifies existing programs, mitigation efforts and response efforts implemented within Genesee County communities, some since the last Hazard Mitigation Plan was developed. In addition, information about future project ideas and implementation are discussed. For existing authorities, policies, programs, and resources for individual communities, as well as how they can be expanded upon, please see the Community Profiles (beginning on Page 25). The goal of hazard mitigation is to reduce future impacts to property and residents, and lessen disruption to local services. Mitigation efforts should be ongoing in order to adapt to the needs of the communities and residents. In addition, efforts should include efficiencies in which residents can benefit during times of emergency.

National Flood Insurance Program (NFIP) – All 33 local units of government in Genesee County participate in the NFIP. Within the County, there are approximately 2,691 structures located in a flood hazard area. Currently, there are no communities that participate in the Community Rating System (CRS) which is a voluntary program that provides incentives and recognizes floodplain management activities that go beyond the minimum requirements of the NFIP. Over the next five years, communities who have experienced recent flooding may want to consider having CRS coordinator to act as the local contact and expert when a flooding event occurs. In addition jurisdictions should continue to consider changes to make insurance premiums lower.

Soil Erosion Management – The Genesee County Drain Commission, Division of Water and Waste Services is the responsible agency for issuing Soil Erosion and Sedimentation Control Permits.
Storm water Management – Genesee County Drain Commission, Surface Water Management Division maintains the drainage systems , as included under Act 40 Public Acts of 1956 (Drain Code). Within the County, there are over 1,400 established drainage districts.

Zoning Management – Communities within the County have locally adopted zoning ordinances. As communities update portions of their ordinances, they will be encouraged to consider hazard mitigation in the decisions they make regarding any zoning changes.

Master Planning – The majority of municipalities within Genesee County agreed to consider including Hazard Mitigation in their next Master Plan update, as well as incorporating Hazard Mitigation Planning into other important guiding documents.

Building Codes – Many of the Genesee County communities have adopted building codes that are enforced. The codes were developed based upon international and State of Michigan building codes. Mitigation activities, such as a continued emphasis on no development in flood prone areas, will continue to be a focus in the local communities.

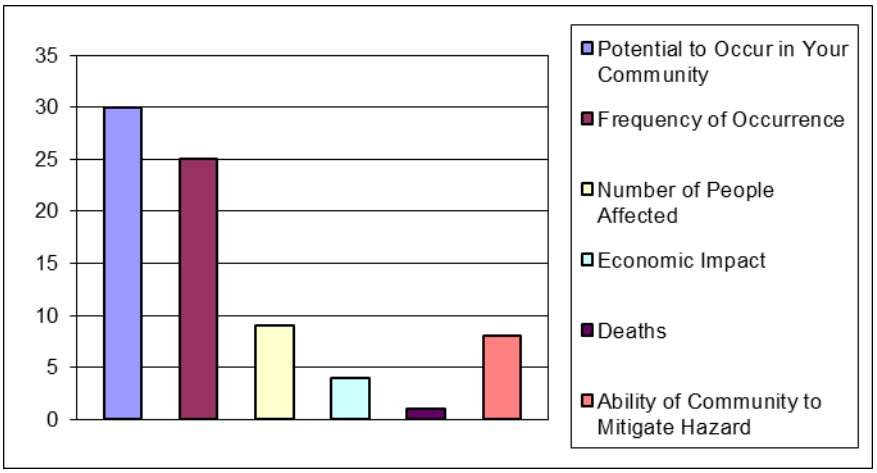
Reverse 911 System/Mass Notification System – Genesee County has recently upgraded to a Reverse 911 system which allows residents added security and information when an incident occurs. There are currently 23 telephone lines, which allow for thousands of residents to be contacted each hour during an event. Areas in which an incident might be isolated can be targeted to receive specific information.

In addition, exploration of a wireless mass notification process has also been discussed.

Mutual Aid Agreements – Genesee County fire departments throughout the county, and state, worked together to create and organize a system for locating needed equipment from other departments with only one call. This will assist during possible large scale emergencies to be better prepared and organized.

Additional Tornado Sirens – All local units of government hold responsibility for the warning sirens in their communities. In addition, maintenance of these systems is taken care of by each local unit.

#1 HAZARD: Inclement Weather



Inclement weather is ranked as the number one hazard, and the county is susceptible to this hazard all year long. Inclement weather includes a) tornadoes, b) thunderstorms, c) hail, d) lightning, e) severe winds, and f) snowstorms. These weather hazards are all combined under the "inclement weather" category because of their connectivity. For example, thunderstorms can produce lightning, severe winds, or hail, or can turn into tornadoes; snowstorms can also include severe winds.

a) Tornadoes

An intense rotating column of wind that extends from the base of a severe thunderstorm to the ground.

Hazard Description

Tornadoes in Michigan are most frequent in the spring and early summer when warm, moist air from the Gulf of Mexico collides with cold air from the Polar Regions to generate severe thunderstorms. These thunderstorms often produce the violently rotating columns of wind that are called tornadoes.

Michigan lies at the northeastern edge of the nation's primary tornado belt, which extends from Texas and Oklahoma through Missouri, Illinois, Indiana, and Ohio. Most of a tornado's destructive force is exerted by the powerful winds that knock down walls and lift roofs from buildings in the storm's path. The violently rotating winds then carry debris that can be blown through the air, becoming dangerous missiles.

A tornado may have winds up to 300 miles per hour and an interior air pressure that is 10-20% below that of the surrounding atmosphere. The typical length of a tornado path is approximately 16 miles, but tracks much longer than that – even up to 200 miles – have been reported. Tornado path widths are generally less than one-quarter mile wide.

Typically, tornadoes last only a few minutes on the ground, but those few minutes can result in tremendous damage and devastation. Historically, tornadoes have resulted in loss of life, with the mean national annual death toll being 144 persons. Property damage from tornadoes is in the hundreds of millions of dollars every year.

Tornado Intensity

Tornado intensity is measured on the Fujita Scale, which examines the damage caused by a tornado on homes, commercial buildings, and other man-made structures. See **Table 2-2** for the Fujita Tornado Scale. The Fujita Scale rates the intensity of a tornado based on damaged caused, not by its size. It is important to remember that the size of a tornado is not necessarily an indication of its intensity. Large tornadoes can be weak, and small tornadoes can be extremely strong, and vice versa. It is very difficult to judge the intensity and power of a tornado while it is occurring. Generally, that can only be done after the tornado has passed, using the Fujita Scale as the measuring stick. According to the National Weather Service (NWS), since 1950, the vast majority of tornadoes that occurred in the United States (approximately 74%) were classified as weak tornadoes (F0 or F1 intensity).

Table 2-2. Fujita Tornado Scale

Magnitude	Description	Wind Speeds
F0	Gale Tornado	42-72 m.p.h.
F1	Moderate Tornado	73-112 m.p.h.
F2	Significant Tornado	113-157 m.p.h.
F3	Severe Tornado	158-206 m.p.h.
F4	Devastating Tornado	207-260 m.p.h.
F5	Incredible Tornado	261-318 m.p.h.

Approximately 25% were classified as strong tornadoes (F2 or F3 intensity), and only 1% was classified as violent tornadoes (F4 or F5 intensity). Unfortunately, those violent tornadoes, while few in number, caused 67% of all tornado-related deaths nationally. Strong tornadoes accounted for another 29% of tornado-related deaths, while weak tornadoes caused only 4% of tornado-related deaths. If the data prior to 1950 is examined, the percentage of deaths attributable to violent tornadoes climbs drastically. That is largely due to the fact that tornado forecasting and awareness programs were not yet established. As a result, it was not uncommon for death tolls from a single tornado to reach several hundred.

Genesee County Perspective:

In a statewide comparison of all Michigan counties for the years 1950 through 1999, Genesee County led the tornado statistics with 34 tornadoes. The county with the next highest number was Lenawee County with 30 tornadoes. As of May 2013, the number of Genesee County incidents has increased; the county now has 46 recorded tornadoes. Using thirty years of recent tornado statistics (from 1983-2013) as a guide, Genesee County can expect to have 1.5 tornadoes in any given year. See **Table 2-3** for a detailed list of recorded incidents from 1953 to 2013. **Figure 2-1** is a map of tornadoes that have touched down in Genesee County.

Figure 2-2 shows the locations of early warning sirens and one-mile buffer zones around the sirens. The buffer zones represent the estimated hearing range for the sirens. The county currently has 88 installed early warning sirens. Working off of siren ranges, approximately 68% of the population, or approximately 289,537 people, are covered by a siren, leaving 32% of the population, or 136,253 people outside the estimated range of early warning sirens.

- On June 8, 1953, the eighth largest tornado in history, an F5, with winds exceeding 300 mph, and a path almost a half-mile wide, occurred in Beecher, just north of Flint. It became known as the "Beecher Tornado", the deadliest tornado in Michigan history, and one of the top ten deadliest tornadoes in U.S. history. The tornado killed 116 people and injured 785 more. The Beecher Tornado was categorized as an F5 on the Fujita Scale.

- A few years later, on May 12, 1956, the second strongest tornado in Genesee County since 1950 resulted in 3 deaths and 116 injuries. This tornado was classified as an F4. It moved three miles east of Flint to three miles northwest of Atlas Township, destroying over 100 homes.

- Two July 2, 1997, tornadoes were part of an outbreak of 13 tornadoes in southeast Lower Michigan, the largest number for a single day since records have been kept. These tornadoes caused over $4,000,000 in damages. Some of these were classified as F3, and some were classified as F1.

- On June 8, 2003, a tornado touched down in Camp Copneconic in Fenton and produced extensive tree damage. The tornado headed northeast to Grand Blanc Township and destroyed several garages and front porches. Other homes reported damaged roofs, lost shingles, and damaged siding. The Michigan Room on one home was destroyed, and several other homes sustained damage due to fallen trees. This tornado was classified as an F1. Oddly enough, while this tornado was making its way across the southern part of the county, commemoration ceremonies to mark the 50th anniversary of the deadly "Beecher Tornado" were going on just north of Flint.

- On August 24, 2007, a large tornado hit the City of Fenton, causing extensive damage to trees, businesses, and homes. The amount of damage totaled $13 million (NOAA)

- On October 19, 2007, a tornado hit Thetford Center, causing $100,000 in property damages.

- In May of 2013 six tornadoes were reported in northern and southern Genesee County with primary damage occurring in the Mount Morris and Genesee Township areas as well as Atlas Township. Many trees were damaged as well as the complete destruction of some homes and businesses.

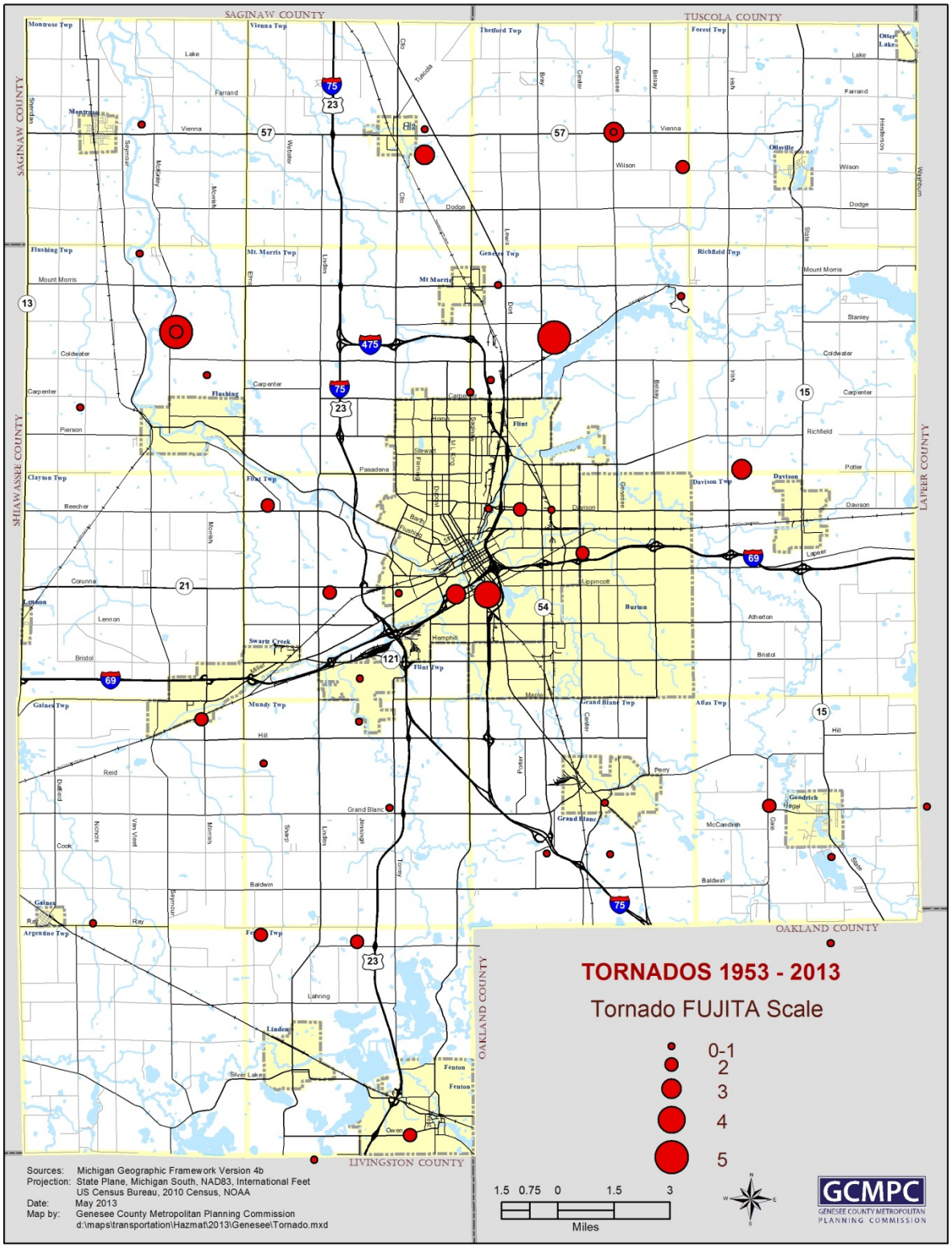

SAGINAW COUNTY
TUSCOLA COUNTY
SHIAWASSEE COUNTY
LAPEER COUNTY
OAKLAND COUNTY
LIVINGSTON COUNTY
TORNADOS 1953 - 2013
Tornado FUJITA Scale
0-1
2
3
4
5
1.5 0.75 0 1.5 3
Miles
Sources: Michigan Geographic Framework Version 4b
Projection: State Plane, Michigan South, NAD83, International Feet
US Census Bureau, 2010 Census, NOAA
Date: May 2013
Map by: Genesee County Metropolitan Planning Commission
d:\maps\transportation\Hazmat\2013\Genesee\Tornado.mxd
GCMPC
GENESEE COUNTY METROPOLITAN PLANNING COMMISSION

Figure 2-1

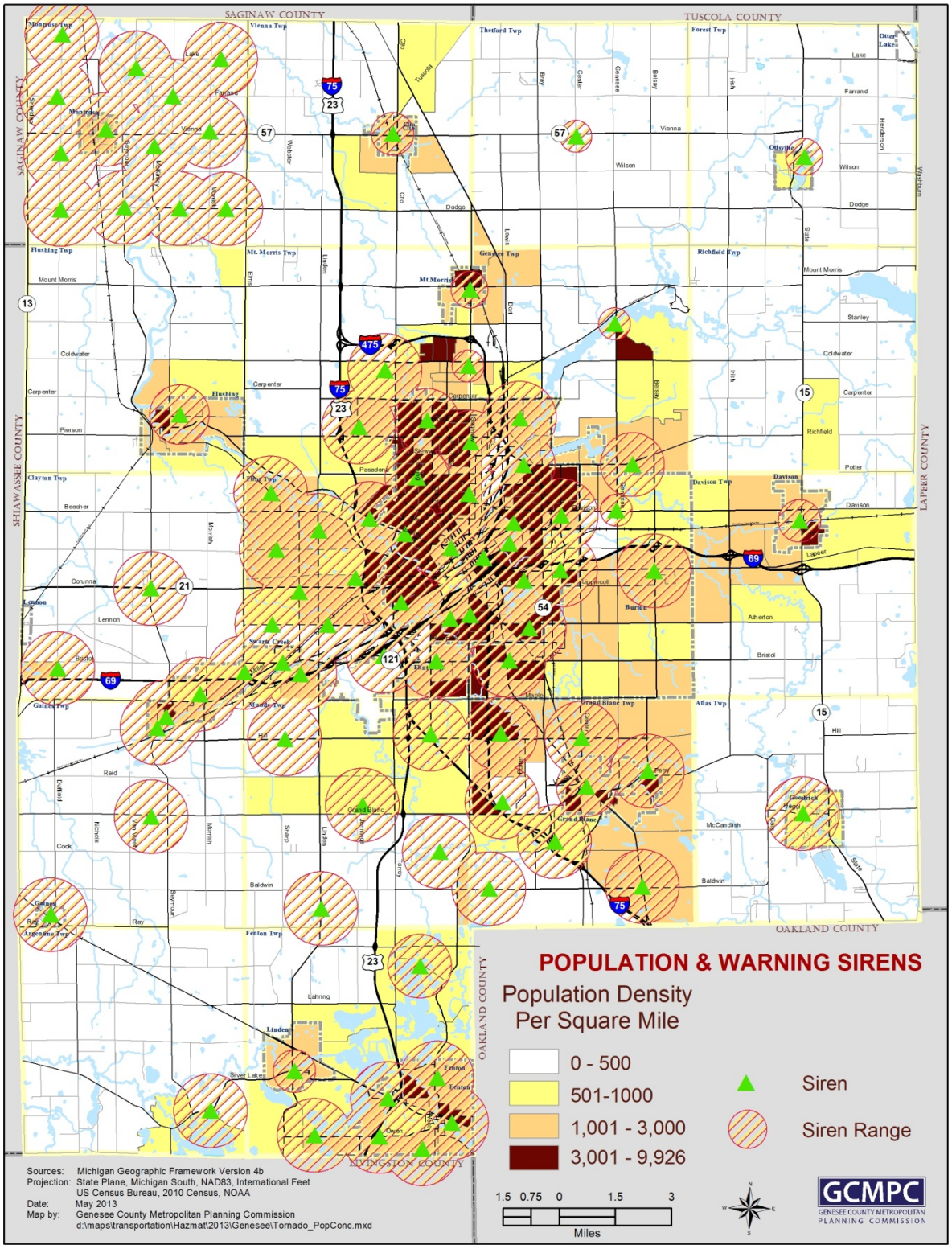

SAGINAW COUNTY
TUSCOLA COUNTY
SHIAWASSEE COUNTY
LAPEER COUNTY
OAKLAND COUNTY
GENESEE COUNTY
LIVINGSTON COUNTY
POPULATION & WARNING SIRENS
Population Density
Per Square Mile
0 - 500
501-1000
1,001 - 3,000
3,001 - 9,926
Siren
Siren Range
1.5 0.75 0 1.5 3
Miles
Sources: Michigan Geographic Framework Version 4b
Projection: State Plane, Michigan South, NAD83, International Feet
US Census Bureau, 2010 Census, NOAA
Date: May 2013
Map by: Genesee County Metropolitan Planning Commission
d:\maps\transportation\Hazmat\2013\Genesee\Tornado_PopConc.mxd
GCMPC
GENESEE COUNTY METROPOLITAN PLANNING COMMISSION

Figure 2-2

Table 2-3. Genesee County Tornadoes (1953-2013)					
Location	**Date**	**Magnitude**	**Deaths**	**Injuries**	**Property Damage**
Genesee Co.	6/8/1953	F5	116	785	$ 25,000,000
Genesee Co.	6/8/1953	F5	0	0	$ 25,000,000
Genesee Co.	4/7/1954	F2	0	2	$ 25,000
Genesee Co.	8/24/1954	F2	0	0	$ -
Genesee Co.	5/12/1956	F4	3	116	$ 2,500,000
Genesee Co.	6/11/1968	F0	0	0	$ -
Genesee Co.	6/2/1971	F1	0	0	$ 250,000
Genesee Co.	8/10/1971	F2	0	1	$ 250,000
Genesee Co.	6/3/1973	F0	0	1	$ 3,000
Genesee Co.	6/3/1973	F0	0	0	$ -
Genesee Co.	7/14/1974	F3	0	0	$ 250,000
Genesee Co.	9/17/1974	F2	0	0	$ 25,000
Genesee Co.	7/4/1977	F1	0	1	$ 250,000
Genesee Co.	9/17/1977	F2	0	1	$ 250,000
Genesee Co.	6/26/1983	F1	0	0	$ 250,000
Genesee Co.	8/8/1984	F2	0	0	$ 2,500,000
Genesee Co.	8/8/1984	F3	0	0	$ 250,000
Genesee Co.	8/8/1984	F1	0	0	$ 25,000
Genesee Co.	8/30/1984	F0	0	0	$ 250,000
Genesee Co.	7/25/1986	F1	0	1	$ 25,000
Genesee Co.	8/26/1986	F0	0	0	$ -
Genesee Co.	9/29/1986	F2	0	0	$ 250,000
Genesee Co.	9/29/1986	F1	0	0	$ 3,000
Genesee Co.	7/18/1990	F0	0	0	$ -
Genesee Co.	7/18/1990	F1	0	0	$ 3,000
Genesee Co.	10/4/1990	F2	0	1	$ 2,500,000
Flint	6/7/1996	F0	0	0	$ -
Clio	6/21/1997	F0	0	0	$ -
Montrose	7/2/1997	F1	0	0	$ -
Montrose	7/2/1997	F1	0	0	$ -
Clio	7/2/1997	F3	0	0	$ 600,000
Clio	7/2/1997	F3	1	1	$ 3,800,000
Flushing	5/31/1998	F0	0	0	$ 10,000
Fenton	5/21/2001	F0	0	0	$ 10,000
Goodrich	5/21/2001	F0	0	0	$ 5,000
Fenton	6/8/2003	F1	0	0	$ 300,000
Montrose	5/23/2004	F0	0	0	$ -
Mount Morris	5/23/2004	F0	0	0	$ -

Fenton	8/24/2007	F2	0	1	$ 13,000,000
Thetford	10/19/2007	F0	0	0	$ 100,000
Fenton Township	5/28/2013	F2	0	0	$ 225,000
Goodrich	5/28/2013	F2			
Atlas Township	5/28/2013	F2			
Gaines Township	5/28/2013	EFO	0	0	$ 10,000
Mount Morris Township	5/28/2013	EF1	0	0	$ 100,000
Genesee Co.	5/2013				
Grand Blanc	5/28/2013	EF2	0	0	$ 350,000
Total Damage					**$ 78,369,000**

Vulnerability Assessment:

Costs associated with tornadoes include deaths, injuries, loss of infrastructure, damage to property, temporary housing, use of emergency personnel and clean-up afterwards. For the thirty-year period from 1983 to 2013, Genesee County had 33 tornado events, giving the county an average of 1.5 tornadoes per year. Available damage costs for past tornadoes in Genesee County were used to calculate the average cost of a tornado, along with identified population density characteristics. See the Vulnerability Chart below.

Breakdown of Costs for Genesee County Tornadoes				
Population Density Categories (per square mile)	**Average Number of Tornadoes Per Year**	**Average Amount of Damage**	**Percentage of County Land in each Population Density Category**	**Estimated Annual Damage by Population Density Category**
Population Density 0-500	1.5	$ 751,439	70%	**$ 578,608**
Population Density 501-1,000	1.5	$ 509,640	13%	**$ 72,879**
Population Density 1,001-3,000	1.5	$ 839,265	13%	**$ 120,015**
Population Density 3,001-13,351	1.5	$ 5,217,736	4%	**$ 229,580**
Total Estimated Annual Damage for Genesee County Tornadoes:				**$ 1,001,082**

Mitigation Strategies for Tornadoes

The following strategies are suggested to minimize the effects of Genesee County tornadoes:

- Additional warning sirens for complete county coverage; repair of broken sirens
- Increased weather radio coverage
- Distribution of weather radios

- Emergency generators for police and fire departments, special-needs facilities, and facilities identified as community shelters during hazardous weather
- Shelters for mobile home communities
- Enhance public awareness on correct safety procedures during tornadoes
- Structural reinforcement for community "safe rooms"
- Stand-by power for water plants, pump stations, booster pumping stations
- Update Disaster Response Plan, if needed
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

New Mitigation Projects

Atlas Township	Project: Emergency warning sirens Project Description: Emergency warning sirens placed in various locations within Atlas Township to be audible by all residents in all sections. Township would like eight sirens. Proposed timeframe for implementation: 1-5 years. **Budget: Approximately $25,000.00 per siren**
City of Linden	Project: Stand-alone generator for City Hall Project Description: The City of Linden's Police, Fire, and Department of Public Works are housed at the City Hall. Currently, if the power goes out in the city, the City Hall building loses power as well. This prevents emergency sirens from being turned on and emergency personnel would not be able to operate. City Hall is designated as an Incident Command Post; however, with a loss in power, this would not be possible. Proposed timeframe for implementation: 1-5 years. **Budget: $30,000.00**
Davison Township	Project: Warning Sirens Project Description: The purchase and installation of three advance warning sirens within Davison Township. Proposed timeframe for implementation: 1-5 years. **Budget: $60,000**
Fenton Township	Project: Emergency Shelter Project Description: The project would involve renovations to the Township Hall basement to make it suitable as an emergency shelter for residents, including the addition of a back-up generator. **Budget: Unknown**

Flushing Township	Project: Back-up Generator Project Description: Install a back-up generator in the Township Hall. Proposed timeframe for implementation: 1-5 years. **Budget: $80,000**
Flushing Township	Project: Tornado Sirens Project Description: Install tornado warning sirens in the Charter Township of Flushing. Proposed timeframe of implementation: 1-5 years. **Budget: $10,000-$30,000**
Forest Township	Project: Warning Sirens Project Description: The purchase and installation of three warning sirens throughout Forest Township. **Budget: Unknown**
University of Michigan Flint	Project: Enhance First Street Residence Hall evacuation and sheltering Project Description: To include developing plans and specifications for construction of a storm shelter to house over 300 residents. Also develop a strategy that can be used to integrate plans for a shelter into any expansion of the residence hall. In addition, install two outdoor warning sirens to alert students/residents of severe weather. Following development of drawings for a shelter, construct a shelter to house residents. Proposed timeframe for implementation: 1-5 years. **Budget: $550,000** Project: Upgrading and improving the U of M Flint EOC and Department of Public Safety Project Description: Upgrading and providing improvements to the U of M Flint EOC. and Department of Public Safety operations. This includes moving the dispatch center and adding additional equipment to the center and EOC. Proposed timeframe for implementation: 1-5 years. **Budget: $500,000**

Mitigation Projects

Bendle Public Schools	The project includes two generators, emergency lighting, back-up air compressor, emergency radios, portable lighting and caution tape.

	Estimated project cost: $5,000-$8,000
Gaines Township	The project includes storm warning sirens. **Estimated project cost: $80,000**
Grand Blanc Township	The project includes three weather sirens. **Estimated project cost: $48,000**
Genesee County Emergency Management	The project includes tornado shelters for mobile home parks. **Estimated project cost: $16,000,000**
Genesee Intermediate School District	The project includes a portable diesel-powered generator to provide back-up power to three separate locations that serve special-need students, many with multiple impairments that prevent physical evacuation of the buildings. **Estimated project cost: $500,000**
Genesee Intermediate School District	The project includes structural reinforcement for the walls and roof of the gyms and multi-purpose rooms (open-space areas) at three separate locations that serve special-needs students, many with multiple impairments that prevent physical evacuation of the buildings. **Estimated project cost: not provided**

HAZARD: INCLEMENT WEATHER

b) Thunderstorms

Severe thunderstorms are weather systems accompanied by strong winds, lightning, heavy rain, and possibly hail and tornadoes.

Hazard Description

Inclement weather is ranked as the number one hazard in Genesee County, and thunderstorms are part of that weather picture. Severe thunderstorms can occur at any time in Michigan, although they are most frequent during the warm spring and summer months from May through September. The potential thunderstorm threat is often measured by the number of "thunderstorm days" – defined as days in which thunderstorms are observed. Michigan is, on

average, subject to 30-40 thunderstorm days per year. The National Weather Service (NWS) in Michigan has further refined that statewide average figure and found that the southern two tiers of countries of the Lower Peninsula (roughly the area south of Interstate 94) is subject to 40-60 thunderstorm days per year.

The Lower Peninsula, in general, is subject to approximately 40 thunderstorm days per year, while the Upper Peninsula average is closer to 30 thunderstorm days per year. Thunderstorms form when a shallow layer of warm, moist air is overrun by a deeper layer of cool, dry air. Cumulonimbus clouds, frequently called "thunderheads", are formed in these conditions. These clouds are often enormous (up to six miles or more across and 40,000 to 50,000 feet high) and may contain tremendous amounts of water and energy. That energy is often released in the form of high winds, excessive rains, lightning, and possibly hail and tornadoes. Thunderstorms are typically short-lived (often lasting no more than 30-40 minutes) and fast moving (30-50 miles per hour). Strong frontal systems, however, may spawn one squall line after another composed of many individual thunderstorm cells. Other sections in this document address specific thunderstorm-related hazards such as hail, lightning, and tornadoes.

Genesee County Perspective:

There were 136 recorded incidents of thunderstorms and high winds in the last decade in Genesee County. Based on those numbers, the county is likely to have approximately 14 thunderstorm/high wind events per year. The highest cost to date was estimated at $21,000,000. (Due to the wide area of impact that many weather hazards have, this cost may include damage estimates from surrounding areas.) See **Table 2-4** for a detailed list of recorded incidents during the last 14 years. On June 8, 2003, thunderstorms swept through Genesee County, some producing damaging winds and large hail. On August 3, 2004, a powerful thunderstorm knocked out power to about 11,000 Consumers Energy customers. In Burton and Flint, large tree branches brought down power lines. High winds were reported, with 69 M.P.H. wind gusts in Flint, and Clio reported ¾ "hail.

Table 2-4. Genesee County Thunderstorms and High Winds (1999-2012)

Location	Date	Type	kts	Miles/Hour	Injuries	Property Damage
Genesee Co.	1/17/1999	Thunderstorm	0	0	0	
Genesee Co.	4/6/1999	Wind	0	0	0	$15,000
Genesee Co.	5/6/1999	Wind	0	0	0	$92,000
Swartz Creek	5/17/1999	Thunderstorm Winds	52	60	0	
Fenton	6/9/1999	Thunderstorm Winds	56	64	0	
Atlas	6/9/1999	Thunderstorm Winds	60	69	0	$30,000
Otisville	7/23/1999	Thunderstorm Winds	52	60	0	$8,000
Flint	7/24/1999	Thunderstorm Winds	52	60	0	

Fenton	7/24/1999	Thunderstorm Winds	52	60	0	$3,000
Goodrich	7/31/1999	Thunderstorm Winds	65	75	0	$140,000
Genesee Co.	5/9/2000	Thunderstorm Winds	50	58	0	$2,000
Swartz Creek	6/1/2000	Thunderstorm Winds	50	58	0	$3,000
Fenton	6/1/2000	Thunderstorm Winds	52	60	0	$6,000
Clio	6/14/2000	Thunderstorm Winds	50	58	0	$3,000
Fenton	7/14/2000	Thunderstorm Winds	52	60	0	
Gaines	7/14/2000	Thunderstorm Winds	69	79	0	$40,000
Burton	8/22/2000	Thunderstorm Winds	52	60	0	$5,000
Flint	9/11/2000	Thunderstorm Winds	50	58	1	$12,000
Flint	4/23/2001	Thunderstorm Winds	53	61	0	
Linden	6/15/2001	Thunderstorm Winds	50	58	0	$1,000
Flint	8/28/2001	Thunderstorm Winds	60	69	0	$25,000
Montrose	9/8/2001	Thunderstorm Winds	50	58	0	
Linden	9/9/2001	Thunderstorm Winds	50	58	0	
Genesee Co.	10/16/2001	High Wind	40	46	0	
Genesee Co.	2/1/2002	High Wind	40	46	1	$30,000
Genesee Co.	3/9/2002	High Wind	61	70	2	$780,000
Flushing	4/19/2002	Thunderstorm Winds	50	58	0	
Flushing	5/31/2002	Thunderstorm Winds	61	70	0	$100,000
Otisville	6/22/2002	Thunderstorm Winds	50	58	0	
Linden	5/5/2003	Thunderstorm Winds	70	81	0	$5,000
Grand Blanc	5/5/2003	Thunderstorm Winds	65	75	0	
Burton	5/5/2003	Thunderstorm Winds	61	70	0	
Flint	6/8/2003	Thunderstorm Winds	52	60	0	
Flint	6/8/2003	Thunderstorm Winds	64	74	0	
Davison	6/8/2003	Thunderstorm Winds	52	60	0	
Linden	7/4/2003	Thunderstorm Winds	55	63	0	
Linden	7/4/2003	Thunderstorm Winds	50	58	0	
Flint	7/4/2003	Thunderstorm Winds	54	62	0	
Mt. Morris	7/6/2003	Thunderstorm Winds	50	58	0	
Mt. Morris	7/6/2003	Thunderstorm Winds	52	60	0	
Mt. Morris	8/1/2003	Thunderstorm Winds	52	60	0	
Flint	8/21/2003	Thunderstorm Winds	52	60	0	
Otisville	8/21/2003	Thunderstorm Winds	56	64	0	
Grand Blanc	8/21/2003	Thunderstorm Winds	54	62	0	
Genesee Co.	11/12/2003	High Wind	76	87	0	$21,000,000
Lennon	6/5/2005	Thunderstorm Winds	52	60	0	
Flint	6/5/2005	Thunderstorm Winds	52	60	0	
Mount Morris	6/5/2005	Thunderstorm Winds	60	69	0	$20,000
Swartz Creek	6/5/2005	Thunderstorm Winds	56	64	0	
Mount Morris	6/5/2005	Thunderstorm Winds	54	62	0	$10,000
Flint	7/18/2005	Thunderstorm Winds	54	62	0	
Flint	7/18/2005	Thunderstorm Winds	52	60	0	
Burton	7/18/2005	Thunderstorm Winds	56	64	0	
Burton	9/22/2005	Thunderstorm Winds	51	59	0	
Linden	9/22/2005	Thunderstorm Winds	50	58	0	
Swartz Creek	2/16/2006	Thunderstorm Winds	60	69	0	
Burton	2/16/2006	Thunderstorm Winds	50	58	0	
Flint	4/12/2006	Thunderstorm Winds	60	69	0	$20,000

Goodrich	5/25/2006	Thunderstorm Winds	52	60	0	
Flushing	7/17/2006	Thunderstorm Winds	56	64	0	
Mount Morris	7/17/2006	Thunderstorm Winds	55	63	0	
Flint	7/17/2006	Thunderstorm Winds	53	61	0	
Linden	7/27/2006	Thunderstorm Winds	52	60	0	
Flushing	7/30/2006	Thunderstorm Winds	55	63	0	
Mount Morris	7/30/2006	Thunderstorm Winds	52	60	0	
Swartz Creek	7/30/2006	Thunderstorm Winds	52	60	0	
Argentine	8/1/2006	Thunderstorm Winds	50	58	0	
Flushing	8/2/2006	Thunderstorm Winds	56	64	0	
Grand Blanc	8/2/2006	Thunderstorm Winds	54	62	0	
Davison	8/2/2006	Thunderstorm Winds	52	60	0	
Mount Morris	9/23/2006	Thunderstorm Winds	52	60	0	
Genesee County	4/16/2007	Severe Winds	47	54	0	$20,000
Grand Blanc	5/15/2007	Thunderstorm Winds	54	62	0	
Grand Blanc	5/15/2007	Thunderstorm Winds	56	64	0	$50,000
Flint	5/15/2007	Thunderstorm Winds	56	64	0	
Montrose	6/2/2007	Thunderstorm Winds	52	60	0	$3,000
Flushing	6/2/2007	Thunderstorm Winds	52	60	0	
Montrose	6/27/2007	Thunderstorm Winds	55	63	0	$3,000
Swartz Creek	6/27/2007	Thunderstorm Winds	56	64	0	
Lennon	6/27/2007	Thunderstorm Winds	55	63	0	
Flint	7/5/2007	Thunderstorm Winds	56	64	0	
Flint	7/5/2007	Thunderstorm Winds	61	70	0	$20,000
Burton	7/5/2007	Thunderstorm Winds	56	64	0	$4,000
Burton	7/5/2007	Thunderstorm Winds	52	60	0	
Flint	7/5/2007	Thunderstorm Winds	56	64	0	$1,500
Grand Blanc	7/5/2007	Thunderstorm Winds	54	62	0	$3,000
Flushing	7/10/2007	Thunderstorm Winds	52	60	0	$3,000
Clio	7/10/2007	Thunderstorm Winds	52	60	0	
Mount Morris	7/10/2007	Thunderstorm Winds	52	60	0	$2,000
Otisville	7/10/2007	Thunderstorm Winds	52	60	0	
Flushing	7/18/2007	Thunderstorm Winds	52	60	0	
Swartz Creek	7/18/2007	Thunderstorm Winds	56	64	0	
Flushing	7/18/2007	Thunderstorm Winds	52	60	0	
Flint	7/18/2007	Thunderstorm Winds	55	63	0	
Flint	8/22/2007	Thunderstorm Winds	52	60	0	
Linden	8/22/2007	Thunderstorm Winds	56	64	0	
Fenton	8/22/2007	Thunderstorm Winds	56	64	0	
Clio	8/29/2007	Thunderstorm Winds	56	64	0	
Mount Morris	8/29/2007	Thunderstorm Winds	55	63	0	$1,000
Mount Morris	8/29/2007	Thunderstorm Winds	61	70	0	
Grand Blanc	8/29/2007	Thunderstorm Winds	54	62	0	
Flushing	9/25/2007	Thunderstorm Winds	70	81	0	$25,000
Mount Morris	9/25/2007	Thunderstorm Winds	52	60	0	
Flint	9/25/2007	Thunderstorm Winds	52	60	0	
Genesee	9/25/2007	Thunderstorm Winds	52	60	0	
Flushing	10/18/2007	Thunderstorm Winds	50	58	0	
Swartz Creek	10/18/2007	Thunderstorm Winds	56	64	0	
Linden	6/6/2008	Thunderstorm Winds	56	64	0	
Montrose	6/6/2008	Thunderstorm Winds	55	63	0	$2,000
Argentine	6/7/2008	Thunderstorm Winds	56	64	0	

Argentine	6/8/2008	Thunderstorm Winds	70	81	0	$250,000
Linden	6/8/2008	Thunderstorm Winds	61	70	0	$30,000
Bayport Park	6/8/2008	Thunderstorm Winds	61	70	0	$750,000
Burton	6/8/2008	Thunderstorm Winds	61	70	0	$600,000
Fenton	6/26/2008	Thunderstorm Winds	53	61	0	$5,000
Flint	7/16/2008	Thunderstorm Winds	52	60	0	$5,000
Genesee Duford Airport	7/16/2008	Thunderstorm Winds	54	62	0	
Beecher	8/23/2008	Thunderstorm Winds	52	60	0	$3,000
Grand Blanc	6/8/2009	Thunderstorm Winds	60		0	
Otisville Airport	6/25/2009	Thunderstorm Winds	55	69	0	$2,000
Goodrich	8/9/2009	Thunderstorm Winds	54	62	0	
Argentine	6/18/2010	Thunderstorm Winds	54	62	0	$5,000
Linden	6/18/2010	Thunderstorm Winds	50	58	0	
Flint	6/18/2010	Thunderstorm Winds	50	58	0	
Fenton	6/23/2010	Thunderstorm Winds	50	58	0	$1,000
Beecher	7/15/2010	Thunderstorm Winds	50	58	0	
Flushing	7/15/2010	Thunderstorm Winds	70	81	0	$15,000
Burton	7/15/2010	Thunderstorm Winds	56	64	0	
Argentine	7/15/2010	Thunderstorm Winds	54	62	0	
Lapeer Heights	7/15/2010	Thunderstorm Winds	62	71	0	
Davison	8/19/2010	Thunderstorm Winds	52	60	0	
Davison	8/19/2010	Thunderstorm Winds	55	63	0	$15,000
Davison	8/19/2010	Thunderstorm Winds	61	70	0	$5,000
Genesee County	9/7/2010	Severe Winds	39	45	0	$5,000
Bishop Airport	9/21/2010	Thunderstorm Winds	52	60	0	
Mount Morris	9/21/2010	Thunderstorm Winds	54	62	0	$3,000
Argentine	9/21/2010	Thunderstorm Winds	52	60	0	
Clio	9/21/2010	Thunderstorm Winds	52	60	1	
Argentine	5/29/2011	Thunderstorm Winds	58	67	0	$3,000
Linden	5/29/2011	Thunderstorm Winds	58	67	0	$5,000
Gaines	5/29/2011	Thunderstorm Winds	56	64	0	
Linden	5/29/2011	Thunderstorm Winds	56	64	0	
Flint	5/29/2011	Thunderstorm Winds	61	70	0	
Goodrich	5/29/2011	Thunderstorm Winds	54	62	0	
Davison	5/29/2011	Thunderstorm Winds	64	74	0	
Genesee County	6/9/2011	Thunderstorm Winds	63	72	0	$50,000
Genesee County	6/9/2011	Thunderstorm Winds	66	76	0	
Genesee County	6/22/2011	Thunderstorm Winds	61	70	0	$20,000
Genesee County	6/22/2011	Thunderstorm Winds	65	75	0	
Otisville	8/20/2011	Thunderstorm Winds	56	64	0	$5,000
Genesee County	10/15/2011	Severe Winds	39	45		$2,000
Bishop Airport	5/3/2012	Thunderstorm Winds	52	60	0	$2,000
Bishop Airport	5/3/2012	Thunderstorm Winds	52	60	0	$5,000
Flint	5/3/2012	Thunderstorm Winds	50	58	0	
Bishop Airport	5/3/2012	Thunderstorm Winds	50	58	0	$5,000
Bishop Airport	5/3/2012	Thunderstorm Winds	56	64	0	$5,000
Flint	5/3/2012	Thunderstorm Winds	56	64	0	
Burton	5/3/2012	Thunderstorm Winds	61	70	0	
Flint Daltons Airport	7/3/2012	Thunderstorm Winds	52	60	0	
Grand Blanc	7/3/2012	Thunderstorm Winds	61	70	0	
Bishop Airport	7/3/2012	Thunderstorm Winds	61	70	0	
Flushing	7/5/2012	Thunderstorm Winds	61	70	0	$15,000

Gaines	7/5/2012	Thunderstorm Winds	50	58	0	
Belsay	7/5/2012	Thunderstorm Winds	56	64	0	$5,000
Flint	7/5/2012	Thunderstorm Winds	56	64	0	
Flushing	7/26/2012	Thunderstorm Winds	52	60	0	
Belsay	7/31/2012	Thunderstorm Winds	52	60	0	

Source: National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC) Storm Event Database

Vulnerability Assessment:

Costs associated with thunderstorms include deaths, injuries, loss of power, damage to property, and clean-up afterwards. Available damage costs for past thunderstorms in Genesee County were used to calculate the average cost of a thunderstorm. See the Vulnerability Assessment Chart below. The chart shows the past twenty years of recorded thunderstorm and high wind events. According to the Federal Emergency Management Agency (FEMA), a death is estimated at $2,710,000, major injuries are estimated at $15,600, and minor injuries are $1,560. Using the historic data below, the cost of six injuries (it was estimated that three were major and three minor) was totaled at $51,480. Added to the property damages of $31,876,500, the total figure becomes $31,927,980 for the 80 thunderstorms that had recorded damages. Based on these figures, the estimated average cost of a thunderstorm that causes damage in Genesee County is expected to be $399,100.

Historically, the county usually has about 3.7 thunderstorm events per year; however, not every storm will have associated damages. Looking at the last 18 years of data, there were 167 of these events but only 80 had recorded damages. This means only 48% of thunderstorm and high wind events will have recorded damages. Using these figures, Genesee County can expect 1.8 thunderstorms per year to cause damage. This average annual cost is expected to be $598,650.

Breakdown of Costs for Genesee County Thunderstorms and High Winds			
Date	**Injuries**	**Deaths**	**Property Damage**
6/28/1994	0	0	$5,000,000
7/4/1995	0	0	$5,000
7/13/1995	0	0	$10,000
3/25/1996	0	0	$65,000
10/30/1996	0	0	$90,000
2/27/1997	0	0	$20,000
4/6/1997	1 (minor @ $1,560) = $1,560	0	$1,200,000
5/31/1998	0	0	$5,000
5/31/1998	0	0	$5,000
5/31/1998	0	0	$25,000
5/31/1998	0	0	$25,000

5/31/1998	0	0	$ 5,000
5/31/1998	0	0	$ 5,000
5/31/1998	0	0	$10,000
7/14/1998	0	0	$3,000
11/10/1998	0	0	$1,100,000
4/6/1999	0	0	$15,000
5/6/1999	0	0	$92,000
6/9/1999	0	0	$30,000
7/23/1999	0	0	$8,000
7/24/1999	0	0	$3,000
7/31/1999	0	0	$140,000
5/9/2000	0	0	$2,000
6/1/2000	0	0	$3,000
6/1/2000	0	0	$6,000
6/14/2000	0	0	$3,000
7/14/2000	0	0	$40,000
8/22/2000	0	0	$5,000
9/11/2000	1 (major @ $15,600) = $15,600	0	$12,000
6/15/2001	0	0	$1,000
8/28/2001	0	0	$25,000
2/1/2002	1 (major @ $15,600) = $15,600	0	$30,000
3/9/2002	2 (minor @ $1,560) = $3,120	0	$780,000
5/31/2002	0	0	$100,000
5/5/2003	0	0	$5,000
11/12/2003	0	0	$21,000,000
6/5/2005	0	0	$20,000
6/5/2005	0	0	$10,000
4/12/2006	0	0	$20,000
4/16/2007	0	0	$20,000
5/15/2007	0	0	$50,000
6/2/2007	0	0	$3,000
6/27/2007	0	0	$3,000
7/5/2007	0	0	$20,000
7/5/2007	0	0	$4,000
7/5/2007	0	0	$1,500
7/5/2007	0	0	$3,000
7/10/2007	0	0	$3,000
7/10/2007	0	0	$2,000
8/29/2007	0	0	$1,000
9/25/2007	0	0	$25,000
6/6/2008	0	0	$2,000
6/8/2008	0	0	$250,000
6/8/2008	0	0	$30,000
6/8/2008	0	0	$750,000
6/8/2008	0	0	$600,000
6/26/2008	0	0	$5,000
7/16/2008	0	0	$5,000
8/23/2008	0	0	$3,000
6/25/2009	0	0	$2,000
6/18/2010	0	0	$5,000
6/23/2010	0	0	$1,000
7/15/2010	0	0	$15,000
8/19/2010	0	0	$15,000
8/19/2010	0	0	$5,000
9/7/2010	0	0	$5,000

9/21/2010	0	0	$3,000
9/21/2010	1 (major @$15,600= $15,600)	0	$ -
5/29/2011	0	0	$3,000
5/29/2011	0	0	$5,000
6/9/2011	0	0	$50,000
6/22/2011	0	0	$20,000
8/20/2011	0	0	$5,000
10/15/2011	0	0	$2,000
5/3/2012	0	0	$2,000
5/3/2012	0	0	$5,000
5/3/2012	0	0	$5,000
5/3/2012	0	0	$5,000
7/5/2012	0	0	$15,000
7/5/2012	0	0	$5,000
Totals	**$51,480**	**0**	**$ 31,876,500**
Grand Total	**$31,927,980 (for all 80 storms that caused damage)**		
Estimated Average Cost of a Thunderstorm that Causes Damage	**$399,100**		
Average Number of Storms per Year that Cause Damages	**1.8**		
Estimated Annual Damage from Thunderstorm and High Wind Events	**$718,380**		

Mitigation Strategies for Thunderstorms

The following strategies are suggested to minimize the effects of Genesee County thunderstorms:

- Increased weather radio coverage
- Distribution of weather radios
- Warning sirens
- Emergency generators for police and fire departments, special-needs facilities, and community shelters
- Stand-by power for water plants, pump stations, booster pumping stations
- Shelters for mobile home communities
- Enhance public awareness on correct safety procedures during tornados
- Direct phone lines between airport control tower, airport fire department, airport police, and the Transportation Security Administration (TSA) checkpoint
- Lightning warning system on airport airfield
- Upgrade/enforce local building codes
- Training for citizens to become Weather Spotters
- Update Disaster Response Plan, if needed
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

Mitigation Projects

Goodrich Area Schools	The project includes two generators, emergency lighting, back-up air compressor, emergency radios, portable lighting and caution tape. **Estimated project cost: $5,000-$8,000**
Village of Lennon	The project includes repair of broken weather siren. **Estimated project cost: $1,000-$16,000** **Project Update: This project was completed in 2011**
Genesee County Emergency Management	The project includes a minimum of 100 storm warning sirens. **Estimated project cost: $1,700,000**

c) Hail

A condition where atmospheric water particles from thunderstorms form into rounded or irregular lumps of ice that fall to the earth.

Hazard Description

Hail is another product of the strong thunderstorms that frequently move across the state. As one of these thunderstorms passes over, hail usually falls near the center of the storm, along with the heaviest rain. Sometimes, strong winds occurring at high altitudes in the thunderstorms can blow the hailstones away from the storm center, causing an unexpected hazard at places that otherwise might not appear threatened. Most hailstones range in size from a pea to a golf ball, but hailstones larger than baseballs have occurred with the most severe thunderstorms.

Hail is formed when strong updrafts within the storm carry water droplets above the freezing level, where they remain suspended and continue to grow larger until their weight can no longer be supported by the winds. They finally fall to the ground, battering crops, denting autos, and injuring wildlife and people. Large hail is a characteristic of severe thunderstorms, and it may precede the occurrence of a tornado.

Genesee County Perspective:

Since 2000, there were 38 recorded incidents of hail storms. Based on those numbers, Genesee County is likely to have 2.9 hail storms per year. See **Table 2-5** for a detailed list of recorded incidents from 1999 through 2003, **Table 2-6** for 2004-2008, and **Table 2-7** for 2009-2013. On July 28, 2000, a small cluster of thunderstorms developed in the county, and dime-sized hail was reported in Flint and Linden. On July 14, 2000, several thunderstorms swept through Genesee County, and golf ball-sized hail was reported in Flint.

Table 2-5. Genesee County Hail Storms (1999-2003)								
Location	Date	Magnitude	Location	Date	Magnitude	Location	Date	Magnitude
Linden	6/9/1999	1.25 in.	Flint	7/28/2000	0.75 in.	Thetford	5/5/2003	0.75 in.
Fenton	6/9/1999	1.75 in.	Linden	7/28/2000	0.75 in.	Burton	5/5/2003	1.00 in.
Swartz Creek	6/9/1999	0.75 in.	Swartz Creek	8/2/2000	0.75 in.	Davison	5/5/2003	0.88 in.
Flushing	7/24/1999	1.00 in.	Fenton	4/9/2001	0.75 in.	Davison	7/21/2003	0.75 in.
Grand Blanc	7/24/1999	1.00 in.	Grand Blanc	5/28/2001	0.75 in.	Burton	8/1/2003	0.75 in.
Goodrich	7/31/1999	1.75 in.	Davison	8/19/2001	0.75 in.	Montrose	8/21/2003	1.00 in.
Linden	5/18/2000	1.00 in.	Otisville	4/19/2002	0.75 in.	Mt. Morris	8/21/2003	0.75 in.
Flint	7/14/2000	1.00 in.	Flint	4/19/2002	1.00 in.	Swartz Creek	8/21/2003	1.75 in.
Grand Blanc	7/14/2000	0.75 in.	Flint	5/31/2002	0.75 in.	Gaines	8/21/2003	1.50 in.
Argentine	7/14/2000	0.75 in.	Montrose	5/31/2002	0.88 in.	Swartz Creek	8/21/2003	1.25 in.
Flint	7/14/2000	1.75 in.	Linden	5/5/2003	0.88 in.	Flint	8/21/2003	0.75 in.
Goodrich	7/14/2000	0.75 in.	Flint	5/5/2003	0.88 in.	Otisville	8/21/2003	1.25 in.
Mt. Morris	7/27/2000	0.75 in.	Fenton	5/5/2003	0.75 in.	Flint	8/21/2003	0.75 in.
Gaines	7/27/2000	0.75 in.	Grand Blanc	5/5/2003	0.88 in.	Burton	8/21/2003	0.88 in.
						Grand Blanc	8/21/2003	0.75 in.

Source: National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC) Storm Event Database

Table 2-6. Genesee County Hail Storms (2004-2008)								
Location	Date	Magnitude	Location	Date	Magnitude	Location	Date	Magnitude
Goodrich	6/5/2005	0.75 in.	Burton	6/8/2006	0.75 in.	Gaines	7/26/2007	1.25 in.
Mount Morris	6/14/2005	0.75 in.	Flushing	6/28/2006	0.75 in.	Lennon	7/26/2007	1.00 in.
Burton	6/29/2005	1.00 in.	Otisville	6/28/2006	1.75 in.	Montrose	8/29/2007	0.75 in.
Burton	6/29/2005	0.88 in.	Otisville	6/28/2006	0.88 in.	Clio	8/29/2007	1.00 in.
Grand Blanc	3/31/2006	0.75 in.	Otisville	8/2/2006	0.75 in.	Clio	10/19/2007	0.75 in.
Atlas	3/31/2006	0.75 in.	Grand Blanc	8/2/2006	0.75 in.	Goodrich	4/11/2008	0.88 in.
Goodrich	3/31/2006	0.88 in.	Fenton	5/15/2007	1.00 in.	Burton	4/11/2008	0.75 in.
Flint	4/22/2006	1.75 in.	Burton	7/5/2007	0.75 in.	Grand Blanc	6/6/2008	0.88 in.
Montrose	4/22/2006	1.00 in.	Burton	7/5/2007	1.00 in.	Goodrich	6/23/2008	0.88 in.
Clio	4/22/2006	0.75 in.	Flint	7/5/2007	1.00 in.	Genesee Duford Airport	7/16/2008	1.00 in.
Flint	5/15/2006	1.00 in.	Flint	7/5/2007	1,25 in.	Genesee Duford Airport	7/16/2008	1.75 in.
Atlas	5/25/2006	1.25 in.	Flint	7/5/2007	0.88 in.	Grand Blanc	8/7/2008	1.00 in.
Grand Blanc	5/25/2006	0.75 in.	Grand Blanc	7/5/2007	0.75 in.	Grand Blanc	8/13/2008	0.75 in.
Goodrich	5/25/2006	1.00 in.	Burton	7/5/2007	1.50 in.			
Burton	6/8/2006	0.88 in.	Grand Blanc	7/5/2007	0.88			

Table 2-7. Genesee County Hail Storms (2009-2013)								
Location	Date	Magnitude	Location	Date	Magnitude	Location	Date	Magnitude
Swartz Creek	5/27/2009	1.00 in.	Genesee Duford Airport	8/20/2011	0.75 in.	Rankin	7/3/2012	0.75 in.
Belsay	5/27/2009	1.25 in.	Thetford Center	8/20/2011	0.75 in.			
Beecher	6/8/2009	1.00 in.	Otisville	8/20/2011	0.75 in.			
Grand Blanc	6/8/2009	0.88 in.	Otisville Airport	3/15/2012	1.50 in.			
Genesee Duford Airport	6/25/2009	1.00 in.	Flushing Airport	5/3/2012	1.00 in.			
Davison	6/25/2009	1.00 in.	Bishop Airport	7/3/2012	1.75 in.			
Otter Lake	6/25/2009	0.88 in.	Grand Blanc	7/3/2012	1.75 in.			
Richfield Center	7/15/2010	0.75 in.	Goodrich	7/3/2012	0.75 in.			
Duffield	5/13/2011	0.75 in.	Atlas	7/3/2012	1.00 in.			
Gaines	5/13/2011	1.00 in.	Goodrich	7/3/2012	1.75 in.			
Genesee County	6/22/2011	0.75 in.	Grand Blanc	7/3/2012	1.00 in.			
Pine Run	7/2/2011	1.00 in.	Grand Blanc	7/3/2012	0.88 in.			
Otisville	7/2/2011	1.00 in.	Atlas	7/3/2012	1.00 in.			
Fenton	7/2/2011	0.75 in.	Atlas	7/3/2012	0.88 in.			
Clio	8/20/2011	0.88 in.	Swartz Creek	7/3/2012	1.00 in.			

Vulnerability Assessment:

Costs associated with hail generally include crop and property damage. There were not enough property damage estimates available in order to calculate the average cost of a hail storm. However, one hail storm did have a cost of $5,000,000. (Due to the wide area of impact that a hail storm can have, this cost may include damage estimates from surrounding areas.) The Michigan State University Extension Office estimates that there are 130 bushels of corn per acre. A bushel of corn is approximately $2.40, and there are 640 acres in a square mile of farmland. If one square mile of corn were destroyed by a hailstorm, the cost would be $199,680.

Mitigation Strategies for Hail

The following strategies are suggested to minimize the effects of Genesee County hail:

- Increased weather radio coverage
- Distribution of weather radios
- Emergency generators for police and fire departments, special-needs facilities, and community shelters
- Enhance public awareness on correct safety procedures during inclement weather
- Stand-by power for water plants, pump stations, booster pumping stations
- Shelters for mobile home communities
- Training for citizens to become Weather Spotters
- Direct phone lines between airport control tower, airport fire department, airport police, and the Transportation Security Administration (TSA) checkpoint. (When the airport receives severe weather alerts, the TSA is called. They are in charge of making sure that everyone in the terminal is in a secure area.)
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

HAZARD: Inclement Weather

d) Lightning

Lightning is the discharge of electricity from within a thunderstorm.

Hazard Description

Lightning is a random and unpredictable product of a thunderstorm's tremendous energy. The energy in the storm produces an intense electrical field similar to a giant battery, with the positive charge concentrated at the top and the negative charge concentrated at the bottom. Lightning strikes when a thunderstorm's electrical potential (the difference between its positive and negative charges) becomes great enough to overcome the resistance of the surrounding air.

Bridging that difference, lightning can jump from cloud to cloud, cloud to ground, or even from the cloud to the air surrounding the thunderstorm. Lightning strikes can generate current levels of 30,000 to 40,000 amperes, with air temperatures often superheated to higher than 50,000 degrees Fahrenheit (hotter than the surface of the sun) and speeds approaching one-third the speed of light.

Globally, there are about 2,000 thunderstorms occurring at any given time, and those thunderstorms cause approximately 100 lightning strikes to earth each second. In the United States, approximately 100,000 thunderstorms occur each year, and every one of those storms generates lightning. It is not uncommon for a single thunderstorm to produce hundreds or even thousands of lightning strikes. However, to the majority of the general public, lightning is perceived as a minor hazard. That perception lingers despite the fact that lightning damages many structures and kills and injures more people in the United States per year, on average, than tornadoes or hurricanes. Many lightning deaths and injuries could be avoided if people would have more respect for the threat lightning presents to their safety.

Lightning deaths are usually caused by the electrical force shocking the heart into cardiac arrest or throwing the heartbeat out of its usual rhythm. Lightning can also cut off breathing by paralyzing the chest muscles or damaging the respiratory center in the brain stem. It takes only about one-hundredth of an ampere of electric current to stop the human heartbeat or send it into ventricular fibrillation. Lightning can also cause severe skin burns that can lead to death if complications from infection set in. Statistics compiled by the National Oceanic and Atmospheric Administration (NOAA) and the National Lightning Safety Institute (NLSI) for the period 1959-1994 revealed the following about lightning fatalities, injuries and damage in the United States:

Location of Lightning Strikes

- 40% are at unspecified locations
- 27% occur in open fields and recreation areas (not golf courses)
- 14% occur to someone under a tree (not on golf course)
- 8% are water-related (boating, fishing, swimming, etc.)
- 5% are golf-related (on golf course or under tree on golf course)
- 3% are related to heavy equipment and machinery
- 2.4% are telephone-related
- 0.7% are radio, transmitter and antenna-related

Gender of Victims

- 84% are male; 16% are female

Months of Most Strikes

- July (30%); August (22%); June (21%)

Days of Most Strikes

- #1 – Sunday; #2 – Wednesday; #3 – Saturday

Time of Most Strikes

- 2:00 p.m. – 6:00 p.m.

Number of Victims

- One victim (91%); two or more victims (9%)

The NLSI estimates that 85% of lightning victims are children and young men (ages 10-35) engaged in recreation or work-related activities. Approximately 20% of lightning strike victims die, and 70% of survivors suffer serious long-term after-effects such as memory and attention deficits, sleep disturbance, fatigue, dizziness, and numbness. Michigan is ranked the second highest state in number of deaths and number of injuries caused by lightning. (NLSI)

Lightning-Related Property Losses

In terms of property losses from lightning, statistics vary widely according to source. The Insurance Information Institute (a national clearinghouse of insurance industry information) estimates that lightning damage amounts to nearly 5% of all paid insurance claims, with residential claims alone exceeding $1,000,000,000.00. Information from insurance companies shows one homeowner's damage claim for every 57 lightning strikes. The NLSI estimates that lightning causes more than 26,000 fires annually, with damage to property exceeding 5,000,000,000.00. Electric utility companies across the country estimate as much as $1,000,000,000.00 per year in damaged equipment and lost revenue from lightning.

The Federal Aviation Administration (FAA) reports approximately $2,000,000,000.00 per year in airline industry operating costs and passenger delays from lightning. Because lightning-related damage information is compiled by so many different sources, using widely varying collection methods and criteria, it is difficult to determine a collective damage figure for the U.S. from lightning.

However, suffice it to say that annual lightning-related property damages are conservatively estimated at several billion dollars per year, and those losses are expected to continue to grow as the use of computers and other lightning-sensitive electronic components becomes more prevalent. See **Table 2-8** for a detailed list of recorded lightning storms during the period from 1993 to 2004.

Genesee County Perspective:

There were 16 recorded lightning storms in 18 years. Based on those numbers, the county has an 89% chance of having a lightning event per year. Two storms had a cost of $500,000.00 each. (Due to the wide area of impact that many weather hazards have, this cost may include damage estimates from surrounding areas.) See **Table 2-9** for a detailed list of recent lightning storms in Genesee County.

On May 25, 2004, lightning struck an abandoned oil well storage tank in Otter Lake. It caused a valve rupture and fire, which was put out by a blanket-type foam. On June 21, 1997 lightning struck a building in Otisville that was housing a children's event. Eight children were taken to the hospital after complaining of numbness and tingling. None of the reported injuries were serious.

Table 2-8. Genesee County Lightning Storms (1993-2004)

Location	Date	Deaths	Injuries	Property Damage
Fenton	8/23/1993	0	0	$ 50,000
Grand Blanc	7/20/1994	0	0	$ 50,000
Grand Blanc Twp	7/20/1994	0	0	$ 500,000
Richfield Twp	5/20/1996	0	1	$ -
Otisville	6/21/1997	0	8	$ -
Flint	6/12/1999	0	1	$ -
Fenton	7/23/1999	1	1	$ -
Atlas Twp	5/10/2004	0	0	$ 3,000

Table 2-9. Genesee County Lightning Storms (2005-2013)

Location	Date	Deaths	Injuries	Property Damage
Fenton	7/13/2005	0	0	$0.00K
Davison	9/22/2005	0	0	$15,000
Flint	11/9/2005	0	0	$50,000
Davison	6/2/2006	0	0	$55,000
Mount Morris	8/2/2006	0	0	$2,500
Flushing	9/5/2006	0	0	$10,000
Flint	5/15/2007	0	0	$75,000
Flint Daltons Airport	9/18/2010	0	0	$5,000
Fenton	7/11/2011	0	0	$5,000

Vulnerability Assessment:

Costs associated with lightning include deaths, injuries, loss of power, and damage to property, and clean-up afterwards. Available damage costs for past lightning events in Genesee County were used to calculate the average cost of a lightning event. See the Vulnerability Assessment Chart below. According to the Federal Emergency Management Agency (FEMA), a death is estimated at $2,710,000, major injuries are estimated at $15,600, and minor injuries are $1,560. Using the historic data below, the cost of one death and eleven injuries (it was estimated that six injuries were major and five minor) was totaled at $2,811,400. Added to the property damages of $603,000, the total figure becomes $3,414,400 for the 8 recorded lightning events. Based on these damage figures, the estimated average cost of a lightning event in Genesee County is expected to be $426,800. Since Genesee County has about a 73% chance of having a lightning event each year, the average annual cost is estimated to be $311,564.

Breakdown of Costs for Genesee County Lightning Events			
Date	**Deaths**	**Injuries**	**Property Damage**
8/23/1993	0	0	$50,000
7/20/1994	0	0	$50,000
7/20/1994	0	0	$500,000
5/20/1996	0	1@$1,560	$
6/21/1997	0	8 (6 @ $15,600 and 2 @ $1,560)	$
6/12/1999	0	1@ $1,560	$
7/23/1999	1@ $2,710,000	1@ $1,560	$
5/10/2004	0	0	$3,000
9/22/2005	0	0	$15,000
11/9/2005	0	0	$50,000
6/2/2006	0	0	$55,000
8/2/2006	0	0	$2,500
9/5/2006	0	0	$10,000
5/15/2007	0	0	$75,000
9/18/2010	0	0	$5,000
7/11/2011	0	0	$5,000
Totals	**$2,710,000**	**$101,400**	**$820,500**
Grand Total	**$3,631,900 (all costs for 16 lightning events)**		
Estimated Average Cost of a Lightning Event	**$226,994**		
Chance Per Year of Lightning Event	**.88**		
Average Annual Cost of a Lightning Event	**$199,755**		

Mitigation Strategies for Lightning

The following strategies are suggested to minimize the effects of Genesee County lightning:

- Increased weather radio coverage
- Distribution of weather radios
- Emergency generators for police and fire departments, special-needs facilities, and community shelters
- Enhance public awareness on correct safety procedures during lightning
- Stand-by power for water plants, pump stations, booster pumping stations
- Lightning warning system on airport airfield

- Direct phone lines between airport control tower, airport fire department, airport police, and the Transportation Security Administration (TSA) checkpoint
- Training for citizens to become Weather Spotters
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

HAZARD: Inclement Weather

e) Severe Winds

Severe winds are winds of 58 miles per hour or greater

Hazard Description

Severe winds spawned by thunderstorms or other storm events have had devastating effects on Michigan in terms of loss of life, injuries and property damage. According to data compiled by the National Weather Service for the period 1970-1996, Michigan experienced over 8,300 severe wind events (does not include tornadoes), which resulted in 98 deaths and millions of dollars in damage. It is important to note that the high number of severe wind events is due in part to the fact that the data was compiled by county; thus, multi-county storms are counted more than once. Severe wind events are characterized by wind velocities of 58 miles per hour or greater, with gusts sometimes exceeding 74 miles per hour (hurricane velocity).

Genesee County Perspective:

There have been 164 recorded incidents of severe winds since 1999. One severe windstorm caused damage costing $21,000,000.00. (Due to the wide area of impact that many weather hazards have, this cost may include damage estimates from surrounding areas.) See **Table 2-10** for a detailed list of recorded severe windstorms during recent years. On November 13, 2003 downed trees and power lines caused auto accidents and power outages during a severe windstorm. At least two motorists reported damage to their vehicles when they were hit by a falling tree or caught by a downed utility line.

Vulnerability Assessment:

For a vulnerability assessment on high winds, please see part “b) Thunderstorms” in the previous text. High winds and thunderstorms usually occur together, so these two hazards are combined in the vulnerability assessment for thunderstorms.

Table 2-10. Genesee County Severe Winds (1999-2012)					
Location	**Date**	**Type**	**Miles/Hour**	**Injuries**	**Property Damage**
Genesee Co.	4/6/1999	Wind	0	0	$15,000
Genesee Co.	5/6/1999	Wind	0	0	$92,000
Swartz Creek	5/17/1999	Thunderstorm Winds	60	0	$
Fenton	6/9/1999	Thunderstorm Winds	64	0	$
Atlas	6/9/1999	Thunderstorm Winds	69	0	$30,000
Otisville	7/23/1999	Thunderstorm Winds	60	0	$8,000
Flint	7/24/1999	Thunderstorm Winds	60	0	$
Fenton	7/24/1999	Thunderstorm Winds	60	0	$3,000
Goodrich	7/31/1999	Thunderstorm Winds	75	0	$140,000
Genesee Co.	5/9/2000	Thunderstorm Winds	58	0	$2,000
Swartz Creek	6/1/2000	Thunderstorm Winds	58	0	$3,000
Fenton	6/1/2000	Thunderstorm Winds	60	0	$6,000
Clio	6/14/2000	Thunderstorm Winds	58	0	$3,000
Fenton	7/14/2000	Thunderstorm Winds	60	0	$
Gaines	7/14/2000	Thunderstorm Winds	79	0	$40,000
Burton	8/22/2000	Thunderstorm Winds	60	0	$5,000
Flint	9/11/2000	Thunderstorm Winds	58	1	$12,000
Flint	4/23/2001	Thunderstorm Winds	61	0	$
Linden	6/15/2001	Thunderstorm Winds	58	0	$1,000
Flint	8/28/2001	Thunderstorm Winds	69	0	$25,000
Montrose	9/8/2001	Thunderstorm Winds	58	0	$
Linden	9/9/2001	Thunderstorm Winds	58	0	$
Genesee Co.	10/16/2001	High Wind	46	0	$
Genesee Co.	2/1/2002	High Wind	46	1	$30,000
Genesee Co.	3/9/2002	High Wind	70	2	$780,000
Flushing	4/19/2002	Thunderstorm Winds	58	0	$
Flushing	5/31/2002	Thunderstorm Winds	70	0	$100,000
Otisville	6/22/2002	Thunderstorm Winds	58	0	$
Linden	5/5/2003	Thunderstorm Winds	81	0	$5,000
Grand Blanc	5/5/2003	Thunderstorm Winds	75	0	$
Burton	5/5/2003	Thunderstorm Winds	70	0	$
Flint	6/8/2003	Thunderstorm Winds	60	0	$
Flint	6/8/2003	Thunderstorm Winds	74	0	$
Davison	6/8/2003	Thunderstorm Winds	60	0	$
Linden	7/4/2003	Thunderstorm Winds	63	0	$
Linden	7/4/2003	Thunderstorm Winds	58	0	$
Flint	7/4/2003	Thunderstorm Winds	62	0	$
Mt. Morris	7/6/2003	Thunderstorm Winds	58	0	$
Mt. Morris	7/6/2003	Thunderstorm Winds	60	0	$
Mt. Morris	8/1/2003	Thunderstorm Winds	60	0	$

Flint	8/21/2003	Thunderstorm Winds	60	0	$
Otisville	8/21/2003	Thunderstorm Winds	64	0	$
Grand Blanc	8/21/2003	Thunderstorm Winds	62	0	$
Genesee Co.	11/12/2003	High Wind	87	0	$21,000,000
Genesee Co.	3/5/2004	High Wind	64	0	$
Lennon	6/5/2005	Thunderstorm Winds	60	0	$ -
Flint	6/5/2005	Thunderstorm Winds	60	0	$ -
Mount Morris	6/5/2005	Thunderstorm Winds	69	0	$20,000
Mount Morris	6/5/2005	Thunderstorm Winds	62	0	$10,000
Flint	7/18/2005	Thunderstorm Winds	62	0	$ -
Flint	7/18/2005	Thunderstorm Winds	60	0	$ -
Burton	7/18/2005	Thunderstorm Winds	64	0	$ -
Burton	9/22/2005	Thunderstorm Winds	59	0	$ -
Linden	9/22/2005	Thunderstorm Winds	58	0	$ -
Swartz Creek	2/16/2006	Thunderstorm Winds	69	0	$ -
Burton	2/16/2006	Thunderstorm Winds	58	0	$ -
Flint	4/12/2006	Thunderstorm Winds	69	0	$20,000
Goodrich	5/25/2006	Thunderstorm Winds	60	0	$ -
Flushing	7/17/2006	Thunderstorm Winds	64	0	$ -
Mount Morris	7/17/2006	Thunderstorm Winds	63	0	$ -
Flint	7/17/2006	Thunderstorm Winds	61	0	$ -
Linden	7/27/2006	Thunderstorm Winds	60	0	$ -
Flushing	7/30/2006	Thunderstorm Winds	63	0	$ -
Mount Morris	7/30/2006	Thunderstorm Winds	63	0	$ -
Swartz Creek	7/30/2006	Thunderstorm Winds	60	0	$ -
Argentine	8/1/2006	Thunderstorm Winds	58	0	$ -
Flushing	8/2/2006	Thunderstorm Winds	64	0	$ -
Grand Blanc	8/2/2006	Thunderstorm Winds	62	0	$ -
Davison	8/2/2006	Thunderstorm Winds	60	0	$ -
Mount Morris	9/23/2006	Thunderstorm Winds	60	0	$ -
Genesee County	4/16/2007	Severe Winds	54	0	$20,000
Grand Blanc	5/15/2007	Thunderstorm Winds	62	0	$ -
Grand Blanc	5/15/2007	Thunderstorm Winds	64	0	$50,000
Flint	5/15/2007	Thunderstorm Winds	64	0	$ -
Montrose	6/2/2007	Thunderstorm Winds	60	0	$3,000
Flushing	6/2/2007	Thunderstorm Winds	60	0	$ -
Montrose	6/27/2007	Thunderstorm Winds	63	0	$3,000
Swartz Creek	6/27/2007	Thunderstorm Winds	64	0	$ -
Lennon	6/27/2007	Thunderstorm Winds	63	0	$ -
Flint	7/5/2007	Thunderstorm Winds	64	0	$ -
Flint	7/5/2007	Thunderstorm Winds	70	0	$20,000
Burton	7/5/2007	Thunderstorm Winds	64	0	$4,000
Burton	7/5/2007	Thunderstorm Winds	60	0	$ -
Flint	7/5//2007	Thunderstorm Winds	64	0	$1,500
Grand Blanc	7/5/2007	Thunderstorm Winds	62	0	$3,000

Flushing	7/10/2007	Thunderstorm Winds	60	0	$3,000
Clio	7/10/2007	Thunderstorm Winds	60	0	$ -
Mount Morris	7/10/2007	Thunderstorm Winds	60	0	$2,000
Otisville	7/10/2007	Thunderstorm Winds	60	0	$ -
Flushing	7/18/2007	Thunderstorm Winds	60	0	$ -
Swartz Creek	7/18/2007	Thunderstorm Winds	64	0	$ -
Flushing	7/18/2007	Thunderstorm Winds	60	0	$ -
Flint	7/18/2007	Thunderstorm Winds	63	0	$ -
Flint	8/22/2007	Thunderstorm Winds	60	0	$ -
Linden	8/22/2007	Thunderstorm Winds	64	0	$ -
Fenton	8/22/2007	Thunderstorm Winds	64	0	$ -
Clio	8/29/2007	Thunderstorm Winds	64	0	$ -
Mount Morris	8/29/2007	Thunderstorm Winds	63	0	$1,000
Mount Morris	8/29/2007	Thunderstorm Winds	70	0	$ -
Flushing	9/25/2007	Thunderstorm Winds	81	0	$25,000
Mount Morris	9/25/2007	Thunderstorm Winds	60	0	$ -
Flint	9/25/2007	Thunderstorm Winds	60	0	$ -
Genesee	9/25/2007	Thunderstorm Winds	60	0	$ -
Flushing	10/18/2007	Thunderstorm Winds	58	0	$ -
Swartz Creek	10/18/2007	Thunderstorm Winds	64	0	$ -
Linden	6/6/2008	Thunderstorm Winds	64	0	$ -
Montrose	6/6/2008	Thunderstorm Winds	63	0	$2,000
Argentine	6/7/2008	Thunderstorm Winds	64	0	$ -
Argentine	6/8/2008	Thunderstorm Winds	81	0	$250,000
Linden	6/8/2008	Thunderstorm Winds	70	0	$30,000
Bayport Park	6/8/2008	Thunderstorm Winds	70	0	$750,000
Burton	6/8/2008	Thunderstorm Winds	70	0	$600,000
Fenton	6/26/2008	Thunderstorm Winds	61	0	$5,000
Flint	7/16/2008	Thunderstorm Winds	60	0	$5,000
Genesee Duford Airport	7/16/2008	Thunderstorm Winds	62	0	$ -
Beecher	8/23/2008	Thunderstorm Winds	60	0	$3,000
Grand Blanc	6/8/2009	Thunderstorm Winds	69	0	$ -
Otisville Airport	6/25/2009	Thunderstorm Winds	63	0	$2,000
Goodrich	8/9/2009	Thunderstorm Winds	62	0	$ -
Argentine	6/18/2010	Thunderstorm Winds	62	0	$5,000
Linden	6/18/2010	Thunderstorm Winds	58	0	$ -
Flint	6/18/2010	Thunderstorm Winds	58	0	$ -
Fenton	6/23/2010	Thunderstorm Winds	58	0	$1,000
Beecher	7/15/2010	Thunderstorm Winds	58	0	$ -
Flushing	7/15/2010	Thunderstorm Winds	81	0	$15,000
Burton	7/15/2010	Thunderstorm Winds	64	0	$ -
Argentine	7/15/2010	Thunderstorm Winds	62	0	$ -
Lapeer Heights	7/15/2010	Thunderstorm Winds	71	0	$ -
Davison	8/19/2010	Thunderstorm Winds	60	0	$ -

Davison	8/19/2010	Thunderstorm Winds	63	0	$15,000
Davison	8/29/2010	Thunderstorm Winds	70	0	$5,000
Genesee County	9/7/2010	Severe Winds	45	0	$5,000
Bishop Airport	9/21/2010	Thunderstorm Winds	60	0	$ -
Mount Morris	9/21/2010	Thunderstorm Winds	62	0	$3,000
Argentine	9/21/2010	Thunderstorm Winds	60	0	$ -
Clio	9/21/2010	Thunderstorm Winds	60	1	$ -
Argentine	5/29/2011	Thunderstorm Winds	67	0	$3,000
Linden	5/29/2011	Thunderstorm Winds	67	0	$5,000
Gaines	5/29/2011	Thunderstorm Winds	64	0	$ -
Linden	5/29/2011	Thunderstorm Winds	64	0	$ -
Flint	5/29/2011	Thunderstorm Winds	70	0	$ -
Goodrich	5/29/2011	Thunderstorm Winds	62	0	$ -
Davison	5/29/2011	Thunderstorm Winds	74	0	$ -
Genesee County	6/9/2011	Thunderstorm Winds	72	0	$50,000
Genesee County	6/9/2011	Thunderstorm Winds	76	0	$ -
Genesee County	6/22/2011	Thunderstorm Winds	70	0	$20,000
Genesee County	6/22/2011	Thunderstorm Winds	75	0	$ -
Otisville	8/202011	Thunderstorm Winds	64	0	$5,000
Genesee County	10/15/2011	Severe Winds	45	0	$2,000
Bishop Airport	5/3/2012	Thunderstorm Winds	60	0	$2,000
Flint	5/3/2012	Thunderstorm Winds	58	0	$ -
Bishop Airport	5/3/2012	Thunderstorm Winds	58	0	$5,000
Bishop Airport	5/3/2012	Thunderstorm Winds	64	0	$5,000
Flint	5/3/2012	Thunderstorm Winds	64	0	$ -
Burton	5/3/2012	Thunderstorm Winds	70	0	$ -
Flint Daltons Airport	7/3/2012	Thunderstorm Winds	60	0	$ -
Grand Blanc	7/3/2012	Thunderstorm Winds	70	0	$ -
Bishop Airport	7/3/2012	Thunderstorm Winds	70	0	$ -
Flushing	7/5/2012	Thunderstorm Winds	70	0	$15,000
Gaines	7/5/2012	Thunderstorm Winds	58	0	$ -
Belsay	7/5/2012	Thunderstorm Winds	64	0	$5,000
Flint	7/5/2012	Thunderstorm Winds	64	0	$ -
Flushing	7/26/2012	Thunderstorm Winds	60	0	$ -
Belsay	7/31/2012	Thunderstorm Winds	60	0	$ -

Source: National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC) Storm Event Database

Mitigation Strategies for Severe Winds

The following strategies are suggested to minimize the effects of Genesee County severe winds:

- Increased weather radio coverage
- Distribution of weather radios
- Emergency generators for police and fire departments, special-needs facilities, and community shelters
- Enhance public awareness on correct safety procedures during high winds
- Warning sirens
- Stand-by power for water plants, pump stations, booster pumping stations
- Shelters for mobile home communities
- Training for citizens to become Weather Spotters
- Direct phone lines between airport control tower, airport fire department, airport police, and the Transportation Security Administration (TSA) checkpoint
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

HAZARD: Inclement Weather

f) Snowstorms

A period of rapid accumulation of snow often accompanied by high winds, cold temperatures, and low visibility.

Hazard Description

As a result of being surrounded by the Great Lakes, Michigan experiences large differences in snowfall in relatively short distances. The annual mean accumulation ranges from 30 to 170 inches of snow. The highest accumulations are in the northern and western parts of the Upper Peninsula. In Lower Michigan, the highest snowfall accumulations occur near Lake Michigan and in the higher elevations of northern Lower Michigan. Blizzards are the most dramatic and perilous of all snowstorms, characterized by low temperatures and strong winds (35 miles per hour or greater) bearing enormous amounts of snow. Most of the snow accompanying a blizzard is in the form of fine, powdery particles that are wind-blown in such great quantities that, at times, visibility is reduced to only a few feet. Blizzards have the potential to result in property damage and loss of life. Just the cost of clearing the snow can be enormous.

Most of the severe winter weather events that occur in Michigan have their origin as Canadian and Arctic cold fronts that move across the state from the west or northwest. Michigan is susceptible to moderate snowfall and extreme cold, averaging 90-180 days per year below

freezing in the Lower Peninsula, and over 180 days below freezing in most of the Upper Peninsula.

Genesee County also has to deal with ice and sleet storms. Ice storms are sometimes incorrectly referred to as sleet storms. Sleet is similar to hail only smaller and can be easily identified as frozen rain drops (ice pellets), which bounce when hitting the ground or other objects. Sleet does not stick to trees and wires, but sleet in sufficient depth does cause hazardous driving conditions. Ice storms are the result of cold rain that freezes on contact with the surface, coating the ground, trees, buildings, overhead wires and other exposed objects with ice, sometimes causing extensive damage. When electric lines are downed, households may be without power for several days, resulting in significant economic loss and disruption of essential services in affected communities.

Genesee County Perspective:

Genesee County had 26 recorded snowstorm incidents from 1993 to 2003, and based on those numbers the county is likely to have 2.6 snow storms per year. See **Table 2-11** for a detailed list of recorded incidents during recent years. On December 11, 2000, Genesee County, and several other counties, sustained 14" of snow along with 45 M.P.H. winds in a 24-hour period. Up to 200 cars were stranded on I-75 just south of Flint during the storm. The County was unable to respond to accidents, medical emergencies and stranded motorists due to four-foot snow drifts, which created impassable roads. This was the third largest snowfall on record, and it was believed to be the first time in its 124 year history that the Flint Journal was unable to publish due to a weather event. A State of Emergency was requested closing down the entire county for a 24-hour period. A Federal Disaster Declaration was issued for Genesee and 26 other counties.

Then, on December 17, 2000, the county received more snow. In Flint, the weight of the accumulated snow collapsed the roof of a banquet room at a Ramada Inn. A home patio roof also gave way in Flint. The sheer volume of the snow was difficult to handle and the process of clearing the snow became tedious and expensive as there was almost no place to put it.

Table 2-11. Genesee County Snow & Ice Storms (2000-2013)

Location	Date	Type	Deaths	Injuries	Property Damage
Genesee Co.	2/18/2000	Heavy Snow	0	0	$
Genesee Co.	10/7/2000	Snow	0	0	$
Genesee Co.	12/5/2000	Snow	0	0	$
Genesee Co.	12/11/2000	Heavy Snow	0	1	$1,100,000
Genesee Co.	12/13/2000	Snow	0	0	$25,000
Genesee Co.	12/17/2000	Heavy Snow	0	0	$560,000
Genesee Co.	1/30/2002	Winter Storm	0	0	$
Genesee Co.	2/25/2002	Winter Storm	0	0	$

Genesee Co.	3/4/2003	Heavy Snow	0	0	$
Genesee Co.	4/3/2003	Ice Storm	1	2	$161,100,000
Genesee Co.	1/14/2004	Heavy Snow	0	0	$
Genesee Co.	1/26/2004	Winter Storm	0	0	$
Genesee Co.	1/20/2006	Winter Storm	0	0	$ -
Genesee Co.	2/5/2006	Winter Storm	0	0	$ -
Genesee Co.	12/1/2006	Ice Storm	0	0	$ -
Genesee Co.	1/14/2007	Ice Storm	0	0	$100,000
Genesee Co.	1/15/2007	Ice Storm	0	0	$ -
Genesee Co.	12/16/2007	Winter Storm	0	0	$ -
Genesee Co.	1/1/2008	Winter Storm	0	0	$ -
Genesee Co.	1/14/2008	Heavy Snow	0	0	$ -
Genesee Co.	1/15/2008	Heavy Snow	0	0	$ -
Genesee Co.	2/6/2008	Winter Storm	0	0	$ -
Genesee Co.	2/7/2008	Winter Storm	0	0	$ -
Genesee Co.	2/12/2008	Heavy Snow	0	0	$ -
Genesee Co.	12/19/2008	Winter Storm	0	0	$ -
Genesee Co.	4/5/2009	Winter Storm	0	0	$ -
Genesee Co.	4/6/2009	Winter Storm	0	0	$ -
Genesee Co.	2/9/2010	Heavy Snow	0	0	$ -
Genesee Co.	2/10/2010	Heavy Snow	0	0	$ -
Genesee Co.	2/22/2010	Heavy Snow	0	0	$ -
Genesee Co.	2/1/2011	Winter Storm	0	0	$ -
Genesee Co.	2/2/2011	Winter Storm	0	0	$ -
Genesee Co.	2/20/2011	Heavy Snow	0	0	$ -
Genesee Co.	2/21/2011	Heavy Snow	0	0	$ -
Genesee Co.	3/22/2011	Winter Storm	0	0	$15,000
Genesee Co.	3/23/2011	Winter Storm	0	0	$ -

NOAA

On January 5, 2014, a massive snow storm hit the region. Genesee County was at the epicenter of the storm and received about 18 inches of snow, with snow drifts making roads nearly impassable. Temperatures dropped to negative 45 degrees with the wind chill and roads were extremely icy. The majority of schools, businesses, and local governments were closed in Genesee County and surrounding areas. It was the largest snow storm that affected the County in almost forty years. Road crews worked around the clock trying to clear the snow, but over a week later, some schools were still closed and back roads remained impassable. Reported snowfall: Burton 13.2 inches; Flint: 17.1 inches; Flushing 14.5 inches; Goodrich: 11.8 inches; Grand Blanc: 13.9 inches, Linden: 16 inches; Swartz Creek: 18 inches.

On December 22, 2013, freezing rain came through the County, causing extensive freezing of trees, power lines, and roadways. The storm left more than 64,000 Genesee County residents without electricity. Even with crews working around the clock, many people did not regain

power for close to a week. The ice made roads very dangerous and there were numerous downed and arcing power lines.

Vulnerability Assessment:

Costs associated with snow storms include deaths, injuries, loss of power, loss of revenues, damage to property, use of emergency personnel, and snow removal. Historic data for past snow storms in Genesee County, and a 2003 Salt Institute Study were used to calculate the average cost of a snowstorm. See the Vulnerability Assessment Chart below. According to the Federal Emergency Management Agency (FEMA), a death is estimated at $2,710,000, major injuries are estimated at $15,600, and minor injuries are $1,560.

Based on these figures, the estimated average cost of a snowstorm in Genesee County is expected to be $14,356,705. Since Genesee County experiences an average of 3.2 snowstorms per year, the average annual cost of snowstorms is estimated to be $**47,377,127**.

Breakdown of Costs for Genesee County Snow and Ice Storms	
Activation of Emergency Management*	$ 25,000
Response (plowing, tree removal, etc.)*	$ 846,658
Infrastructure Failure (road closure, car delays, etc.)*	$ 322,300
Property Damage	$ 1,800,000
Wages/Salaries Lost*	$ 7,257,386
State/Local Taxes Lost*	$ 383,804
Federal Taxes Lost*	$ 566,983
Retail Sales Lost*	$ 3,135,854
Minor Injuries @ $1,560 per person x 2	$ 3,120
Major Injuries @ $15,600 per person x 1	$ 15,600
Deaths @ $2,710,000 (average snowstorm in Genesee County does not cause a death)	$ -
Estimated Cost of One Average Genesee County Snowstorm:	$ 14,356,705
Number of Expected Snowstorms each Year:	3.2
Total Estimated Annual Cost of Snowstorms:	$ **47,377,127**

***** Activation of Emergency Management figure based on estimate from the Michigan State Police

*Response figure based on the Oakland County Road Commission's formula of $333.33 per mile cost multiplied by Genesee County's 2,540 total roadway miles

*Infrastructure Failure figure based on 1 hour of delay during morning traffic on I-69 which is approximately 10,000 vehicles multiplied by FEMA's estimate of $32.23 cost of delay per vehicle

*Wages/Salaries Lost figure based on the 2003 Salt Institute Study formula of $16.64 per person factored for Genesee County's population

*State/Local Taxes Lost figure based on the 2003 Salt Institute Study formula of .88 per person factored for Genesee County's population

*Federal Taxes Lost figure based on the 2003 Salt Institute Study formula of $1.30 per person factored for Genesee County's population

*Retail Sales Lost figure based on the 2003 Salt Institute Study formula of $7.19 per person factored for Genesee County's population

Mitigation Strategies for Snow and Ice Storms

The following strategies are suggested to minimize the effects of Genesee County snow and ice storms:

- Increased weather radio coverage
- Distribution of weather radios
- Emergency generators for police and fire departments, special-needs facilities, and community shelters
- Enhance public awareness on correct safety procedures during snow and ice storms
- Stand-by power for water plants, pump stations, booster pumping stations
- Direct phone lines between airport control tower, airport fire department, airport police, and the Transportation Security Administration (TSA) checkpoint
- County/local utility tree-trimming program
- Shelters for mobile home communities
- Update Disaster Response Plan if needed
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

Mitigation Projects

Bishop International Airport	This project includes a weather computer to help forecast snow, thunderstorms and high winds; lightning warning systems for the airfield, and a direct phone line from the FAA Control Tower to the Airport Fire Department, Airport Police and the security checkpoint. **Estimated project cost: not provided**
Goodrich Area Schools	The project includes two generators, emergency lighting, back-up air compressor, emergency radios, portable lighting and caution tape. **Estimated project cost: $5,000-$8,000**
Village of Lennon	The project includes a back-up generator for the Police Department **Estimated project cost: $3,000** **Project Update: This project was tabled due to cost.**

Village of Lennon	The project includes a back-up generator for the Village Hall. **Estimated project cost: $3,000** **Project Update: This project was tabled due to cost.**

To sum up the inclement weather section, see **Table 2-12** for a listing of the seven Gubernatorial Disaster Declarations that were issued during the years 1978 through 2013. **Table 2-13** shows a listing of the eight Presidential Major Disaster Declarations that were issued during the years 1975 through 2013. Genesee County received a total of sixteen disaster declarations during these years.

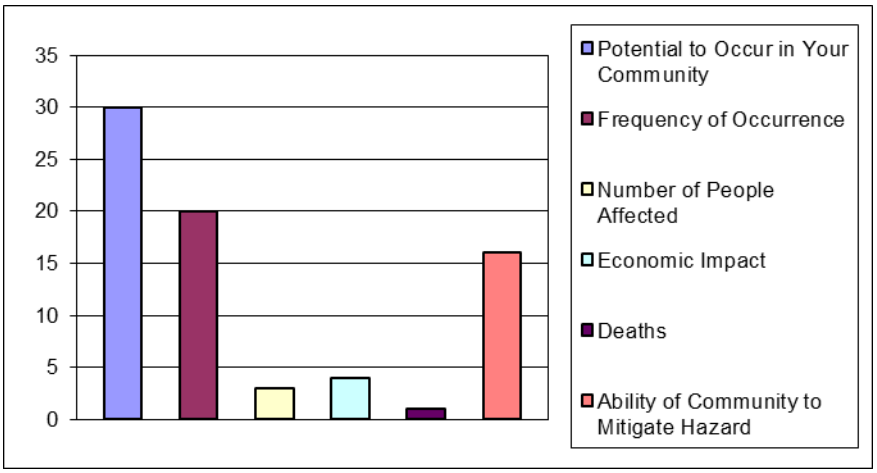
Table 2-12. Gubernatorial Disaster Declarations in Genesee County from 1978 to 2013
(under Act 390, P.A. 1976, as amended-The Michigan Emergency Management Act)

Date of Declaration	Type of Incident	Type of Declaration
May 11, 2012	Flooding and Heavy Rain	Major Disaster
December 11, 2000	Winter Storm	Major Disaster
July 6, 1997 July 3, 1997	Tornadoes and flooding	Disaster
October 4, 1990	Tornado	Disaster
October 28, 1986 September 15, 1986 September 12, 1986	Flooding and heavy rain	Disaster
September 10, 1985	Flooding and heavy rain	Disaster
January 1, 1985	Ice Storm	Disaster
January 26, 1978	Snowstorm and blizzard	Disaster
Note: Declarations made prior to the enactment of this Act were made under the authority of Act 302, 302, P.A. 1945.		

Source: (Michigan State Police)

Table 2-13. Presidential Disaster Declarations for Genesee County From 1975 to 2013 (Under P. L. 93-288, as amended)		
Date of Declaration	Type of Incident	Type of Declaration
December 11, 2000	Winter Storm	Major Disaster
July 2, 1997	Tornadoes and flooding	Major Disaster
September 10-19, 1986	Flooding	Major Disaster
September 5-6, 1985	Flooding	Major Disaster
January 26-27, 1978	Snowstorm and blizzard	Emergency
March 20, 1976 **March 2-7, 1976**	**Ice storms,** **Tornadoes**	Major Disaster
August 20, 1975-September 6, 1975	Rainstorms, high winds, flooding	Major Disaster
April 18-30, 1975	Flooding, rain, tornadoes	Major Disaster
Note: Does not include separate Secretary of Agriculture or Small Business Administration (SBA) disaster declarations, which are issued under other authorities.		

#2 HAZARD: Structure Fires



Structure Fire

A fire, of any origin, that ignites one or more structures, causing loss of life and/or property.

Hazard description

Structure fires are ranked as the number two hazard in Genesee County. Structure fires are often referred to as the "universal hazard" because they occur in virtually every community. The highest risk is during winter months, when wood stoves and faulty heaters are used. Each year in the United States, fires result in approximately 2,495 deaths and 13,250 injuries requiring medical treatment (FEMA). According to some sources, structure fires cause more loss of life and property damage than all types of natural disasters combined. Direct property losses due to fire are $7 billion per year – and much of that figure is the result of structure fire.

Ironically, while the United States has made great strides in lessening deaths and injuries caused by other types of disasters, the problem of structure fires is worse in this country than in many other industrialized countries (even those with a more densely-developed population pattern). The United States Centers for Disease Control (CDC) figures indicate that fire-associated mortality rates in the United States are approximately 2-3 times greater than those in many other developed countries.

Genesee County Perspective:

In 2003, Genesee County had 829 reported structure fires, which resulted in 4 civilian deaths, 12 civilian injuries, and 17 firefighter injuries. The property and content losses of these fires was $19,819,208.00. This number accounts for almost 91% of fire-related losses in 2003 for

Genesee County. In 2008, there were 624 fires in Genesee County; 4 were arson fires and 138 were suspicious fires. These fires caused $9,847,349 in property and contents loss and two civilian injuries. (NFIRS). Structure fires are a common occurrence in Genesee County.

Genesee County Fire Data Table				
Local Unit of Government	**Number of Fires from 2007-2012**	**Injuries**	**Deaths**	**Total Loss**
Argentine Township	50	0	0	$4,058,925
Atlas Township	41	1	0	$7,116,150
City of Burton	293	29	0	$7,763,901
City of Clio	116	6	1	$1,153,000
City of Davison (Davison Area)	165	6	0	$6,100,110
City of Fenton	93	3	0	$2,875,655
City of Flint* only for 2012	622	39	0	$10,421,904
City of Flushing	89	6	0	$2,438,900
City of Grand Blanc	229	10	0	$12,746,270
City of Linden	25	0	0	$399,335
City of Montrose	Only Twp			
City of Mount Morris	85	16	1	$1,508,400
City of Swartz Creek (area)	71	2	0	$1,292,175
Clayton Charter Township	Did Not Submit			
Davison Township (Davison Area)	165	6	0	$6,100,110
Fenton Charter Township	60	0	0	$155,220
Flint Charter Township *missing 2012	302	23	2	$11,630,397
Flushing Charter Township	89	6	0	$2,438,900
Forest Township	29	0	0	$5,152,400
Gaines Township * none for 2007,2008	23	0	0	$1,164,500
Genesee Charter Township	160	7	0	$3,537,054
Grand Blanc Charter Township	229	10	0	$12,749,270
Montrose Charter Township	57	2	0	$3,164,570
Mount Morris Township	Not submitted			
Mundy Township	82	3	0	$1,181,100

Richfield Township	165	6	0	$6,100,110
Thetford Township	Did Not Submit			
Vienna Township	Did Not Submit			
Village of Gaines				
Village of Goodrich				
Village of Lennon				
Village of Otisville				
Village of Otter Lake *missing 2009, 2012	12	1	0	$1,139,490

Vulnerability Assessment:

Costs associated with structure fires include deaths, injuries, temporary housing, use of emergency personnel, and damage to property. Available damage costs for structure fires in Genesee County for the last five years were used to determine an average annual cost of structure fires. See the Vulnerability Assessment Chart below. According to the Federal Emergency Management Agency (FEMA), a death is estimated at $2,710,000, major injuries are estimated at $15,600, and minor injuries are $1,560. Using the historic data below, the cost of 31 deaths and 181 injuries (it was estimated that approximately half the injuries were major and half were minor) was totaled at $85,570,000. When that figure is added to the property loss of $47,624,950, the total figure becomes $133,194,950 for the 2,983 recorded structure fires. Based on these damage costs, the estimated average cost of a structure fire in Genesee County is expected to be $44,651. Using the last five years of data to get an estimate, the county can expect to have an average of 597 structure fires per year. This calculates to a yearly cost of $26,656,647 for deaths, injuries and property loss due to Genesee County structure fires.

Breakdown of Costs for Genesee County Structure Fires				
Year	**Number of structure fires**	**Deaths**	**Injuries**	**Property Loss**
1999	405	5	32	$7,651,440
2000	957	10	54	$11,908,322
2001	387	4	18	$7,432,753
2002	405	8	48	$9,938,680
2003	829	4	29	$10,693,755

Totals	**2,983**	**31 @ $2,710,000 =** **$84,010,000**	**181 (90 @$1,560 = $140,400 and 91 @ $15,600 = $1,419,600** **for a total of $1,560,000)**	**$47,624,950**
Grand Total	**$133,194,950 (above costs for 2,983 structure fires)**			
Estimated Average Cost of a Structure Fire	**$44,651**			
Average Number of Structure Fires Per Year	**597**			
Average Annual Estimated Cost of Structure Fires	**$26,656,647**			

Mitigation Strategies for Structure Fires

The following strategies are suggested to minimize the effects of Genesee County's number two hazard, structure fires:

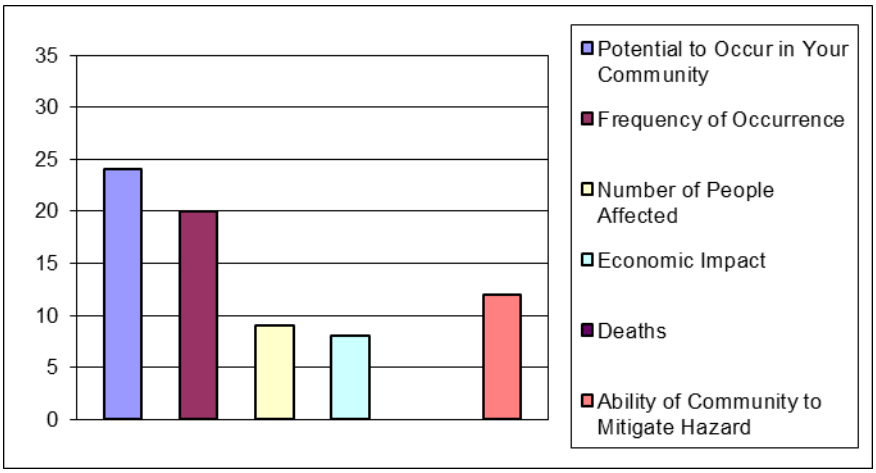
- Continued fire department training
- Continued first responder training
- Upgrade fire department equipment as needed
- Public education on fire safety
- Enforce fire codes
- Continued mutual aid agreements

Mitigation Projects

Atlas Township

Project: High pressure 10 inch water wells (electric).
Project Description: To be used by the Fire Department to fight fires in various Township locations. Township would like eight wells. Proposed timeframe for implementation: 1-5 years.
Budget: Approximately $28,000.00 per well

3 HAZARD: Riverine Flooding



Riverine Flooding

The overflowing of rivers, streams, drains and lakes due to excessive rainfall, rapid snowmelt or ice.

Hazard Description

Riverine flooding is ranked as the number three hazard in Genesee County. Flooding of land adjoining the normal course of a stream or river has been a natural occurrence since the beginning of time. If these floodplain areas were left in their natural state, flooding would not cause significant damage. Development has increased the potential for serious flooding because rainfall that used to soak into the ground or take several days to reach a river or stream via a natural drainage basin, now quickly runs off streets, parking lots, and rooftops, and through man-made channels and pipes.

Floods can damage or destroy public and private property, disable utilities, make roads and bridges impassable, destroy crops and agricultural lands, cause disruption to emergency services, and result in fatalities. People may be stranded in their homes for several days without power or heat, or they may be unable to reach their homes at all. Long-term collateral dangers include the outbreak of disease, widespread animal death, broken sewer lines causing water supply pollution, downed power lines, broken gas lines, fires, and the release of hazardous materials.

Flood-prone areas are found throughout the state, as every lake, river, stream and county drain has a

floodplain. The type of development that exists within the floodplain will determine whether or not flooding will cause damage. The Michigan Department of Environmental Quality estimates that about 6% of Michigan's land is flood-prone, which includes about 200,000 buildings in those areas.

Floodplain areas are identified based on hydrological and topographical surveys, as well as, soil studies and land cover characteristics. The result of this research is a statistical model that indicates an area vulnerable to the "100-year" flood. The term "100-year flood" is often used incorrectly and can be misleading. It does not refer to a certain flood that will occur once every 100 years. Rather, it is the flood elevation that has a 1% chance of being equaled or exceeded each year. So actually, the 100-year flood could occur more than once in a relatively short period of time. It is also referred to as the "1% annual chance flood."

The 100-year flood, which is the standard used by most federal and state agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance. The 100-year flood only has a 1% chance of occurring in any given year, but structures located in the flood hazard area have a 26% chance of suffering flood damage during the term of a 30-year mortgage. This means a home in the mapped flood hazard area is five times more likely to be damaged by flood than to have a major fire.

The southern half of the Lower Peninsula contains the areas with the most flood damage potential. The primary flooding sources include the Great Lakes and connecting waters (Detroit River, St. Clair River, and St. Mary's River), thousands of miles of rivers and streams, and hundreds of inland lakes. Michigan is divided into 63 major watersheds. All of these watersheds experience flooding, although the following watersheds have experienced the most extensive flooding problems or have significant damage potential: 1) Clinton River; 2) Ecorse River; 3) Grand River; 4) Huron River; 5) Kalamazoo River; 6) Muskegon River; 7) Saginaw River; 8) Rifle River; 9) River Raisin; 10) Rouge River; 11) St. Joseph River; and 12) Whitefish River. The flooding is not restricted to the main branches of these rivers. Most riverine flooding occurs in early spring and is the result of excessive rainfall and/or the combination of rainfall and snowmelt. Ice jams also cause flooding in winter and early spring.

Severe thunderstorms may cause flooding during the summer or fall, although these are normally localized and have more impact on watercourses with smaller drainage areas. Oftentimes, flooding may not necessarily be directly attributable to a river, stream or lake overflowing its banks. Rather, it may simply be the combination of excessive rainfall and/or snowmelt, saturated ground, and inadequate drainage. With no place to go, the water will find the lowest elevations – areas that are often not in a floodplain. This type of flooding is becoming increasingly prevalent in Michigan, as development outstrips the ability of the drainage infrastructure to properly carry and disburse the water flow. Flooding also occurs due to combined storm and sanitary sewers that cannot handle the tremendous flow of water that often accompanies storm events. Typically, the result is water backing up into basements, which damages mechanical systems and can create serious public health and safety concerns.

Genesee County Perspective:

From 1975-1999, Michigan experienced seven flood disasters that resulted in both a Presidential Major Disaster declaration and a Governor's Disaster Declaration, and seven that resulted in a Governor's Disaster Declaration. Combined, these flood disasters have caused hundreds of millions of dollars in damage to homes, businesses, personal property, and agriculture. See **Table 2-14** for a list of recent Genesee County floods. During the last 18 years, Genesee County has had twenty-nine flood events. Based on these numbers, the county can expect 1.6 flood events per year.

Table 2-14. Genesee County Floods (1994-2013)

Location	Date	Type	Property Damage
Genesee Co.	2/19/1994	Flash Flood	$500,000
Flint	4/25/1994	Flash Flood	$-
Genesee Co.	4/27/1994	Flood	$-
Genesee Co.	6/29/1994	Flood	$-
Genesee Co.	3/12/1995	Flood	$-
Genesee Co.	5/21/1996	Flood	$-
Genesee Co.	5/21/1996	Flood	$-
Genesee Co.	6/18/1996	Flood	$-
Genesee Co.	6/18/1996	Flood	$-
Genesee Co.	6/23/1996	Flood	$-
Genesee Co.	12/24/1996	Flood	$-
Genesee Co.	2/21/1997	Flood	$-
Genesee Co.	2/27/1997	Flood	$-
Genesee Co.	2/27/1997	Flood	$-
Flint	6/21/1997	Flash Flood	$-
Mt. Morris	6/1/1999	Flash Flood	$-
Flint	7/29/2000	Flash Flood	$35,000
Genesee Co.	2/9/2001	Flood	$15,000
Genesee Co	5/23/2004	Flood	$100,000,000
Genesee Co	5/24/2004	Flood	$
Genesee Co	5/24/2004	Flood	$
Genesee Co.	9/22/2005	Flash Flood	$250,000
Flint	6/26/2006	Flash Flood	$35,000
Gaines Airport	6/17/2009	Flood	$200,000
Flushing	6/19/2009	Flash Flood	$ -
Duffield	5/13/2011	Flash Flood	$100,000
Gaines	7/28/2011	Flash Flood	$15,000
Lennon	5/4/2012	Flash Flood	$7,100,000
Argentine	5/4/2012	Flood	$ -

An important step in hazard mitigation is knowing where the County's floodplains are located. This information could impact future land use decisions. Also, homes or businesses already located in the floodplain may need to take action to mitigate the effects of the next flood on their property. Floodplain maps for Genesee County were developed by the NFIP. These maps, called Flood Insurance Rate Maps (FIRM), indicate which areas are vulnerable to flood hazards. These maps were then digitized using computer software, and can now be used as an overlay on county maps that show, where property is located.

The entire county has had its floodplains mapped, except for Forest Township, Richfield Township, and Thetford Township. Genesee County's mapped floodplain areas contain 2,691 structures that could potentially be flooded. Included in that number are 2,149 structures that have been identified as single- and multi-family homes. There are also 362 mobile homes, for a total of 2,511 residences. This means that 93% of the structures in the floodplains are homes. By using block-group information, staff determined that the average value of a Genesee County home in the floodplain was approximately $135,966.

A worst-case flood scenario could therefore jeopardize approximately $341,410,626 worth of homes. However, there are only about 461 flood insurance policies in the county. This indicates that most homes located in the flood plain are not currently covered by flood insurance, and are at risk for flood losses. See **Figure 2-3** for a map of Genesee County's floodplain areas. **Figure 2-4** shows structures located in the floodplain that could potentially be flooded.

Also, there are currently 17 repetitive loss structures in the county. Some of these structures have had losses up to five times as of 2001. The average total damage paid in claims (building and contents) per structure is $25,390.00. Repetitive loss structures put a strain on the flood insurance fund, as well as disrupt and threaten residents' lives over and over again. See **Table 2-15** for a list of repetitive loss structures. See **Figure 2-5** for a map of the repetitive loss structures.

Figure 2-6 shows the emergency facilities and 302 sites on the flood plain. It may be used to determine the possible added challenges that may be faced with flooding, such as the release of chemicals from 302 sites into the flood water, or the inability to access a hospital in the event of a large flood.

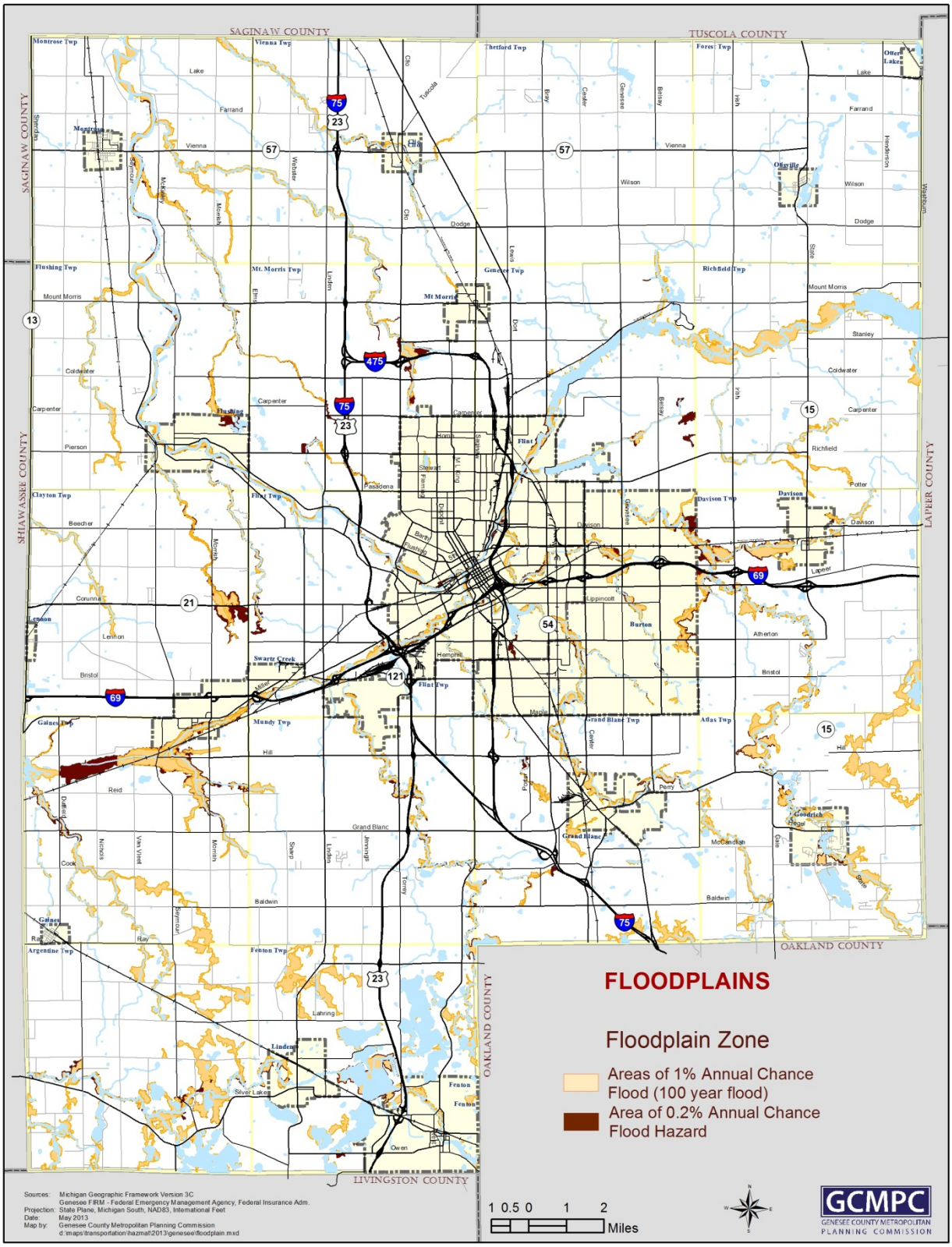

SAGINAW COUNTY
TUSCOLA COUNTY
SHIAWASSEE COUNTY
LAPEER COUNTY
OAKLAND COUNTY
LIVINGSTON COUNTY
FLOODPLAINS
Floodplain Zone
Areas of 1% Annual Chance Flood (100 year flood)
Area of 0.2% Annual Chance Flood Hazard
1 0.5 0 1 2
Miles
GCMPC
GENESEE COUNTY METROPOLITAN PLANNING COMMISSION
Sources: Michigan Geographic Framework Version 3C
Genesee FIRM - Federal Emergency Management Agency, Federal Insurance Adm.
Projection: State Plane, Michigan South, NAD83, International Feet
Date: May 2013
Map by: Genesee County Metropolitan Planning Commission
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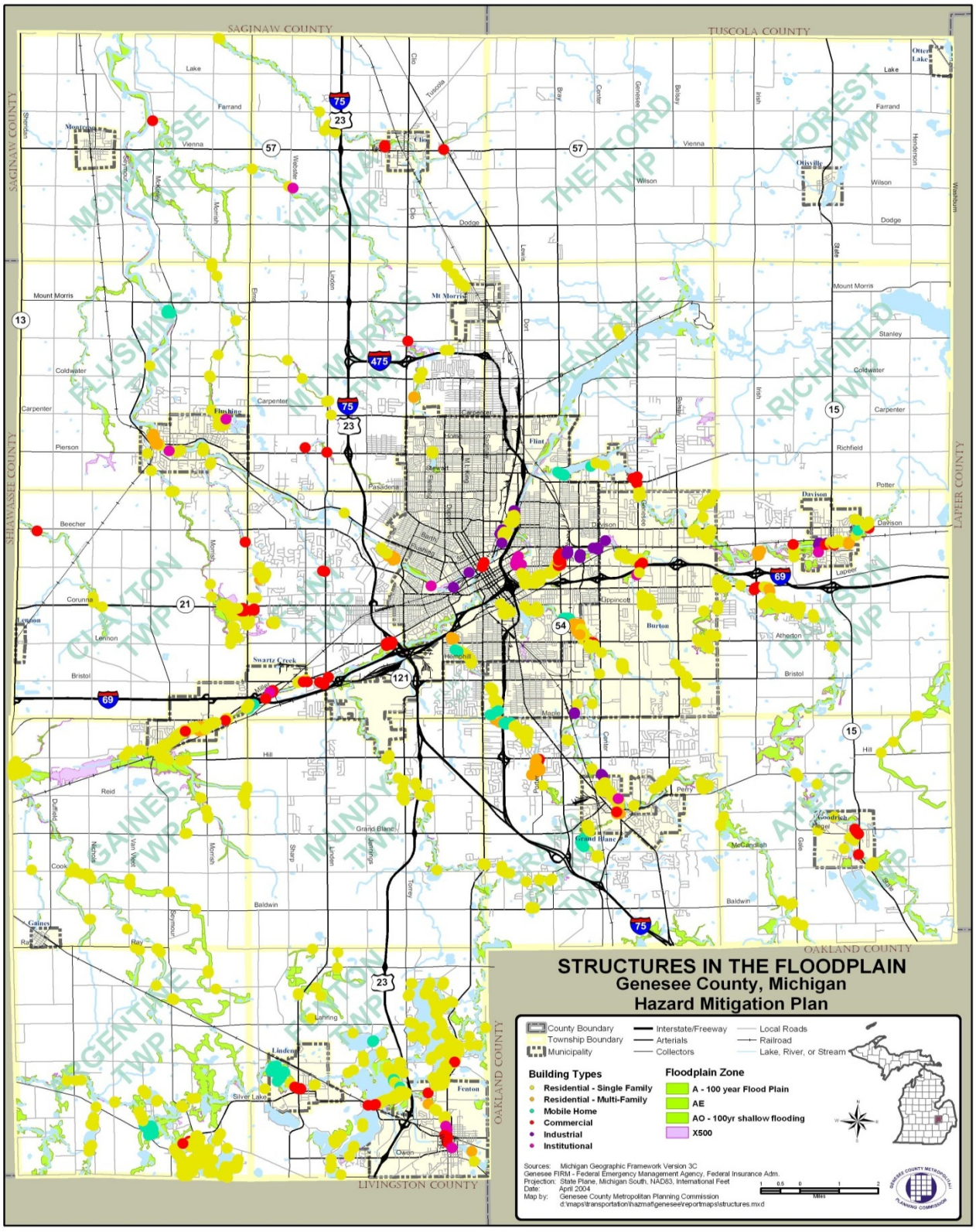
Figure 2-3


SAGINAW COUNTY
TUSCOLA COUNTY
SHIAWASSEE COUNTY
LAPEER COUNTY
OAKLAND COUNTY
LIVINGSTON COUNTY
STRUCTURES IN THE FLOODPLAIN
Genesee County, Michigan
Hazard Mitigation Plan
County Boundary
Township Boundary
Municipality
Interstate/Freeway
Arterials
Collectors
Local Roads
Railroad
Lake, River, or Stream
Building Types
Residential - Single Family
Residential - Multi-Family
Mobile Home
Commercial
Industrial
Institutional
Floodplain Zone
A - 100 year Flood Plain
AE
AO - 100yr shallow flooding
X500
Sources: Michigan Geographic Framework Version 3C
Genesee FIRM - Federal Emergency Management Agency, Federal Insurance Adm.
Projection: State Plane, Michigan South, NAD83, International Feet
Date: April 2004
Map by: Genesee County Metropolitan Planning Commission
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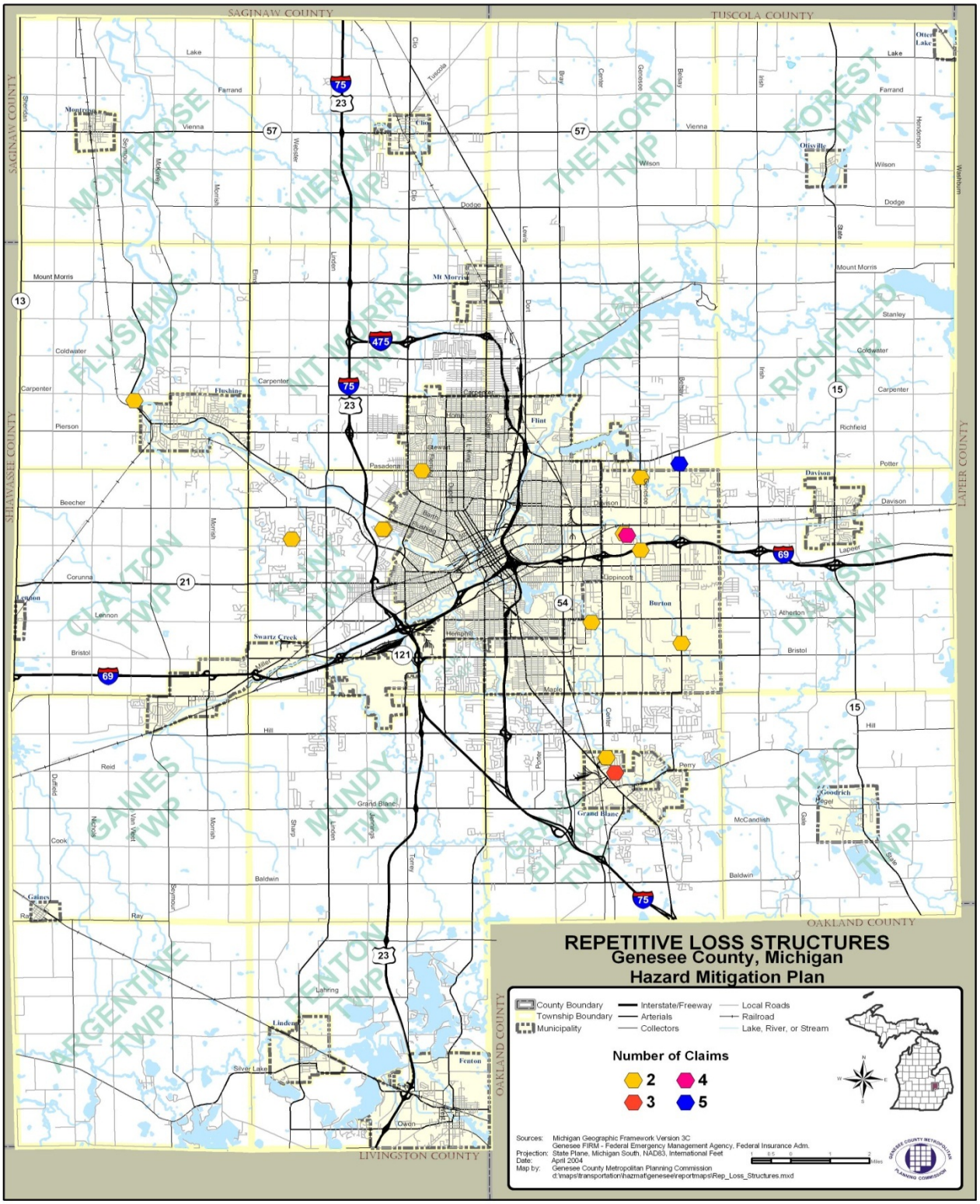
Miles

Figure 2-4


SAGINAW COUNTY
TUSCOLA COUNTY
SHIAWASSEE COUNTY
LAPEER COUNTY
OAKLAND COUNTY
LIVINGSTON COUNTY
MONTROSE TWP
VIENNA TWP
THETFORD TWP
FOREST TWP
FLUSHING TWP
MT MORRIS TWP
GENESEE TWP
RICHFIELD TWP
CLAYTON TWP
ARGENTINE TWP
MUNDY TWP
GAINES TWP
FENTON TWP
ATLAS TWP
GRAND BLANC TWP
DAVISON TWP
REPETITIVE LOSS STRUCTURES
Genesee County, Michigan
Hazard Mitigation Plan
County Boundary
Township Boundary
Municipality
Interstate/Freeway
Arterials
Collectors
Local Roads
Railroad
Lake, River, or Stream
Number of Claims
2
3
4
5
Sources: Michigan Geographic Framework Version 3C
Genesee FIRM - Federal Emergency Management Agency, Federal Insurance Adm.
Projection: State Plane, Michigan South, NAD83, International Feet
Date: April 2004
Map by: Genesee County Metropolitan Planning Commission
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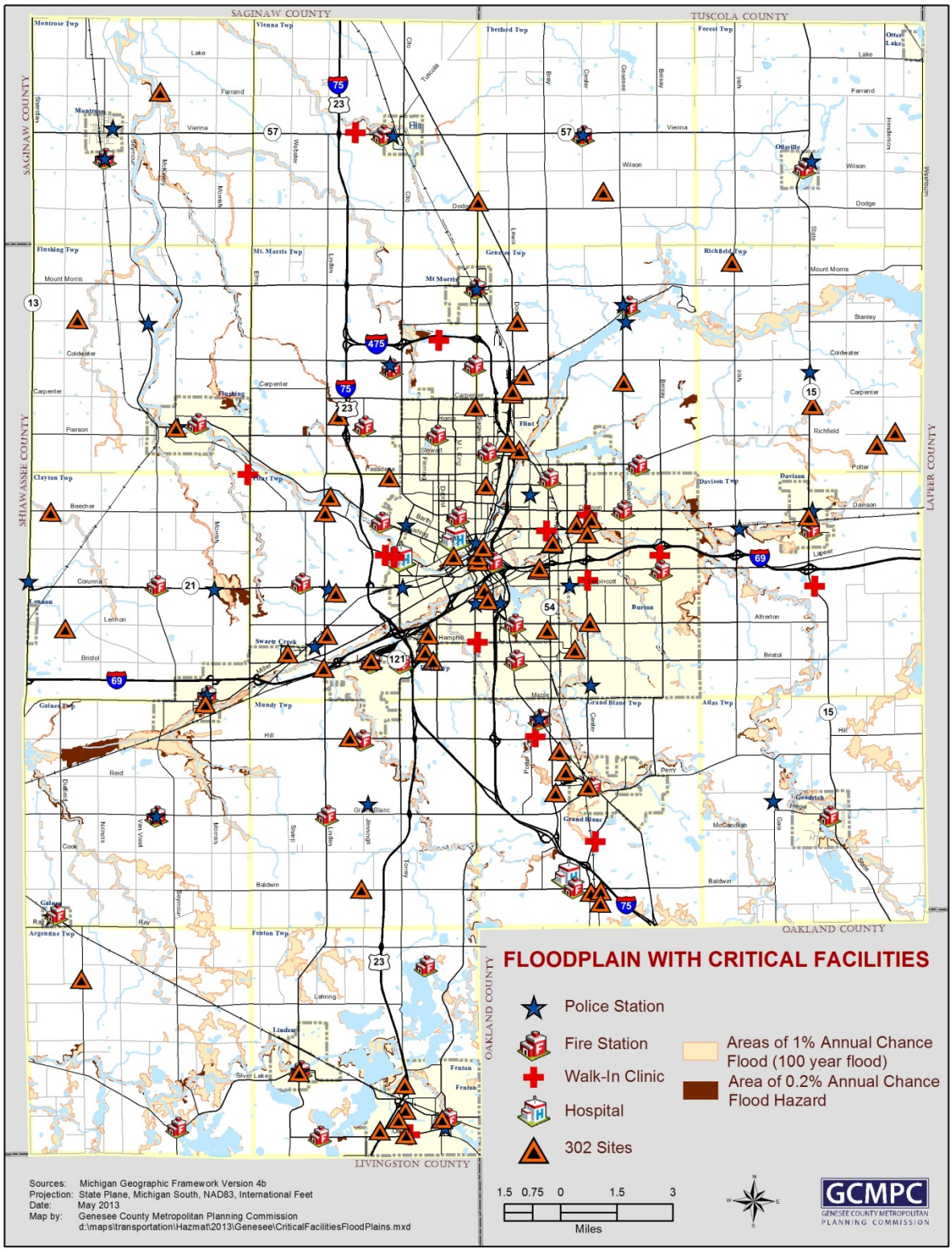
Miles

Figure 2-5

Table 2-15.	Genesee County Repetitive Loss Structures						
City	Mitigated?	Insured?	Occupancy	Building Value	Losses	Total Paid*	Date of Most Recent Loss
BURTON	NO	NO	SINGLE FMLY	65,000	2	38,923.05	09/06/1985
BURTON	NO	SDF	SINGLE FMLY	200,209	4	38,113.93	02/09/2001
BURTON	NO	NO	SINGLE FMLY	25,000	2	6,166.50	09/06/1985
BURTON	NO	NO	SINGLE FMLY	40,000	2	28,640.61	09/06/1985
BURTON	NO	NO	SINGLE FMLY	78,000	2	14,013.59	09/06/1985
BURTON	YES	NO	SINGLE FMLY	29,200	2	5,514.06	03/13/1982
FLINT	NO	NO	SINGLE FMLY	40,000	2	18,842.77	09/06/1985
FLINT	NO	NO	SINGLE FMLY	170,000	2	8,578.58	03/13/1982
FLINT	YES	NO	SINGLE FMLY	23,000	4	28,476.07	09/06/1985
FLINT	YES	NO	SINGLE FMLY	25,000	2	7,328.27	09/05/1985
FLINT	YES	NO	SINGLE FMLY	22,000	2	16,898.00	09/06/1985
FLUSHING	NO	NO	SINGLE FMLY	69,000	2	17,111.45	09/06/1985
FLINT	NO	SDF	SINGLE FMLY	98,850	5	163,199.08	02/09/2001
FLINT	YES	NO	SINGLE FMLY	38,000	2	4,869.13	09/06/1985
GRAND BLANC	NO	YES	SINGLE FMLY	65,000	2	7,511.80	03/13/1982
GRAND BLANC	NO	NO	SINGLE FMLY	44,000	2	11,175.91	10/01/1981
GRAND BLANC	NO	NO	SINGLE FMLY	75,000	3	16,266.51	03/13/1982
*Total damage paid in claims (building and contents) for each property.							


SAGINAW COUNTY
TUSCOLA COUNTY
SHIAWASSEE COUNTY
LAPEER COUNTY
OAKLAND COUNTY
LIVINGSTON COUNTY
FLOODPLAIN WITH CRITICAL FACILITIES
Police Station
Fire Station
Walk-In Clinic
Hospital
302 Sites
Areas of 1% Annual Chance Flood (100 year flood)
Area of 0.2% Annual Chance Flood Hazard
1.5 0.75 0 1.5 3
Miles
Sources: Michigan Geographic Framework Version 4b
Projection: State Plane, Michigan South, NAD83, International Feet
Date: May 2013
Map by: Genesee County Metropolitan Planning Commission
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GCMPC
GENESEE COUNTY METROPOLITAN PLANNING COMMISSION

Figure 2-6

- On May 23 and 24, 2004, severe thunderstorms and heavy rains were to blame for widespread flooding in southeastern Michigan. Much of the rainfall occurred in saturated areas that had experienced well-above average precipitation for the month of May. Actually, May 2004 will go down as the wettest May on record at Flint and Detroit. During a 36 hour period (12 am May 22nd to 8 am May 23rd), up to 6" of rain fell across southeastern Michigan. Genesee County was declared a major disaster area by President Bush along with Shiawassee, Livingston, Macomb and Oakland Counties due to the flooding and severe storms.

- On February 9, 2001, a flood knocked out the pump at a Flint Township waste water treatment plant, starting a flow of at least 30 million gallons of sewer water into the Flint River system Saturday. The spill came on a day that Genesee County had declared a State of Emergency because of flooding. Two water mains broke and residents battled for a second day to keep water out of their homes.

- On July 29, 2000, Bishop International Airport recorded 2.65" of rain. This was the fourth straight day with heavy rains in the area. The previous day, 2.26" of rain were recorded. The resulting flood waters left just one lane of I-75 open in each direction in Flint, and contributed to a major accident involving a large truck.

- On September 5, 1985, when severe thunderstorms struck east central Michigan, resulting in flooding in a six county area. As much as 7.45 inches of rain fell in Genesee County, which was hardest hit. The heavy rainfall caused flash flooding in many areas. Damage occurred primarily from overbank flooding on major rivers and streams. In addition, widespread flooding occurred in residential areas due to overburdened storm water drainage systems. Over 2,500 homes were damaged, many roads were washed out and bridges damaged, and extensive agriculture damage occurred. Total public and private damage was estimated at $63 million. A Presidential Major Disaster declaration was granted for the six counties

Vulnerability Assessment:

Costs associated with flooding include deaths, injuries, loss of infrastructure, damage to property and contents, temporary housing, use of emergency personnel and clean-up afterwards. Genesee County's mapped floodplain areas contain 2,511 homes. These homes account for 93% of all structures in the mapped floodplains. See **Table 2-16** for a breakdown of the types of structures in the floodplain. Also, see **Figure 2-6** for a map of Genesee County's population density.

Table 2-16. Structures in the Genesee County Mapped Floodplain Areas		
Types of Structures	Number of Structures	Percentages
Residential:		
Single-family	1,965	73%
Multi-family	184	7%
Mobile Homes	362	13%
Total Residential:	**2,511**	**93%**
Non-residential:		
Commercial	135	5%
Industrial	28	1%
Institutional	17	1%
Total Non-residential:	**180**	**7%**
Total of All Structures:	**2,691**	**100%**

To estimate the amount of residential flood damage that could occur in the mapped Genesee County floodplains, staff used some basic FEMA techniques. These techniques included finding the replacement values of the structures, and estimating damages by equating flood depths with appropriate percentages of that replacement value. For the purposes of this flooding scenario, staff estimated that approximately one-quarter (628) of the 2,511 homes in the floodplain were damaged by 7' of flood water during the 100-year flood event. Flood Damage Estimation Tables adapted from the Flood Insurance Administration were used to estimate a damage percentage for different types of structures. See **Table 2-17** for a Flood Damage Estimation Table.

Table 2-17. Flood Damage Estimation (Numbers are damages as a percentage of the structure's replacement value)						
Depth of Flooding in Feet	1 story, no basement	2 story, no basement	Split-level, no basement	1 or 2 story with basement	Split-level with basement	Mobile Home
About 1' flooding at surface	14%	9%	9%	15%	16%	44%
About 2' flooding on ground floor	22%	13%	13%	20%	19%	63%
About 3' flooding on	27%	18%	25%	23%	22%	73%

ground floor						
About 4' flooding on ground floor	29%	20%	27%	28%	27%	78%
About 5' flooding on ground floor	30%	22%	28%	33%	32%	80%
About 6' flooding on ground floor	40%	24%	33%	38%	35%	81%
About 7' flooding on ground floor	43%	26%	34%	44%	36%	82%

Note: This table is adapted from Flood Insurance Administration guidelines, based on historical averages from observed flood damages. Since replacement value may exceed the current market value of a structure, damages greater than 50% of the replacement value can be considered a total loss of the structure, unless special historic or service functions require that additional expenses be undertaken to repair and preserve it.

The Flood Damage Estimation Table sorts residential structures into six categories. Using these six categories, staff estimated that 5% of the flooded homes (31) would be 1 story, no basement; 20% of the flooded homes (126) would be 2 story, no basement; 10% of the flooded homes (63) would be split-level, no basement; 40% of the flooded homes (251) would be 1 or 2 story, with a basement; 15% of the flooded homes (94) would be split-level with a basement; and 10% of the flooded homes (63) would be mobile homes. From the block-group information, staff calculated that the average value of a Genesee County home in the floodplain was approximately $135,966. This average value figure was then multiplied by the appropriate damage percentages in **Table 2-18** to arrive at a damage cost for each type of structure. The resulting damage costs were then multiplied by the number of flooded homes in each structure category to arrive at the residential structure damages, as seen in **Table 2-18.** The total cost of residential structure damage for this flood scenario in Genesee County would be approximately $35,820,243.

Table 2-18. Flood Scenario Estimated Structure Damage by Residential Structure Category

Types of Structure	Average Cost of Home	Damage Percentage From Table 2-17	Number of Structures Affected by Flood Scenario	Estimated Damage to Structures
1 story, no basement	$135,966	.43	31	$ 1,812,427
2 story, no basement	"	.26	126	$ 4,454,246
Split-level, no basement	"	.34	63	$ 2,912,392
1 or 2 story with basement	"	.44	251	$ 15,016,085
Split-level with basement	"	.36	94	$ 4,601,089
Mobile Home	"	.82	63	$ 7,024,004

Total Number of Structures:	**628**
Total Estimated Structure Damage:	**$ 35,820,243**

Damage to the contents of these structures must also be calculated and then added to the structural damages to obtain a total estimated damage amount. It is assumed that the contents of a residential structure are equal to 30% of the replacement value of the home, then it is estimated that the damages to those contents will be 1.5 times the appropriate percentages from **Table 2-17**. An amount is then obtained that is estimated to be the contents damage in one flooded home in this scenario. That figure is then multiplied by the number of homes in that structure category to get the total contents damage in that category. The contents damage to all six categories are added together, resulting in the total estimated contents damage for residential structures as seen in **Table 2-19**.

Table 2-19. Flood Scenario Estimated Contents Damage by Residential Structure Category

Types of Structure	Average Cost Of Home x .30	Value of Contents	Damages to Contents	Damages to Contents of One Home	Number of Structures Affected by Flood Scenario	Estimated Damage to Contents
1 story, no basement	$135,966 x .30	$40,790	1.5 x .43	$26,310	31	$ 815,610
2 story, no basement	"	"	1.5 x .26	$15,908	126	$ 2,004,408
Split-level, no basement	"	"	1.5 x .34	$20,803	63	$ 1,310,589
1 or 2 story with basement	"	"	1.5 x .44	$26,921	251	$ 6,757,171
Split-level with basement	"	"	1.5 x .36	$22,027	94	$ 2,070,538
Mobile Home	"	"	1.5 x .82	$50,172	63	$ 3,160,836
Total Number of Structures:					**628**	
Total Estimated Contents Damage:						**$16,119,152**

Adding together the structural damage and the contents damage from the scenario, the total residential damage is estimated to be $51,939,395 as shown in **Table 2-20**. It is important to note that only 25% of the residences in the mapped floodplains were included in this scenario, that is, only 628 of the 2,511 homes in the mapped floodplains. If the flooding scenario had included a larger percentage of homes, the already hefty damage estimate would have grown accordingly.

Table 2-20. Flood Scenario Total Residential Damage	
Total Estimated Structure Damage:	$35,820,243
Total Estimated Contents Damage:	$16,119,152
Total Residential Damage:	**$51,939,395**

Mitigation Strategies for Riverine Flooding

The following strategies are suggested to minimize the effects of Genesee County's number three hazard, riverine flooding:

- Map all floodplains
- Identify all structures in the floodplain
- Enforce/adopt land use regulations to prevent development in floodplains
- Move existing mobile home parks from floodplains
- Retrofit existing structures in floodplains
- Emergency generators
- Public education about safety during a flood
- Update Disaster Response Plan if necessary
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

New Mitigation Projects

Atlas Township

Project: Natural gas backup generator for Atlas Township Office/Hall which also serves as a Community Room and sub-station for Genesee County Sheriff Department.

Project Description: To allow use as a safe haven room year round for residents needing shelter. Location of generator would be: 7386 S. Gale Road, Grand Blanc, MI. Proposed timeframe for implementation is 1-5 years.

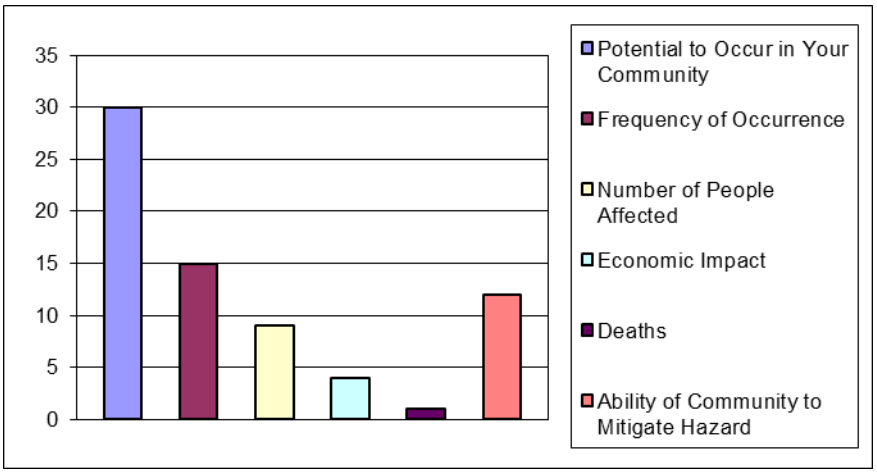
	Budget: $31,000.00 (Have currently received quote from Consumers Energy- waiting for quotes from 2 private contractors). Project: Drainage improvements to reduce risk of flooding to residential structures. Project Description: Location: Catherwood/Farnsworth, Hill Road, Washburn Road between County Line (Ray Road) and Kipp Road. Proposed timeframe for implementation: 1-5 years. **Budget: $500,000.00** Project: Boat for water or ice rescue Project Description: For Fire Department to help with evacuation in the event of floods or dam failure within the Village of Goodrich. Proposed timeframe for implementation: 1-5 years. **Budget: $5,000.00**
City of Flint	Project: Hamilton Dam Project Description: The City of Flint is looking into possibly working on improvements to the Hamilton Dam.
City of Linden	Project: Stand-alone generator for City Hall Project Description: The City of Linden's Police, Fire, and Department of Public Works are housed at the City Hall. Currently, if the power goes out in the city, the City Hall building loses power as well. This prevents emergency sirens from being turned on and emergency personnel would not be able to operate. City Hall is designated as an Incident Command Post; however, with a loss in power, this would not be possible. Proposed timeframe for implementation: 1-5 years. **Budget: $30,000.00**
Flushing Township	Project: Back-up Generator Project Description: Install a back-up generator in the Township Hall. Proposed timeframe for implementation: 1-5 years. **Budget: $80,000**
Flushing Township	Project: Dredge Brent Creek and Cole Creek Project Description: Dredge creeks to prevent the flooding of roads caused by heavy rainfall. Proposed timeframe for implementation: 1-5 years. **Budget: $10,000-$30,000**
University of Michigan	Project: Flood Mitigation Plan

Flint	Project Description: Provide the funding to develop a Flood Mitigation Plan. This plan will address ongoing mitigation needs such as installing USGS constructing berms /physical barriers that can resist the elevation associated with the overflow of the Flint River. Proposed timeframe for implementation: 1-5 years. **Budget: $50,000**

Mitigation Projects

Genesee County Emergency Management	The project includes relocation of mobile home parks in flood-prone areas. **Estimated project cost: $4,000,000**

4 HAZARD: Extreme Temperatures



Extreme Temperatures

Prolonged periods of very high or very low temperatures, often accompanied by other extreme meteorological conditions.

Hazard Description

Extreme temperatures are ranked as the number four hazard in Genesee County. This county is susceptible to both extreme heat and extreme cold. It is not uncommon to have a 40-degree swing in temperature within a 24-hour period. Prolonged periods of extreme temperatures, whether extreme summer heat or extreme winter cold, can pose severe and often life-threatening problems for Michigan's citizens. Although they are radically different in terms of initiating conditions, the two hazards share a commonality in that they both primarily affect the most vulnerable segments of the population – the elderly, children, impoverished individuals, and people in poor health.

Extreme Summer Heat

Extreme summer weather is characterized by a combination of very high temperatures and exceptionally humid conditions. When persisting over a long period of time, this phenomenon is commonly called a heat wave. The major threats of extreme summer heat are heatstroke (a major medical emergency), and heat exhaustion. Heatstroke often results in high body temperatures, and the victim may be delirious, comatose, or fall into a stupor. Rapid cooling is essential to preventing permanent neurological damage or death.

Heat exhaustion is a less severe condition than heatstroke, although it can still cause severe problems such as dizziness, weakness and fatigue. Heat exhaustion if often the result of fluid

imbalance due to increased perspiration in response to the intense heat. Treatment generally consists of restoring fluids and staying indoors in a cooler environment until the body returns to normal. Other, less serious risks associated with extreme summer heat are often exercise-related and include heat syncope (a loss of consciousness by persons not acclimated to hot weather), and heat cramps (an imbalance of fluids that occurs when people unaccustomed to heat exercise outdoors). Because the combined effects of high temperatures and high humidity are more intense in urban centers, heatstroke and heat exhaustion are a greater problem in cities than in suburban or rural areas. Nationwide, approximately 200 deaths a year are directly attributable to extreme heat. Extreme summer heat is also hazardous to livestock and agricultural crops, and it can cause water shortages, exacerbate fire hazards, and prompt excessive demands for energy. Roads, bridges, railroad tracks and other infrastructure are susceptible to damage from extreme heat. Air conditioning is probably the most effective measure for mitigating the effects on extreme summer heat on people. Unfortunately, many of those most vulnerable to this hazard do not live or work in air-conditioned environments, especially in major urban centers where the vulnerability is highest. The use of fans to move air may help some, but recent research indicates that increased air movement may actually exacerbate heat stress in many individuals.

Extreme Winter Cold

Like heat waves, periods of prolonged, unusually cold weather can result in a significant number of temperature-related deaths. Each year in the United States, approximately 700 people die as a result of severe cold temperature-related causes. This is substantially higher than the average of 200 heat-related deaths each year. It should be noted that a significant number of cold-related deaths are not the direct result of "freezing" conditions. Rather, many deaths are the result of illnesses and diseases that are negatively impacted by severe cold weather, such as stroke, heart disease and pneumonia. It could convincingly be argued that, were it not for the extreme cold temperatures, death in many cases would not have occurred at the time it did from the illness or disease alone.

Hypothermia (the unintentional lowering of core body temperature), and frostbite (damage from tissue being frozen) are probably the two conditions most closely associated with cold temperature-related injury and death. Hypothermia is usually the result of over-exposure to the cold, and is generally thought to be clinically significant when core body temperature reaches 95 degrees or less. As body temperature drops, the victim may slip in and out of consciousness, and appear confused or disoriented. Treatment normally involves re-warming the victim, although there is some controversy in the medical community as to exactly how that should be done. Frostbite rarely results in death, but in extreme cases it can result in amputation of the affected body tissue.

Hypothermia usually occurs in one of two sets of circumstances. One situation involves hypothermia associated with prolonged exposure to cold while participating in outdoor sports such as skiing, hiking, or camping. Most victims of this form of hypothermia tend to be young, generally healthy individuals who may lack experience in dealing with extreme cold

temperatures. The second situation involves a particularly vulnerable person who is subjected to only a moderate, indoor cold stress. A common example would be that of an elderly person living in an inadequately heated home. In such circumstances, hypothermia may not occur until days, or perhaps weeks after the cold stress begins.

The special vulnerability of elderly persons to hypothermia has become readily apparent. Over half of the approximately 700 persons who die each year due to cold exposure are 60 years of age or older, even though this age group only represents about 20% of the country's population. This remarkable statistic may be due, in part, to the fact that elderly persons appear to perceive cold less well than younger persons and may voluntarily set thermostats to relatively low temperatures. In addition, high energy costs and the relative poverty among some elderly people may discourage their setting thermostats high enough to maintain adequate warmth. Because many elderly people live alone and do not have regular visitors, the cold conditions may persist for several days or weeks, thus allowing hypothermia to set in.

Babies and very young children are also very vulnerable to hypothermia. In addition, statistics indicate that death due to cold is more frequent among males than females in virtually all age groups. Part of that may be explained by differences in risk factors, and part may be due to different rates of cold exposure between the sexes.

Genesee County Perspective:

See **Table 2-21** for a detailed list of extreme temperature events in Genesee County.

- On January 5, 2014, a polar vortex made its way through Genesee County, bringing with it the worst snow storm in nearly forty years and subzero temperatures with high winds. The coldest temperatures were on January 7, with temperatures reported as low as negative 45 degrees with the wind chill. Most schools, along with some businesses and local government offices were closed, as people were advised not to leave their homes.

- For a three week period in late December of 2002 and early January of 2003, the temperatures never rose above freezing. On January 10, 2003, the City of Flint had several reports of water main breaks. Broken water mains place a severe strain on residents, depriving them of a basic city service. The frigid temperatures also make repair of the broken water mains even more difficult. Several area schools had to cancel classes due to frozen pipes. Many homeless shelters in the area were filled to capacity and area hospitals reported dozens of cases of frostbite.

- In June of 2002, Governor John Engler requested federal disaster assistance for 26 Michigan counties (including Genesee) that faced devastating grapefruit and some vegetable crop losses due to extreme weather conditions in the spring. These counties experienced record-high temperatures during the week of April 14, followed by freezing temperatures and frost that caused extreme bud damage. Hail and cold, wet weather conditions throughout the month of May also kept bee activity low, resulting in limited

pollination of fruit crops. Additional frost and freezing temperatures May 17 to 22 further damaged crops.

Table 2-21. Genesee County Extreme Temperature Events					
Location	**Date**	**Type**	**Deaths**	**Injuries**	**Property Damage**
Genesee Co.	12/9/1995	Cold Wave	3	0	$
Genesee Co.	2/1/1996	Extreme Cold	1	0	$
Genesee Co.	1/17/1997	Extreme Cold	2	0	$
Genesee Co.	1/12/1999	Extreme Cold	0	1	$
Genesee Co.	2/11/1999	Record Warmth	0	0	$
Genesee Co.	7/4/1999	Excessive Heat	0	52	$
Genesee Co.	3/8/2000	Record Warmth	0	0	$
Genesee Co.	12/21/2000	Extreme Cold	0	0	$475,000
Genesee Co.	8/6/2001	Excessive Heat	1	200	$
Genesee Co.	1/10/2003	Extreme Cold/Wind Chill	0	0	$
Genesee Co.	5/29/2006	Heat	0	4	$ -
Genesee Co.	7/29/2006	Heat	0	0	$ -
Genesee Co.	8/1/2006	Heat	0	0	$ -
Genesee Co.	2/3/2007	Cold/Wind Chill	0	10	$25,000
Genesee Co.	7/17/2011	Excessive Heat	0	0	$ -
Genesee Co.	6/28/2012	Heat	0	8	$ -
Genesee Co.	7/1/2012	Heat	0	5	$ -

Mitigation Strategies for Extreme Temperatures

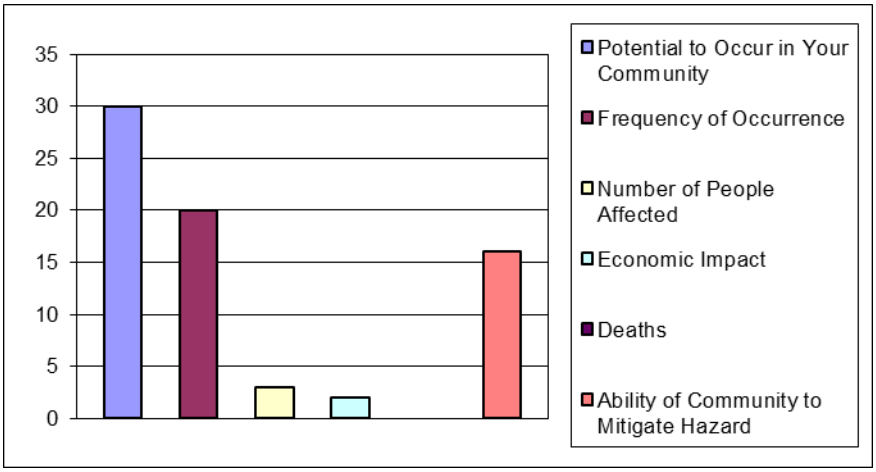
The following strategies are suggested to minimize the effects of Genesee County's number four hazard, extreme temperatures:

- Emergency generators
- Community shelters
- Public education on safety during extreme temperatures
- Distribution of weather radios
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

Mitigation Projects

Atlas Township	Project: Natural gas backup generator for Atlas Township Office/Hall which also serves as a Community Room and sub-station for Genesee County Sheriff Department. Project Description: To allow use as a safe haven room year round for residents needing shelter. Location of generator would be: 7386 S. Gale Road, Grand Blanc, MI. Proposed timeframe for implementation is 1-5 years. **Budget: $31,000.00** (Have currently received quote from Consumers Energy- waiting for quotes from 2 private contractors).
Flushing Township	Project: Back-up Generator Project Description: Install a back-up generator in the Township Hall. Proposed timeframe for implementation: 1-5 years. **Budget: $80,000**

4 HAZARD: Hazardous Materials Incidents during Transportation



Hazardous Materials Incidents during Transportation

An uncontrolled release of hazardous materials during transport capable of posing a risk to life, health, safety, property or the environment.

Hazard Description

Hazardous materials incidents during transportation are ranked as the number four hazard in Genesee County. As a result of the extensive use of chemicals in our society, all modes of transportation – highway, rail, air, marine, and pipeline – are carrying thousands of hazardous materials shipments on a daily basis through local communities. A transportation accident involving any one of those hazardous material shipments could cause a local emergency affecting many people. Pipeline transportation accident issues are addressed in the "Oil or Natural Gas Well/Pipeline Accidents" section of this document. Refer to that section for information on those particular hazards.

Michigan has had numerous hazardous material transportation incidents that affected the immediate vicinity of an accident site or a small portion of the surrounding community. Those types of incidents, while problematic for the affected community, are fairly commonplace. They are effectively dealt with by local and state emergency responders and hazardous material response teams. Larger incidents, however, pose a whole new set of problems and concerns for the affected community. Large-scale or serious hazardous material transportation incidents that involve a widespread release of harmful material (or have the potential for such a release) can adversely impact the life, safety and/or health and well-being of those in the immediate

vicinity of the accident site, as well as those who come in contact with the spill or airborne plume. In addition, damage to property and the environment can be severe as well. Statistics show almost all hazardous material transportation incidents are the result of an accident or other human error. Rarely are they caused simply by mechanical failure of the carrying vessel.

Being surrounded by the Great Lakes, one of the most dangerous hazardous material transportation accident scenarios that could occur in Michigan would be a spill or release of oil, petroleum or other harmful materials into one of the lakes from a marine cargo vessel. Such an incident, if it involved a large quantity of material, could cause environmental contamination of unprecedented proportions. Fortunately, the Great Lakes states, working in partnership with oil and petroleum companies and other private industries, have taken significant steps to ensure that a spill of significant magnitude is not likely to occur on the Great Lakes.

Heating fuel and motor fuel account for approximately 98% of all the hazardous materials that are being transported on today's roadways. The remaining 2% includes all other hazardous materials. Available estimates from the Michigan State Police indicate that about 100 loads of propane go over I-69 daily during the winter season. In the warmer months, this amount declines. However, large quantities of anhydrous ammonia are transported during the warmer months. Anhydrous ammonia is sprayed on farm fields, and is also used for air conditioning and refrigeration purposes. This would also be an extremely dangerous hazardous material if a release occurred during transportation.

Genesee County Perspective:

Genesee County has had numerous small-scale hazardous material transportation incidents that required a response by local fire departments and hazardous material teams, and many required the implementation of evacuation and other protective actions. As a major manufacturer, user and transporter of hazardous materials, Genesee County remains vulnerable to the threat of a serious hazardous material transportation incident at any point in time. Also, Genesee County is crisscrossed by major interstate routes and state trunk line roads, all of which are used by commercial traffic that may be transporting hazardous materials.

To get an estimate of how many trucks may be carrying hazardous materials on these roads, MDOT's 2003 commercial traffic counts were used as a baseline. These counts are Average Daily Traffic (ADT) counts for major routes within the City of Flint. Using these numbers, and estimating that 10% of all truck traffic in the county is carrying hazardous materials, **Table 2-22** was developed.

Table 2-22. Commercial ADTs and Estimated Trucks Carrying Hazardous Materials		
Major Route in Flint, MI	MDOT Commercial ADT	Estimated Trucks Carrying Hazardous Materials
I-69	7,500	750
I-75	8,600	860
I-475	2,400	240
M-54	1,700	170
M-21	870	87
Totals	**21,070**	**2,107**

Approximately 2,107 trucks carrying hazardous materials are on Genesee County roads on a daily basis. Also see **Figure 2-7**. This map includes a buffer zone of one mile where major transportation routes carry hazardous materials. These buffer zones cover approximately 262 square miles of the county, and include about 61% of the county population.

- On January 2, 2014, a tanker hauling crude oil fell off of the I-69 overpass onto Irish Road in Davison and exploded. Residents were evacuated. Irish Road has been closed at the point of explosion until MDOT is able to determine the extent of the damage.

- On August 7, 2013, there was a spillage of .25 liquid gallons of potassium hydroxide, solution, considered a hazardous class 8 corrosive material, on the highway in Flint. The spill cost less than $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On June 26, 2013, there was a spillage of .25 liquid gallons of corrosive liquids, N.O.S., considered a hazardous class 8 corrosive material, on the highway in Swartz Creek. The basic material was punctured during a forklift accident. The spill was taken care of through in-house cleanup and the cost was less than $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On May 3, 2013, there was a spillage of .028125 liquid gallons of paint (including paint, lacquer, enamel, stain, shellac solutions, varnish, polish, liquid filler and liquid lacquer base), considered a hazardous class 3 flammable- combustible liquid, on the highway in Flint. The inner packaging leaked because of a defective component or device. The spill was taken care of through in-house cleanup and the cost was less than $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On April 4, 2013, there was a spillage of .000001 liquid gallons of paint (including paint, lacquer, enamel, stain, shellac solutions, varnish, polish, liquid filler and liquid lacquer base), considered a hazardous class 3 flammable- combustible liquid, on the highway in Davison. The inner packaging leaked because it was dropped. The material loss was

$500 and the remediation/cleanup cost was $2,400 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On January 14, 2013, there was an incident involving corrosive solid, basic, organic, N.O.S., considered a hazardous class 8 corrosive material, on the highway in Flint. The cost was less than $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On November 5, 2012, there was a spillage of .125 liquid gallons of styrene monomer, stabilized, considered a hazardous class 3 flammable- combustible liquid, on the railway in Flint. The bottom outlet valve leaked because of inadequate preparation for transportation. The spill was taken care of through in-house cleanup. Material loss was $10 and the response cost was $6,050 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On August 11, 2012, there was an incident involving ethyl ether, considered a hazardous class 3 flammable- combustible liquid in a Federal Express airplane in the air over Flint. The incident was taken care of through in-house cleanup and cost less than $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On July 13, 2011, there was a spillage of .25 solid pounds of articles, pyrotechnic for technical purposes, considered a hazardous class 1.4s explosive no blast hazard, on the highway in Flint. The closure leaked because of a defective component or device. The cost was less than $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On May 30, 2012, there was a spillage of 1 solid pound of environmentally hazardous substances, solid, N.O.S., considered a hazardous class 9 miscellaneous hazardous material, on the highway in Burton. The gasket leaked because of deterioration or aging. The spill was taken care of through in-house cleanup and the cost was less than $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On May 19, 2011, there was a spillage of .015625 liquid gallons of xylenes, considered a hazardous class 3 flammable- combustible liquid, on the highway in Flint. The closure leaked because of human error. The spill was taken care of through in-house cleanup and the cost was less than $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On March 9, 2011, there was an incident with methyltrichlorosilane, considered a hazardous class 3 flammable-combustible liquid, on the railway in Flint. There were Fire and EMS on the scene and the response cost was $2,000. Nine members of the general public were evacuated and there were three transportation arteries or facilities closed. The material was involved in a derailment. The train was traveling at approximately 5

mile per hour and left the roadway/track and was overturned because of the rainy weather conditions (U.S. Department of Transportation Hazardous Materials Incident Report).

- On February 18, 2011, there was a spillage of 1 solid pound of batteries, wet, filled with alkali, electric storage, considered a hazardous class 8 corrosive material, on the highway in Flint. The basic material burst or ruptured because of inadequate blocking and bracing. The response cost was $250 and the remediation/cleanup cost was $1,000 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On February 17, 2011, there was a spillage of .5 liquid gallons of corrosive liquid, basic, organic, N.O.S., considered a hazardous class 8 corrosive material, on the highway in Flint. The inner packaging leaked because of a defective component or device. The spill was taken care of through in-house cleanup and the cost was less than $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On January 25, 2011, there was a spillage of .25 liquid gallons of flammable liquids, N.O.S., considered a hazardous class 3 flammable-combustible liquid, on the highway in Flint. The basic material was gouged or cut in a forklift accident. The spill was taken care of through in-house cleanup and the cost was less than $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On October 5, 2010, there was a spillage of 30 liquid gallons of diesel fuel, considered a hazardous class 3 flammable- combustible liquid, on the highway in Flint. The cause was overfilling. The remediation/cleanup cost was $2,500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On July 19, 2010, there was a spillage of .5 liquid gallons of isopropanol or isopropyl alcohol, considered a hazardous class 3 flammable-combustible liquid, on the highway in Flint. The inner packaging leaked because of improper preparation for transportation. The spill was taken care of through in-house cleanup and the cost was less than $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On December 21, 2010, there was a spillage of .25 liquid gallons of flammable liquids, corrosive, N.O.S., considered a hazardous class 3 flammable- combustible liquid, on the highway in Flint. The basic material was crushed because of inadequate blocking and bracing. The spill was taken care of through in-house cleanup and the cost was less than $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On August, 31, 2010, there was a spillage of 8 solid pounds of batteries, wet, filled with acid, electric storage, considered a hazardous class 8 corrosive material, on the highway in Flint. The closure leaked because of a forklift accident. The spill was taken care of

through in-house cleanup and the cost was less than $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On July 9, 2010, there was a spillage of .007812 liquid gallons of petroleum distillates, N.O.S. or petroleum products, N.O.S., considered a hazardous class 3 flammable-combustible liquid, on the railway in Flint. The man way or dome cover leaked because of a loose closure, component, or device, and the gasket leaked because of deterioration or age. Fire, EMS, and Police were on the scene. The spill was taken care of through in-house cleanup and the response cost was $6,050 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On June 2, 2010, there was a spillage of 2 liquid gallons of muriatic acid, considered a hazardous class 8 corrosive material, on the highway in Flint. The basic material was punctured in a forklift accident. The spill was taken care of through in-house cleanup and the cost was less than $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On January 27, 2010, there was a spillage of 1.5 liquid gallons of corrosive liquids, toxic N.O.S., considered a hazardous class 8 corrosive material, on the highway in Flint. The basic material leaked because of impact with a sharp or protruding object. The spill was taken care of through in-house cleanup and the cost was less than $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On June 19, 2009, there was an issue, but no release of dry ice, a hazardous material class 9 miscellaneous hazardous material, while a Federal Express airplane was in transit over Flint. The ventilation of the basic material failed because of improper preparation for transportation. The incident was taken care of through in-house cleanup and the cost was less than $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On May 7, 2009, there was a spillage of 1 liquid gallon of flammable liquids, N.O.S., considered a hazardous class 3 flammable- combustible liquid, on the highway in Burton. The bolts or nuts leaked because of a loose closure, component, or device and the flange was torn off or damages because of a missing component or device. The spill was taken care of through in-house cleanup and the cost was less than $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On February 25, 2009, there was a spillage of 300 liquid gallons of gasoline (includes gasoline mixed with ethyl alcohol, with not more than 10% alcohol), considered a hazardous class 3 flammable- combustible liquid, on the highway in Flint. The high level sensor failed to operate because of human error. The spill was taken care of through in-house clean up and cost $2,000 in material loss (U.S. Department of Transportation Hazardous Materials Incident Report).

- On February 19, 2009, there was a spillage of .25 liquid gallons of battery fluid acid, considered a hazardous class 8 corrosive material, on the highway in Flint. The body was crushed because of improper preparation for transportation. The spill was taken care of through in-house cleanup. There was a cost of $250 in material loss and $350 in remediation/cleanup (U.S. Department of Transportation Hazardous Materials Incident Report).

- On January 14, 2009, there was a spillage of .004409 solid pounds of consumer commodity, considered a hazardous class ORM-D other regulated material, class D, while unloading an airplane in Flint. The closure leaked because of improper preparation for transportation. The spill was taken care of through in-house cleanup and cost less than $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On September 15, 2008, there was a vapor (gas) dispersion of .06684 cubic feet of petroleum gas, liquefied or liquefied petroleum gas, considered a hazardous class 2.1 flammable gas, on the railway in Flint. The gauging device and the liquid valve leaked because of improper preparation for transportation. Fire, EMS, and Police were on the scene and the response cost for the cleanup was $2,000 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On August 22, 2008, there was a spillage of .015625 liquid gallons of methanol, considered a hazardous class 3 flammable- combustible liquid, on the highway in Flint. The inner packaging leaked because of human error. The spill was taken care of by in-house cleanup and the cost was under $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On June 3, 2008, there was a spillage of .015625 liquid gallons of paint related material including paint thinning, drying, removing, or reducing compound, considered a hazardous class 3 flammable- combustible liquid, on the highway in Flint. The inner receptacle was punctured because of inadequate preparation for transportation. The response cost was $1,500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On February 27, 2008, there was a spillage of .125 liquid gallons of corrosive liquids, N.O.S., considered a hazardous class 8 corrosive material, on the highway in Flint. The closure leaked because the valve was open. The spill was resolved through in-house clean up and the cost was less than $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On February 18, 2008, there was a spillage of .25 liquid gallons of “dangerous goods in machinery or dangerous goods in apparatus,” considered a hazardous class 9

miscellaneous hazardous material, on the highway in Flint. The inner receptacle leaked because of inadequate preparation for transportation. The response cost was $995 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On January 25, 2008, there was a railway spillage of unknown material in Flint. Fire, EMS, and Police were on the scene and there was in-house clean up. The total damages were less than $500 (U.S. Department of Transportation Hazardous Materials Incident Report).

- On June 5, 2004, I-69 near I-75 in Flint Township was closed for several hours when two semi-trucks collided. One of the trucks spilled about 43,000 pounds of brake rotors and parts containing asbestos.

- On July 21, 2003, a CN Train derailment occurred when four tanker cars of natural gas left the tracks in Flint Township. On May 27, 2003, a CN Train derailment occurred when three tanker cars of propane left the tracks in Flint Township.

- On January 30, 2003, the driver of a propane truck suffered a heart attack as he drove off I-69 heading down the Dort Highway exit ramp. The truck exploded as it veered off the ramp and landed, killing the driver and destroying part of I-69 and the off-ramp. The off-ramp was closed for almost five months for repairs. This horrible incident could have been even worse, as the wreckage came to land only feet away from local fuel storage tanks.

- On January 21, 2000, a CSX railcar containing 33,000 gallons of propane began leaking. A fire burned for 22 hours, threatening an explosion. Approximately 7,500 residents were evacuated as a result.

- On May 22, 1998, three hundred gallons of sodium hydroxide spilled from a truck on I-75 south of Miller Road in Flint Township.

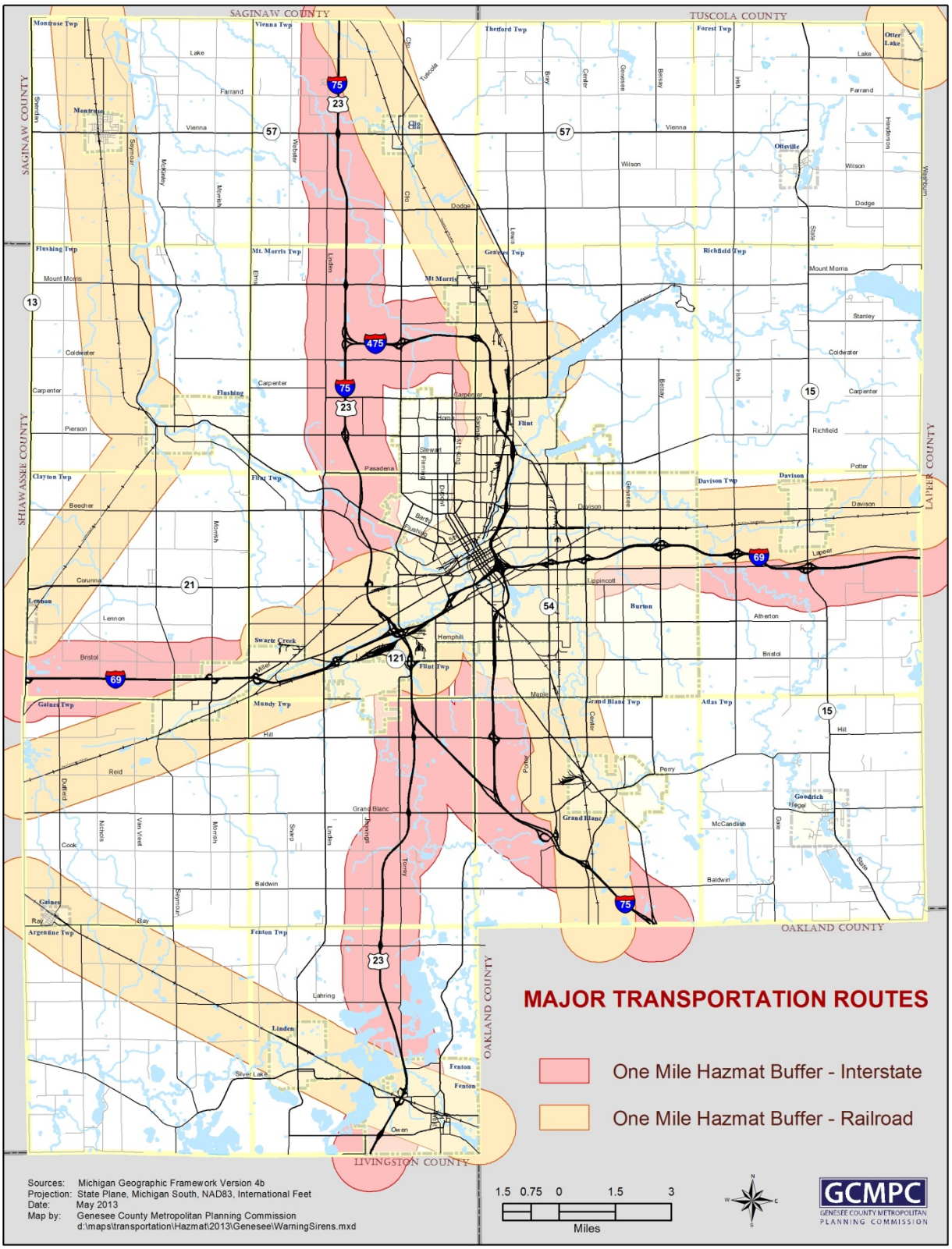

SAGINAW COUNTY
TUSCOLA COUNTY
SHIAWASSEE COUNTY
LAPEER COUNTY
OAKLAND COUNTY
LIVINGSTON COUNTY
MAJOR TRANSPORTATION ROUTES
One Mile Hazmat Buffer - Interstate
One Mile Hazmat Buffer - Railroad
Sources: Michigan Geographic Framework Version 4b
Projection: State Plane, Michigan South, NAD83, International Feet
Date: May 2013
Map by: Genesee County Metropolitan Planning Commission
d:\maps\transportation\Hazmat\2013\Genesee\WarningSirens.mxd
1.5 0.75 0 1.5 3
Miles
GCMPC
GENESEE COUNTY METROPOLITAN PLANNING COMMISSION

Figure 2-7

Vulnerability Assessment:

Costs associated with hazardous materials incidents during transportation include deaths, injuries, loss of infrastructure, damage to property, and use of emergency personnel. The U.S. Department of Transportation recorded 216 hazardous materials incidents in Michigan for 2013. Other damages were $3,606,224 for a total of $6,338,064. During a catastrophic event such as the Dort Highway explosion mentioned above, costs could easily climb into the millions. The cost of replacing just the destroyed bridges after that incident cost $1,500,000. The U.S. Department of Transportation reported 33 Hazardous Materials Incidents for Genesee County for 2008-2013, with a cost of at least $27,857 (damages less than $500 were not recorded.)

Mitigation Strategies for Hazardous Materials Incidents during Transportation

The following strategies are suggested to minimize the effects of Genesee County's number four hazard, hazardous materials incidents during transportation:

- Warning sirens
- Emergency generators
- Continued training for Hazardous Materials Response Teams and Fire Department Personnel
- Upgrade hazardous materials response equipment as needed
- Safety training for hazardous materials transporters
- Public education
- Adoption of Hazardous Spills Expense Recovery Ordinance
- Update Disaster Response Plan if necessary
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

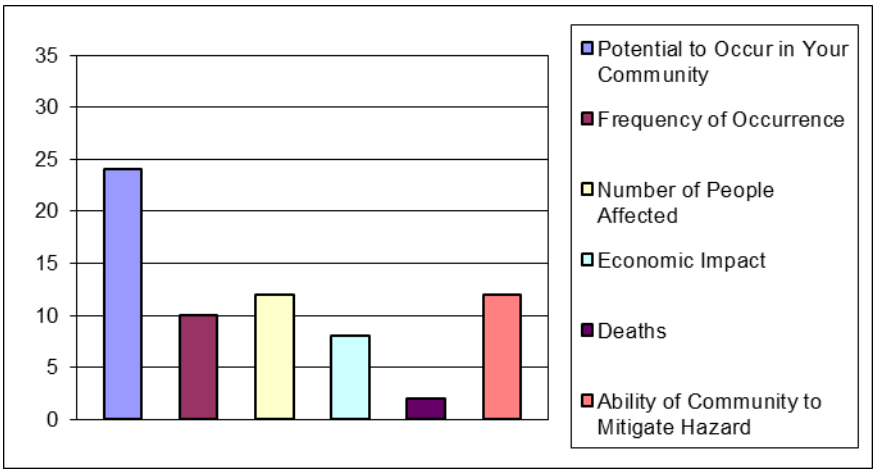
Mitigation Projects

Atlas Township	Project: Natural gas backup generator for Atlas Township Office/Hall which also serves as a Community Room and sub-station for Genesee County Sheriff Department. Project Description: To allow use as a safe haven room year round for residents needing shelter. Location of generator would be: 7386 S. Gale Road, Grand Blanc, MI. Proposed timeframe for implementation is 1-5 years. **Budget: $31,000.00** (Have currently received quote from Consumers Energy- waiting for quotes from 2 private contractors).

	Project: Emergency warning sirens Project Description: Emergency warning sirens placed in various locations within Atlas Township to be audible by all residents in all sections. Township would like eight sirens. Proposed timeframe for implementation: 1-5 years. **Budget: Approximately $25,000.00 per siren**
City of Linden	Project: Stand-alone generator for City Hall Project Description: The City of Linden's Police, Fire, and Department of Public Works are housed at the City Hall. Currently, if the power goes out in the city, the City Hall building loses power as well. This prevents emergency sirens from being turned on and emergency personnel would not be able to operate. City Hall is designated as an Incident Command Post; however, with a loss in power, this would not be possible. Proposed timeframe for implementation: 1-5 years. **Budget: $30,000.00**
Davison Township	Project: Warning Sirens Project Description: The purchase and installation of three advance warning sirens within Davison Township. Proposed timeframe for implementation: 1-5 years. **Budget: $60,000**
Flushing Township	Project: Warning Sirens Project Description: Install warning sirens in the Charter Township of Flushing. Proposed timeframe of implementation: 1-5 years. **Budget: $10,000-$30,000.**
University of Michigan Flint	Project: Enhance First Street Residence Hall evacuation and sheltering Project Description: To include developing plans and specifications for construction of a storm shelter to house over 300 residents. Also develop a strategy that can be used to integrate plans for a shelter into any expansion of the residence hall. In addition, install two outdoor warning sirens to alert students/residents of severe weather. Following development of drawings for a shelter, construct a shelter to house residents. Proposed timeframe for implementation: 1-5 years. **Budget: $550,000**
	Project: Upgrading and improving the U of M Flint EOC and Department of Public Safety Project Description: Upgrading and providing improvements to the U of M Flint EOC. and Department of Public Safety operations. This includes moving the dispatch center and adding additional equipment

to the center and EOC. Proposed timeframe for implementation: 1-5 years.
Budget: $500,000

5 HAZARD: Public Health Emergencies



Public Health Emergency

A public health emergency is anything that causes, or could cause injuries or illness to a large number of people. Public health emergencies include the following:

- *Infectious disease outbreaks/pandemics*
- *Health-endangering effects of severe weather, natural disasters, and power outages*
- *Incidents resulting in mass casualties*
- *Toxic chemical or radiological releases*
- *Acts of bioterrorism*

Hazard Description

Public health emergencies are ranked as the number five hazard in Genesee County. Public health emergencies can take many forms – disease epidemics, large-scale incidents of food or water contamination, extended periods without power, adequate water and/or sewer services, effects of severe weather or natural disasters, harmful exposure to chemical, radiological or biological agents, and large-scale infestations of disease-carrying insects or rodents – to name just a few. Public health emergencies can occur as primary events by themselves, or they may be secondary events to another disaster or emergency such as a flood, tornado, or a hazardous materials incident. The common characteristic of most public health emergencies is that they adversely impact, or have the potential to adversely impact, a large number of people. Public health emergencies can be statewide, regional, or localized in scope and magnitude.

The greatest public health hazard is the possibility of an infectious disease outbreak or epidemic. The public is at risk from common infectious diseases (e.g. influenza, norovirus, pertussis); infectious diseases that were once thought almost eliminated but that are now making a comeback (e.g. measles); and diseases that are not common in this part of the world

but may be brought here by travelers or contaminated food (e.g. typhoid, hepatitis A). Even diseases for which the public has some immunity to or for which there is a vaccine can cause an epidemic because when viruses change and mutate, the general public loses its immunity. Depending on the nature and severity of the outbreak, an epidemic could cause widespread illness and death, the shutdown of public spaces (schools, buildings, events, etc.), and the crippling of the medical infrastructure. Government, healthcare facilities, and businesses could be severely impacted and even forced to close if enough workers were ill or afraid to go out in public.

Another public health hazard of great concern is the secondary health implications of contaminated food, air and/or water following a natural or manmade disaster. As has been observed following recent domestic and foreign natural disasters, access to clean water, unspoiled food, and sanitation is often an issue. Flooding can lead to human exposure to sewage and other contaminants that have leached into the water. Water damage in homes can lead to air quality issues caused by mold and other contaminants. Water damage and/or loss of power can cause food to become unsafe to eat and can lead to food borne illness outbreaks. And, as Genesee County is at a major transportation crossroads, pollution of the water system or air by a chemical release is also of concern.

The public health hazard that has received the most attention since 2001 is the possibility of an intentional release of a radiological, chemical or biological agent. Such a release would most likely be an act of terrorism aimed at the government or a specific organization or segment of the population. Fortunately, to date, Michigan has not yet experienced such a release aimed at mass destruction. However, it is probable that an incident of that nature and magnitude will occur. If and when it does, the public health implications – under the right set of circumstances – could be staggering.

Genesee County Perspective:

Like the rest of the United States and the world, Genesee County has had serious outbreaks of diseases like polio, smallpox, mumps, and influenza.

Genesee County is susceptible to health emergencies such as infectious diseases, Severe Acute Respiratory Syndrome (SARS), Middle Eastern Respiratory Syndrome (MERS-COV), influenza; other common communicable disease outbreaks- meningitis, Pertussis (whooping cough), and norovirus; and sexually transmitted diseases (Syphilis, Gonorrhea). Additionally, due to the diversity and mobility of the county's population, the county has seen incidences of uncommon communicable diseases including Typhoid and Hepatitis A.

- A sewer spill was discovered near Mott Lake on August 9th, 2002. This spill resulted in dangerously high E. Coli levels at nearby Blue Bell Beach. Officials were forced to close down the beach not only for the remainder of August, but also for the rest of the swimming season, which was scheduled to last until September 19th. As of September 21st, the water was still unsafe.

- According to the Centers for Disease Control, Genesee County had two confirmed cases of West Nile Virus in 2003.

- In the 10 year period between 2003 and 2013, Genesee County had hundreds of cases involving foodborne illness. While most of them were individual or small clusters of illness, there were several larger outbreaks during that time. Additionally, several of the cases were linked to national foodborne illness outbreaks.

- In 2008, Genesee County experienced a syphilis epidemic. The number of reported cases (over 109) represented a 2,000% increase in reported cases over the same period the previous year. This also gave Genesee County a higher syphilis rate than Detroit.

- In mid-2009, Genesee County began experiencing an increase in diagnosed Pertussis cases. From July 2009 through June 2010, Genesee County experienced a 1,500% increase in identified Pertussis cases over the previous year.

- In 2009, the WHO declared that the world was experiencing an influenza pandemic caused by the 2009 H1N1 virus. The CDC estimates that 43 million to 89 million people had H1N1 between April 2009 and April 2010. They estimate between 8,870 and 18,300 H1N1 related deaths. Genesee County experienced illness and deaths associated with the 2009 influenza pandemic.

Vulnerability Assessment:

Costs associated with public health emergencies include deaths, hospitalizations, doctors' visits, mass immunization programs, lost wages, and lost productivity. There are not enough documented incidents of recent public health emergencies in Genesee County to estimate an average cost. However, national estimates put the total annual cost to employers for lost productive-time for all health conditions at approximately $2,000 per worker per year. According to U.S. Census 2000 figures, Genesee County has about 207,800 workers in the labor force. Based on this data, Genesee County already suffers $415,600,000 in lost worker productivity each year. A public health emergency such as a wide-spread flu epidemic would raise that estimate, which does not even include the non-labor force population.

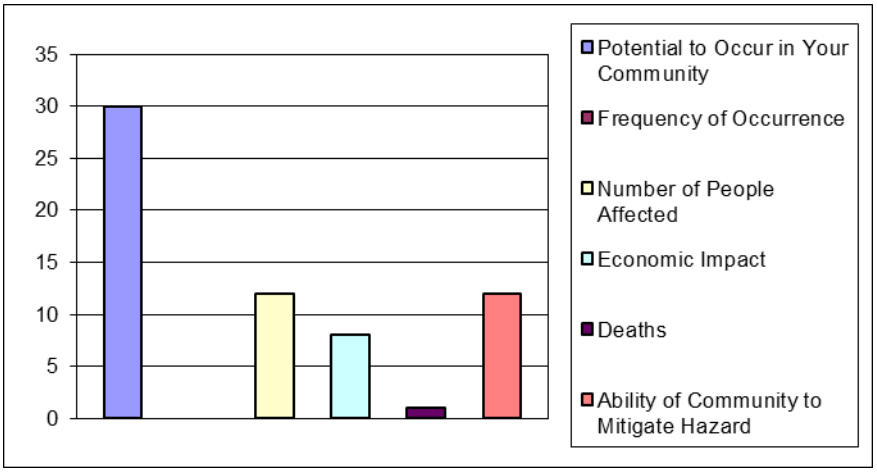
Mitigation Strategies for Public Health Emergencies

The following strategies are suggested to minimize the effects of Genesee County's number five hazard, public health emergencies:

- All hazards emergency planning involving all sectors of the community

- Continue treating known breeding grounds for disease-carrying insects
- Offer vaccinations when appropriate
- Start/continue public education on public health emergencies
- Health and safety training for first responders
- Continued and improved surveillance including in schools and hospital emergency departments
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

6 HAZARD: Dam Failure

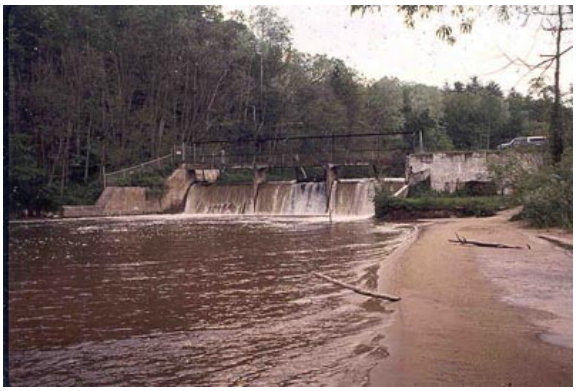


Dam Failure

The collapse or failure of an impoundment resulting in downstream flooding.

Hazard Description

Dam failures are ranked as the number six hazard in Genesee County. A dam failure can result in loss of life and extensive property or natural resource damage for miles downstream from the dam. Dam failures occur not only during flood events, which may cause overtopping of a dam, but also as a result of poor operation, lack of maintenance and repair, and vandalism. Such failures can be catastrophic because they occur unexpectedly, with no time for evacuation. The Michigan Department of Environmental Quality (MDEQ) has documented approximately 263 dam failures throughout Michigan. There are over 2,400 dams in the state of Michigan and about 935 of them are regulated by Part 315 of the Dam Safety Program. Dams are regulated when they are over 6 feet in height, and when over 5 acres are impounded during the design flood. (A flood that does not exceed the magnitude of the discharge for the design frequency.)



Permits are required for construction and repair of regulated dams. Inspection reports are also required every three to five years for dams based on their hazard potential rating. The hazard potential rating is determined by the Dam Safety Program, and is based on an assessment of the potential for loss of life, property damage, and environmental damage in the area downstream of a dam in the event of dam failure or failure of

appurtenant works. Hazard potential rating is not based upon the structural or hydraulic condition of the dam. The definitions for the hazard classification as specified in the state's Dam Safety Statute, Part 315, Dam Safety, of Act 451, P.A. 1994 are as follows:

"Low hazard potential dam" means a dam located in an area where failure may cause damage limited to agriculture, uninhabited buildings, structures, or township or county roads, where environmental degradation would be minimal, and where danger to individuals is slight or nonexistent.

"Significant hazard potential dam" means a dam located in an area where its failure may cause damage limited to isolated inhabited homes, agricultural buildings, structures, secondary highways, short line railroads, or public utilities, where environmental degradation may be significant, or where danger to individuals exists.

"High hazard potential dam" means a dam located in an area where a failure may cause serious damage to inhabited homes, agricultural buildings, campgrounds, recreational facilities, industrial or commercial buildings, public utilities, main highways, or Class I carrier railroads, or where environmental degradation would be significant, or where danger to individuals exists with the potential for loss of life.

Part 315 of the Dam Safety Program also requires that dam owners prepare and keep current, Emergency Action Plans (EAP) for all high hazard and significant hazard potential dams. An EAP is a plan developed by the owner that establishes notification procedures for its departments, public off-site authorities, and other agencies of the emergency actions to be taken before and following an impending or actual dam failure.

After the events of September 11th, it became evident that dams could be attractive targets to terrorists. Dam failures could not only cause enormous loss of life and property and infrastructure damage, but could have residual long-lasting social, economic, and public health impacts. These sobering facts point to the need to have dam security in place at critical locales. **Figure 1-6** for a map of Genesee County dams.

Genesee County Perspective:

Genesee County has a total of 33 dams, and of those, 3 dams are rated as a High Hazard and 7 dams are rated as a Significant Hazard. Although there are no recorded dam failures to date, the potential is very real because of Genesee County's aging infrastructure and strained budget.

Vulnerability Assessment:

Costs associated with dam failures include deaths, injuries, loss of infrastructure, damage to property, temporary housing, use of emergency personnel and clean-up afterwards. Genesee County has no prior history of dam failure, so potential costs are taken from other communities' experiences. In May of 2003, Silver Lake Dam in the city of Marquette, Michigan

failed. More than 1,800 people were evacuated from the city, and the total damages were estimated at more than $100,000,000. That figure includes $10,000,000 in utility facility damages, $4,000,000 in environmental damages, and $3,000,000 in road and bridge damages.

Locally, we can look at The City of Flint's Hamilton Dam for a possible dam failure example. It is a High Hazard Dam, built in 1920, located in the center of the downtown business district. It is bordered on each side by the University of Michigan, Flint campus. Failure of this dam would most likely generate significant damage to property and pose the threat of loss of life and potential injuries. It is also one of the main structures that provides pool elevation for the intake of the drinking water production facility upstream. The failure of this dam would most likely cost millions in damages to the area.

Mitigation Strategies for Dam Failure

The following strategies are suggested to minimize the effects of Genesee County's number six hazard, dam failure:

- Regular dam inspections
- Repairs done as recommended by State Inspection Reports
- Removal of dams that meet removal criteria; replacement if needed
- Public education on dam safety
- Identify area of impact if dam failure were to occur
- Evacuation plans
- Improvements to dams and spillways
- Update Disaster Response Plan if necessary
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

New Mitigation Projects

Atlas Township	Project: Boat for water or ice rescue Project Description: For Fire Department to help with evacuation in the event of floods or dam failure within the Village of Goodrich. Proposed timeframe for implementation: 1-5 years. **Budget: $5,000.00**
City of Flint	Project: Hamilton Dam Project Description: The City of Flint is looking into possibly working on improvements to the Hamilton Dam.

University of Michigan Flint	Project: Flood Mitigation Plan Project Description: Provide the funding to develop a Flood Mitigation Plan. This plan will address ongoing mitigation needs such as installing USGS constructing berms /physical barriers that can resist the elevation associated with the overflow of the Flint River. Proposed timeframe for implementation: 1-5 years. **Budget: $50,000**

Mitigation Projects

City of Flint	The project includes removal and replacement of Thread Dam which is in a state of failure. Estimated costs reflect completing engineering, construction, removal, and construction inspection. **Estimated project cost: $2,100,000**
City of Flint	The project includes removal and replacement of Hamilton Dam. Estimated costs reflect engineering, construction, removal, and construction inspection. **Estimated project cost: $8,000,000**
Village of Goodrich	The project includes work on the Goodrich Dam relating to floodgates, stabilization, spillway-wing walls, etc. **Estimated project cost: not provided** Project Update: Improvements have been made to the Goodrich/Mill Pond Dam. Two additional gates were altered to allow them to open but only under special situations.

7 HAZARD: Tornadoes

Tornadoes

An intense rotating column of wind that extends from the base of a severe thunderstorm to the ground.

Hazard Description

Tornadoes in Michigan are most frequent in the spring and early summer when warm, moist air from the Gulf of Mexico collides with cold air from the Polar Regions to generate severe thunderstorms. These thunderstorms often produce the violently rotating columns of wind that are called tornados.

Michigan lies at the northeastern edge of the nation's primary tornado belt, which extends from Texas and Oklahoma through Missouri, Illinois, Indiana, and Ohio. Most of a tornado's destructive force is exerted by the powerful winds that knock down walls and lift roofs from buildings in the storm's path. The violently rotating winds then carry debris that can be blown through the air, becoming dangerous missiles.

A tornado may have winds up to 300 miles per hour and an interior air pressure that is 10-20% below that of the surrounding atmosphere. The typical length of a tornado path is approximately 16 miles, but tracks much longer than that – even up to 200 miles – have been reported. Tornado path widths are generally less than one-quarter mile wide.

Typically, tornadoes last only a few minutes on the ground, but those few minutes can result in tremendous damage and devastation. Historically, tornadoes have resulted in loss of life, with the mean national annual death toll being 144 persons. Property damage from tornadoes is in the hundreds of millions of dollars every year.

Tornado Intensity

Table 2-23. Fujita Tornado Scale

Magnitude	Description	Wind Speeds
F0	Gale Tornado	42-72 m.p.h.
F1	Moderate Tornado	73-112 m.p.h.
F2	Significant Tornado	113-157 m.p.h.
F3	Severe Tornado	158-206 m.p.h.
F4	Devastating Tornado	207-260 m.p.h.
F5	Incredible Tornado	261-318 m.p.h.

Tornado intensity is measured on the Fujita Scale, which examines the damage caused by a tornado on homes, commercial buildings, and other man-made structures. See **Table 2-23** for the Fujita Tornado Scale. The Fujita Scale rates the intensity of a tornado based on damaged caused, not by its size. It is important to remember that the size of a tornado is not necessarily an indication of its intensity. Large tornadoes can be weak, and small tornadoes can be extremely strong, and

vice versa. It is very difficult to judge the intensity and power of a tornado while it is occurring. Generally, that can only be done after the tornado has passed, using the Fujita Scale as the measuring stick. According to the National Weather Service (NWS), since 1950, the vast majority of tornadoes that occurred in the United States (approximately 74%) were classified as weak tornadoes (F0 or F1 intensity).

Approximately 25% were classified as strong tornadoes (F2 or F3 intensity), and only 1% was classified as violent tornadoes (F4 or F5 intensity). Unfortunately, those violent tornadoes, while few in number, caused 67% of all tornado-related deaths nationally. Strong tornadoes accounted for another 29% of tornado-related deaths, while weak tornadoes caused only 4% of tornado-related deaths. If the data prior to 1950 is examined, the percentage of deaths attributable to violent tornadoes climbs drastically. That is largely due to the fact that tornado forecasting and awareness programs were not yet established. As a result, it was not uncommon for death tolls from a single tornado to reach several hundred.

Genesee County Perspective:

In a statewide comparison of all Michigan counties for the years 1950 through 1999, Genesee County led the tornado statistics with 34 tornadoes. The county with the next highest number was Lenawee County with 30 tornadoes. As of May 2013, the number of Genesee County incidents has increased; the county now has 46 recorded tornadoes. Using thirty years of recent tornado statistics (from 1983-2013) as a guide, Genesee County can expect to have 1.5 tornadoes in any given year.

Four tornadoes since 1950 have been categorized as F3 in Genesee County. All other tornadoes since 1950 in Genesee County have either been F2, F1, or F0. See **Table 2-24** for a detailed list of recorded incidents from 1953 to 2013. **Figure 2-8** is a map of tornadoes that have touched down in Genesee County.

Figure 2-2 shows the locations of early warning sirens and one-mile buffer zones around the sirens. The buffer zones represent the estimated hearing range for the sirens. The county currently has 88 installed early warning sirens. Working off of siren ranges, approximately 68% of the population is covered by a siren, leaving 32% of the population, or 136,253 people outside the estimated range of early warning sirens.

- On June 8, 1953, the eighth largest tornado in history, an F5, with winds exceeding 300 M.P.H., and a path almost a half-mile wide, occurred in Beecher, just north of Flint. It became known as the “Beecher Tornado”, the deadliest tornado in Michigan history, and one of the top ten deadliest tornadoes in U.S. history. The tornado killed 116 people and injured 785 more. The Beecher Tornado was categorized as an F5 on the Fujita Scale and was the last single tornado to date to kill more than 100 people.

- A few years later, on May 12, 1956, the second strongest tornado in Genesee County since 1950 resulted in 3 deaths and 116 injuries. This tornado was classified as an F4. It

moved three miles east of Flint to three miles northwest of Atlas Township, destroying over 100 homes.

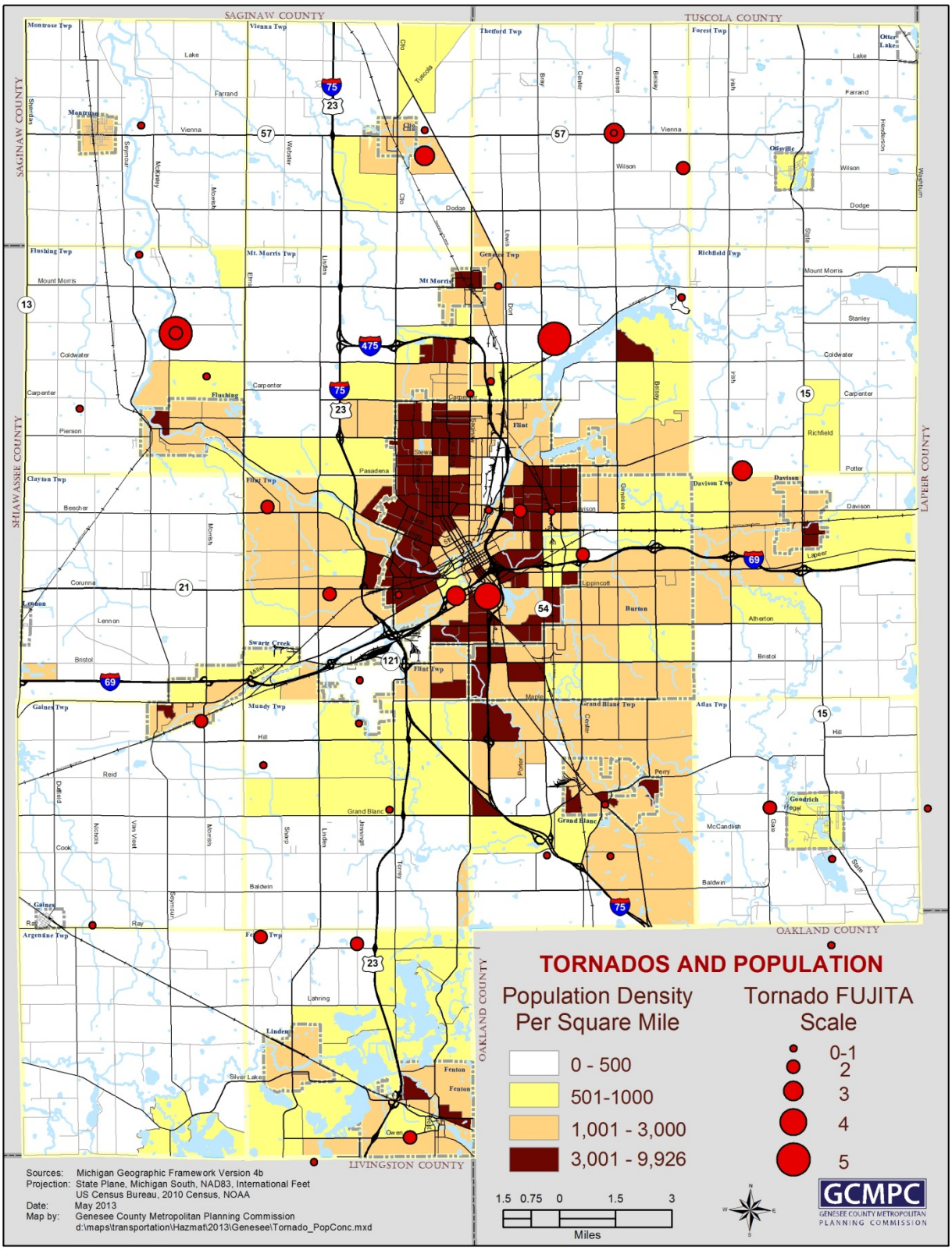
- Two July 2, 1997, tornadoes were part of an outbreak of 13 tornadoes in southeast Lower Michigan, the largest number for a single day since records have been kept. These tornadoes caused over $4,000,000 in damages. Some of these were classified as F3, and some were classified as F1.

- On June 8, 2003, a tornado touched down in Camp Copneconic in Fenton and produced extensive tree damage. The tornado headed northeast to Grand Blanc Township and destroyed several garages and front porches. Other homes reported damaged roofs, lost shingles, and damaged siding. The Michigan Room on one home was destroyed, and several other homes sustained damage due to fallen trees. This tornado was classified as an F1. Oddly enough, while this tornado was making its way across the southern part of the county, commemoration ceremonies to mark the 50th anniversary of the deadly "Beecher Tornado" were going on just north of Flint.

- On August 24, 2007, a large tornado hit the City of Fenton, causing extensive damage to trees, businesses, and homes. The amount of damage totaled $13 million (NOAA)

- On October 19, 2007, a tornado hit Thetford Center, causing $100,000 in property damages.

- In May of 2013, six tornadoes were reported in northern and southern Genesee County with primary damage occurring in the Mt. Morris and Genesee Township areas, as well as Atlas Township. Many trees were damaged, as well as the complete destruction of some homes and businesses.


SAGINAW COUNTY
TUSCOLA COUNTY
SHIAWASSEE COUNTY
LAPEER COUNTY
OAKLAND COUNTY
LIVINGSTON COUNTY
TORNADOS AND POPULATION
Population Density Per Square Mile
0 - 500
501-1000
1,001 - 3,000
3,001 - 9,926
Tornado FUJITA Scale
0-1
2
3
4
5
1.5 0.75 0 1.5 3
Miles
Sources: Michigan Geographic Framework Version 4b
Projection: State Plane, Michigan South, NAD83, International Feet
US Census Bureau, 2010 Census, NOAA
Date: May 2013
Map by: Genesee County Metropolitan Planning Commission
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GCMPC
GENESEE COUNTY METROPOLITAN PLANNING COMMISSION

Figure 2-8

Table 2-24. Genesee County Tornadoes (1953-2013)					
Location	**Date**	**Magnitude**	**Deaths**	**Injuries**	**Property Damage**
Genesee Co.	6/8/1953	F5	116	785	$ 25,000,000
Genesee Co.	6/8/1953	F5	0	0	$ 25,000,000
Genesee Co.	4/7/1954	F2	0	2	$ 25,000
Genesee Co.	8/24/1954	F2	0	0	$ -
Genesee Co.	5/12/1956	F4	3	116	$ 2,500,000
Genesee Co.	6/11/1968	F0	0	0	$ -
Genesee Co.	6/2/1971	F1	0	0	$ 250,000
Genesee Co.	8/10/1971	F2	0	1	$ 250,000
Genesee Co.	6/3/1973	F0	0	1	$ 3,000
Genesee Co.	6/3/1973	F0	0	0	$ -
Genesee Co.	7/14/1974	F3	0	0	$ 250,000
Genesee Co.	9/17/1974	F2	0	0	$ 25,000
Genesee Co.	7/4/1977	F1	0	1	$ 250,000
Genesee Co.	9/17/1977	F2	0	1	$ 250,000
Genesee Co.	6/26/1983	F1	0	0	$ 250,000
Genesee Co.	8/8/1984	F2	0	0	$ 2,500,000
Genesee Co.	8/8/1984	F3	0	0	$ 250,000
Genesee Co.	8/8/1984	F1	0	0	$ 25,000
Genesee Co.	8/30/1984	F0	0	0	$ 250,000
Genesee Co.	7/25/1986	F1	0	1	$ 25,000
Genesee Co.	8/26/1986	F0	0	0	$ -
Genesee Co.	9/29/1986	F2	0	0	$ 250,000
Genesee Co.	9/29/1986	F1	0	0	$ 3,000
Genesee Co.	7/18/1990	F0	0	0	$ -
Genesee Co.	7/18/1990	F1	0	0	$ 3,000
Genesee Co.	10/4/1990	F2	0	1	$ 2,500,000
Flint	6/7/1996	F0	0	0	$ -
Clio	6/21/1997	F0	0	0	$ -
Montrose	7/2/1997	F1	0	0	$ -
Montrose	7/2/1997	F1	0	0	$ -
Clio	7/2/1997	F3	0	0	$ 600,000
Clio	7/2/1997	F3	1	1	$ 3,800,000
Flushing	5/31/1998	F0	0	0	$ 10,000
Fenton	5/21/2001	F0	0	0	$ 10,000
Goodrich	5/21/2001	F0	0	0	$ 5,000
Fenton	6/8/2003	F1	0	0	$ 300,000
Montrose	5/23/2004	F0	0	0	$ -
Mount Morris	5/23/2004	F0	0	0	$ -

Fenton	8/24/2007	F2	0	1	$ 13,000,000
Thetford	10/19/2007	F0	0	0	$ 100,000
Fenton Township	5/28/2013	F2	0	0	$ 225,000
Goodrich	5/28/2013	F2			
Atlas Township	5/28/2013	F2			
Gaines Township	5/28/2013	EFO	0	0	$ 10,000
Mount Morris Township	5/28/2013	EF1	0	0	$ 100,000
Genesee Co.	5/2013				
Grand Blanc	5/28/2013	EF2	0	0	$ 350,000
Total Damage					**$ 78,369,000**

Vulnerability Assessment:

Costs associated with tornadoes include deaths, injuries, loss of infrastructure, damage to property, temporary housing, use of emergency personnel and clean-up afterwards. For the thirty-year period from 1983 to 2013, Genesee County had 31 tornado events, giving the county an average of 1.5 tornados per year. Available damage costs for past tornadoes in Genesee County were used to calculate the average cost of a tornado, along with identified population density characteristics. See the Vulnerability Chart below. A tornado occurs almost every year in Genesee County, with the estimated average annual cost of tornadoes being $1,001,082.

Breakdown of Costs for Genesee County Tornadoes				
Population Density Categories (per square mile)	**Average Number of Tornadoes Per Year**	**Average Amount of Damage**	**Percentage of County Land in each Population Density Category**	**Estimated Annual Damage by Population Density Category**
Population Density 0-500	1.5	$ 751,439	70%	**$ 578,608**
Population Density 501-1,000	1.5	$ 509,640	13%	**$ 72,879**
Population Density 1,001-3,000	1.5	$ 839,265	13%	**$ 120,015**
Population Density 3,001-13,351	1.5	$ 5,217,736	4%	**$ 229,580**
Total Estimated Annual Damage for Genesee County Tornadoes: $ 1,001,082				

Mitigation Strategies for Tornadoes

The following strategies are suggested to minimize the effects of Genesee County tornadoes:

- Additional warning sirens for complete county coverage; repair of broken sirens
- Increased weather radio coverage

- Distribution of weather radios
- Emergency generators for police and fire departments, special-needs facilities, and facilities identified as community shelters during hazardous weather
- Shelters for mobile home communities
- Enhance public awareness on correct safety procedures during tornadoes
- Structural reinforcement for community "safe rooms"
- Stand-by power for water plants, pump stations, booster pumping stations
- Update Disaster Response Plan if needed
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

New Mitigation Projects

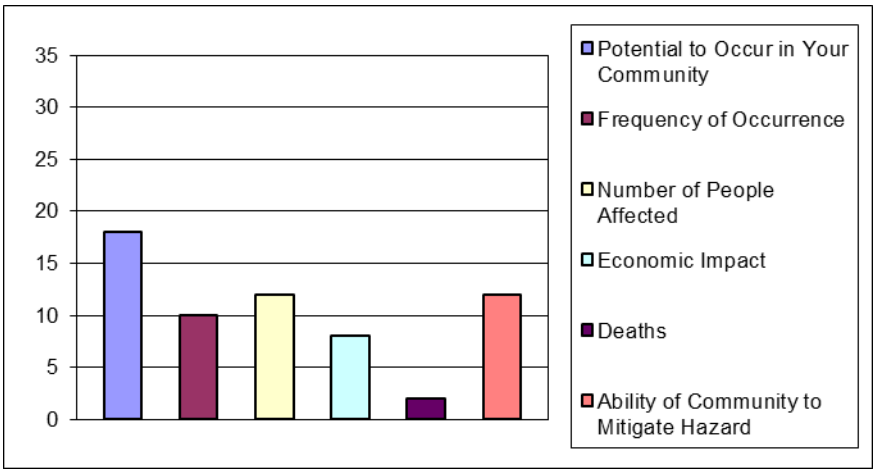
Atlas Township	Project: Emergency warning sirens Project Description: Emergency warning sirens placed in various locations within Atlas Township to be audible by all residents in all sections. Township would like eight sirens. Proposed timeframe for implementation: 1-5 years. **Budget: Approximately $25,000.00 per siren**
City of Linden	Project: Stand-alone generator for City Hall Project Description: The City of Linden's Police, Fire, and Department of Public Works are housed at the City Hall. Currently, if the power goes out in the city, the City Hall building loses power as well. This prevents emergency sirens from being turned on and emergency personnel would not be able to operate. City Hall is designated as an Incident Command Post; however, with a loss in power, this would not be possible. Proposed timeframe for implementation: 1-5 years. **Budget: $30,000.00**
Davison Township	Project: Warning Sirens Project Description: The purchase and installation of three advance warning sirens within Davison Township. Proposed timeframe for implementation: 1-5 years. **Budget: $60,000**
Fenton Township	Project: Emergency Shelter Project Description: The project would involve renovations to the Township Hall basement to make it suitable as an emergency shelter for residents, including the addition of a back-up generator.

	Budget: Unknown
Flushing Township	Project: Back-up Generator Project Description: Install a back-up generator in the Township Hall. Proposed timeframe for implementation: 1-5 years. **Budget: $80,000**
Flushing Township	Project: Tornado Sirens Project Description: Install tornado warning sirens in the Charter Township of Flushing. Proposed timeframe of implementation: 1-5 years. **Budget: $10,000-$30,000**
Forest Township	Project: Warning Sirens Project Description: The purchase and installation of three warning sirens throughout Forest Township. **Budget: Unknown**
University of Michigan Flint	Project: Enhance First Street Residence Hall evacuation and sheltering Project Description: To include developing plans and specifications for construction of a storm shelter to house over 300 residents. Also develop a strategy that can be used to integrate plans for a shelter into any expansion of the residence hall. In addition, install two outdoor warning sirens to alert students/residents of severe weather. Following development of drawings for a shelter, construct a shelter to house residents. Proposed timeframe for implementation: 1-5 years. **Budget: $550,000** Project: Upgrading and improving the U of M Flint EOC and Department of Public Safety Project Description: Upgrading and providing improvements to the U of M Flint EOC. and Department of Public Safety operations. This includes moving the dispatch center and adding additional equipment to the center and EOC. Proposed timeframe for implementation: 1-5 years. **Budget: $500,000**

Mitigation Projects

Bendle Public Schools	The project includes two generators, emergency lighting, back-up air compressor, emergency radios, portable lighting and caution tape. **Estimated project cost: $5,000-$8,000**
Gaines Township	The project includes storm warning sirens. **Estimated project cost: $80,000**
Grand Blanc Township	The project includes three weather sirens. **Estimated project cost: $48,000**
Genesee County Emergency Management	The project includes tornado shelters for mobile home parks. **Estimated project cost: $16,000,000**
Genesee Intermediate School District	The project includes a portable diesel-powered generator to provide back-up power to three separate locations that serve special-need students, many with multiple impairments that prevent physical evacuation of the buildings. **Estimated project cost: $500,000**
Genesee Intermediate School District	The project includes structural reinforcement for the walls and roof of the gyms and multi-purpose rooms (open-space areas) at three separate locations that serve special-needs students, many with multiple impairments that prevent physical evacuation of the buildings. **Estimated project cost: not provided**

7 HAZARD: Terrorism



Terrorism

An intentional unlawful use of force, violence or subversion against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political, social, or religious objectives.

Hazard Description

Terrorism is ranked as the number seven hazard in Genesee County. In today's world, terrorism can take on many forms, although civilian bombings, assassination and extortion are probably the methods with which we are most familiar. Internationally, such acts have, unfortunately, become quite commonplace, as various religious, ethnic, and nationalistic groups have attempted to alter and dictate political agendas, seek revenge for perceived past wrongdoing, or intentionally disrupt the political, social and economic infrastructure of individual businesses, units of government, or nations.

The Middle East, in particular, and parts of Europe have been hard hit by acts of terrorism over the past several decades. Parts of Asia and South America have also experienced a high level of activity. Tragically, with the events of September 11th, terrorism has now occurred on our own soil. Equally alarming is the rapid increase in the scope and magnitude of terrorism methods and threats, which now include: 1) nuclear, chemical and biological weapons; 2) information warfare; 3) ethnic/religious/gender intimidation (hate crimes); 4) state and local militia groups that advocate the overthrow of our government; 5) eco-extremism, designed to destroy or disrupt specific research or resource-

related activities; and 6) widespread and organized narcotics (and other contraband) smuggling and distribution organizations.

Just as the methods and potential instigators have increased, so too have the potential targets of terrorism. As recent events across the country have shown, virtually any public facility or infrastructure, or place of public assembly can be considered a target of terrorism. In addition, certain types of businesses engaged in controversial activities are also potential targets. With the advent of the information age and growth in the number of computer "hackers", computer systems (especially those of government agencies, large businesses, financial institutions, health care facilities, and colleges/universities) are potential targets as well.

One of the primary common denominators of most terrorists is their general desire for organizational recognition, but not necessarily individual recognition. They often seek publicity for their "cause" or specific agenda, but they go to great lengths to avoid individual detection by law enforcement agencies.

The exception to this might be individuals and organizations involved in narcotics or other contraband smuggling and distribution, who seek to keep their clandestine operations out of public and law enforcement scrutiny.) Another commonality is that innocent people are always the ones that suffer the most in these senseless and cowardly criminal acts.

Genesee County Perspective:

Genesee County has several government buildings, churches, stadiums, recreation facilities, and many other large facilities that accommodate a large number of people. Any government building or individual can become a target of domestic terrorism. On April 15, 2013, the Boston Marathon was the target of a bombing. Genesee County and downtown Flint in particular, hold many large-scale public events and officials should be aware of a possible threat. The horrific events of September 11th have shown that anyone, anywhere, at any point in time, can be a target of terrorism. All citizens now have a responsibility to be aware of any situation that may indicate this type of threat, and to inform law enforcement of what may be occurring.

Mitigation Strategies for Terrorism

The following strategies are suggested to minimize the effects of Genesee County's number seven hazard, terrorism:

- Continued training for first responders, police and fire personnel
- Riot gear for police personnel
- Public education about Homeland Security
- Update Disaster Response Plan if necessary
- Identify critical infrastructure

- Prepare vulnerability assessment for critical infrastructure
- Homeland Security training for critical infrastructure employees
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

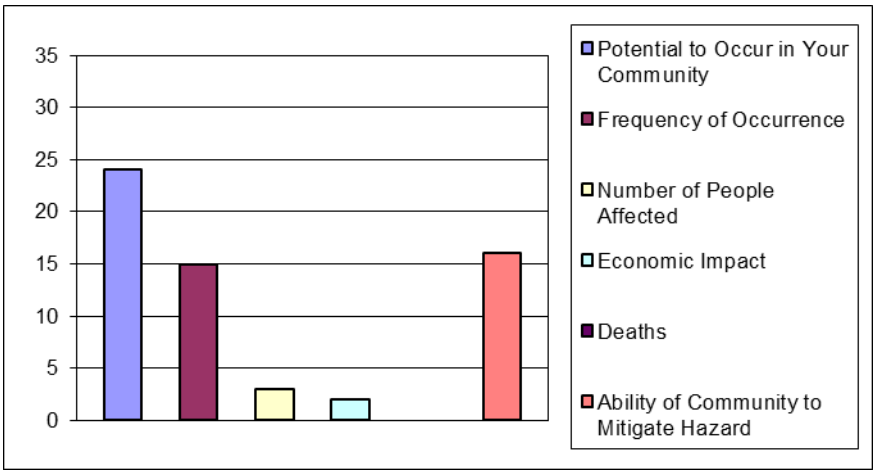
Mitigation Projects

Atlas Township	Project: Natural gas backup generator for Atlas Township Office/Hall which also serves as a Community Room and sub-station for Genesee County Sheriff Department. Project Description: To allow use as a safe haven room year round for residents needing shelter. Location of generator would be: 7386 S. Gale Road, Grand Blanc, MI. Proposed timeframe for implementation is 1-5 years. **Budget: $31,000.00** (Have currently received quote from Consumers Energy- waiting for quotes from 2 private contractors).
City of Linden	Project: Stand-alone generator for City Hall Project Description: The City of Linden's Police, Fire, and Department of Public Works are housed at the City Hall. Currently, if the power goes out in the city, the City Hall building loses power as well. This prevents emergency sirens from being turned on and emergency personnel would not be able to operate. City Hall is designated as an Incident Command Post; however, with a loss in power, this would not be possible. Proposed timeframe for implementation: 1-5 years. **Budget: $30,000.00**
Flushing Township	Project: Back-up Generator Project Description: Install a back-up generator in the Township Hall. Proposed timeframe for implementation: 1-5 years. **Budget: $80,000**
University of Michigan Flint	Project: Enhance First Street Residence Hall evacuation and sheltering Project Description: To include developing plans and specifications for construction of a storm shelter to house over 300 residents. Also develop a strategy that can be used to integrate plans for a shelter into any expansion of the residence hall. In addition, install two outdoor warning sirens to alert students/residents of severe weather. Following development of drawings for a shelter, construct a shelter to house residents. Proposed timeframe for implementation: 1-5 years.

Budget: $550,000

Project: Upgrading and improving the U of M Flint EOC and Department of Public Safety
Project Description: Upgrading and providing improvements to the U of M Flint EOC. and Department of Public Safety operations. This includes moving the dispatch center and adding additional equipment to the center and EOC. Proposed timeframe for implementation: 1-5 years.
Budget: $500,000

#8 HAZARD: Hazardous Materials Incidents at Fixed Sites



Hazardous Materials Incidents at Fixed Sites

An uncontrolled release of hazardous materials from a fixed site capable of posing risk to life, health, safety, property, or the environment.

Hazard Description

Hazardous materials incidents at fixed sites are ranked as the number eight hazard in Genesee County. Over the past few decades, new technologies have developed at a stunning pace. As a result, hazardous materials are present in quantities of concern in business and industry, agriculture, universities, hospitals, utilities, and other facilities in our communities. Hazardous materials are materials or substances which, because of their chemical, physical, or biological nature, pose a potential risk to life, health, property, or the environment if they are released.

Examples of hazardous materials include corrosives, explosives, flammable materials, radioactive materials, poisons, oxidizers, and dangerous gasses. Hazardous materials are highly regulated by federal and state agencies to reduce risk to the general public and the environment. Despite precautions taken to ensure careful handling during the manufacture, transport, storage, use, and disposal of these materials, accidental releases do occur. Often, these releases can cause severe harm to people or the environment if proper mitigative action is not immediately taken. Most releases are the result of human error. Occasionally, releases can be attributed to natural causes, such as a flood that washes away barrels of chemicals stored at a site. However, those situations are the exception rather than the rule.

In 1986, the President signed into law the Superfund Amendments and Reauthorization Act (SARA). Included under Title III of SARA was the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), commonly known as SARA Title III. SARA Title III is meant to

encourage and support emergency planning efforts at the State and local levels and to provide the public and local units of government with information concerning potential chemical hazards present in their communities.

Determining if a facility is subject to emergency planning requirements is straightforward. The Environmental Protection Agency (EPA) publishes a list of Extremely Hazardous Substances (EHS). For each EHS, the list identifies and describes the chemical, and includes a number called a Threshold Planning Quantity (TPQ). The TPQ, expressed in pounds, is the key number. If a facility has within its boundaries an amount of an EHS equal to or in excess of its TPQ, then Section 302 of SARA Title III requires that the facility is subject to emergency planning requirements and must notify both the State Emergency Response Commission (SERC) and the Local Emergency Management Office of this fact. The facility must also identify an emergency response coordinator who works with the Local Emergency Management Office on developing and implementing the local emergency plan at the facility. This regulation applies even if the chemical is on site for only a day. There are no exemptions for emergency planning notification.

Genesee County Perspective:

There are currently 69 facilities in Genesee County that meet the above emergency planning requirements regarding the hazardous materials at their sites. These facilities are designated as SARA Title III, Section 302 sites, or "302 sites" for short. See **Figure 2-9** for a map of the 69 302 sites in Genesee County. This map includes a one-mile buffer zone around each 302 site.

- On July 16, 2003, at least two hundred gallons of an anti-freeze, ethylene glycol, spilled from a cooling tower at PPG Industries in Flint. The chemical leaked into a storm sewer that flows to the Flint River.

- On January 21, 1998, when nine employees of a Flint trucking company were treated for respiratory distress after a container of acid ruptured, sending clouds of toxic smoke through the business.

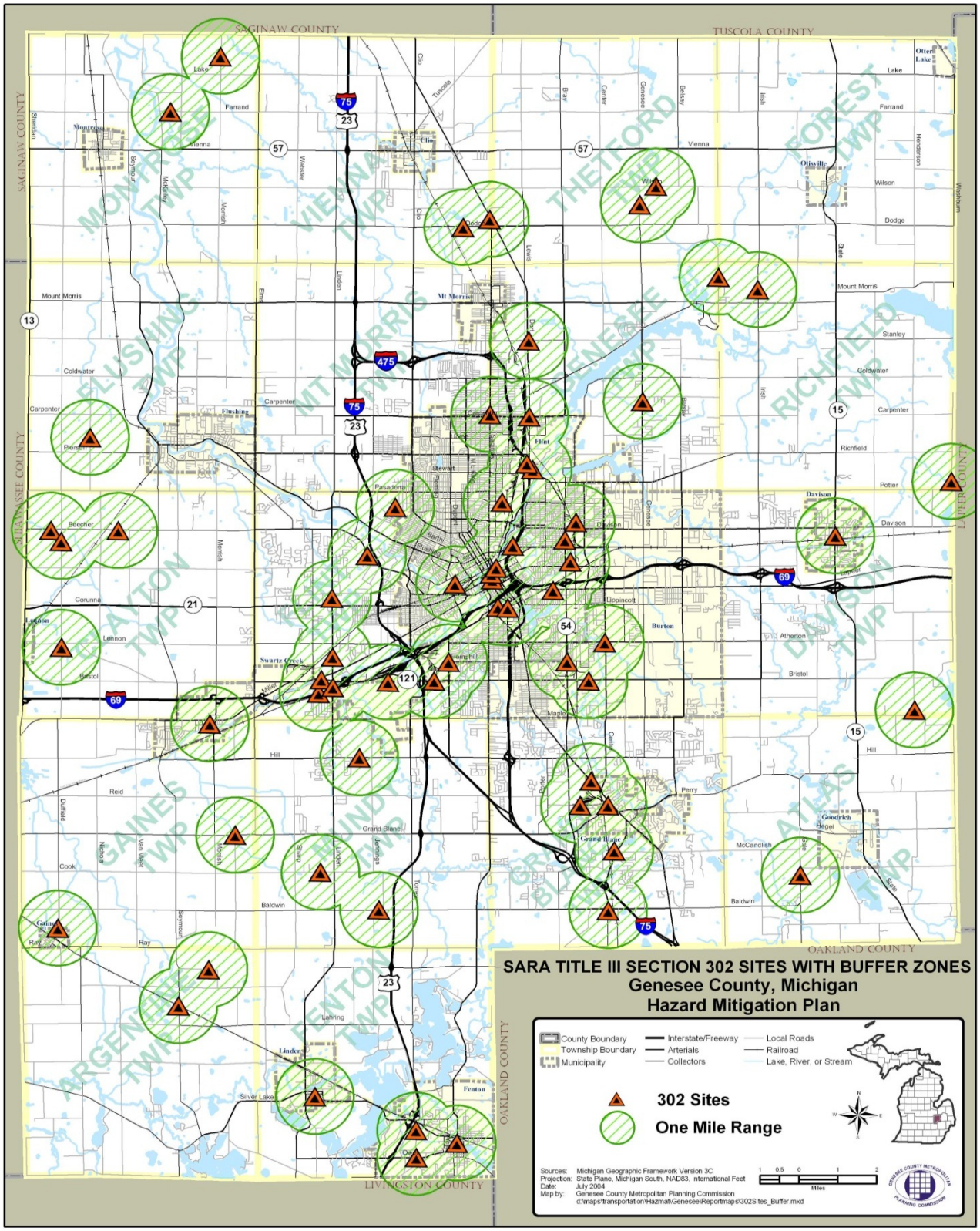

SARA TITLE III SECTION 302 SITES WITH BUFFER ZONES
Genesee County, Michigan
Hazard Mitigation Plan
County Boundary
Township Boundary
Municipality
Interstate/Freeway
Arterials
Collectors
Local Roads
Railroad
Lake, River, or Stream
302 Sites
One Mile Range
Sources: Michigan Geographic Framework Version 3C
Projection: State Plane, Michigan South, NAD83, International Feet
Date: July 2004
Map by: Genesee County Metropolitan Planning Commission
d:\maps\transportation\Hazmat\Genesee\Reportmaps\302Sites_Buffer.mxd
Miles
SAGINAW COUNTY
TUSCOLA COUNTY
SHIAWASSEE COUNTY
LAPEER COUNTY
OAKLAND COUNTY
LIVINGSTON COUNTY

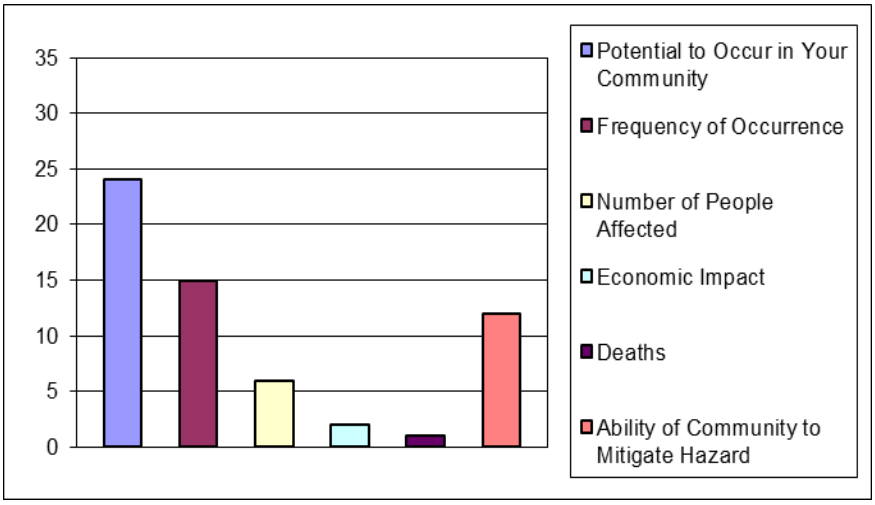
Figure 2-9

Mitigation Strategies for Hazardous Materials Incidents at Fixed Sites

The following strategies are suggested to minimize the effects of Genesee County's number eight hazard, hazardous materials incidents at fixed sites:

- Emergency generators
- Warning sirens
- Continued training for Hazardous Materials Response Team and fire department personnel
- Adoption of Hazardous Spills Expense Recovery Ordinance
- Public education
- Update Disaster Response Plan if necessary
- Update hazardous materials inventory
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

9 HAZARD: Civil Disturbance



Civil Disturbance

A public demonstration or gathering, or a prison uprising, that results in a disruption of essential functions; rioting, looting, arson or other unlawful behavior.

Hazard Description

Civil disturbance is ranked the number nine hazard in Genesee County. Large-scale civil disturbances rarely occur, but when they do they are usually an offshoot or result of one or more of the following events: 1) labor disputes where there is a high degree of animosity between the participating parties; 2) high profile/controversial judicial proceedings; 3) the implementation of controversial laws or other governmental actions; 4) resource shortages caused by a catastrophic event; 5) disagreements between special interest groups over a particular issue or cause; or 6) a perceived unjust death or injury to a person held in high esteem or regard by a particular segment of society.

Prison uprisings are normally the result of perceived injustice by inmates regarding facility rules, operating policies and/or living conditions, or insurrections started by rival groups or gangs within the facility. Genesee County has experienced many labor strikes over the years, and rallies concerning jobs and politics.

Genesee County Perspective:

The famous Flint Sit-Down Strike lasted for 44 days beginning on December 30, 1936. Flint auto workers actually occupied the auto plants as a strike tactic. Supporters streamed into Flint

from across the Midwest to man picket lines and other support activities. As the strike continued into January, tensions mounted. The police used tear gas and bullets to end the strike, and 14 strikers were injured. Governor Frank Murphy called in the National Guard to stand between the strikers and police.

Strike supporters smashing windows at Chevrolet Plant 9 in Flint to let out tear gas

After the strikers succeeded in taking General Motors' (GM) most important plant, GM was finally forced to go to the bargaining table. The strike ended on February 11, 1937, and established the United Auto Workers (UAW) as the only bargaining representative for auto laborers.

Arson can also be considered civil disobedience. In 2003, Genesee County had 313 arson fires, and 198 fires of a suspicious nature. Arson and suspicious fires accounted for 23% of all fires in the county for that year. These fires resulted in $8,432,685.00 in total losses. Four civilian injuries and two civilian deaths were also attributed to these fires.

Mitigation Strategies for Civil Disturbance

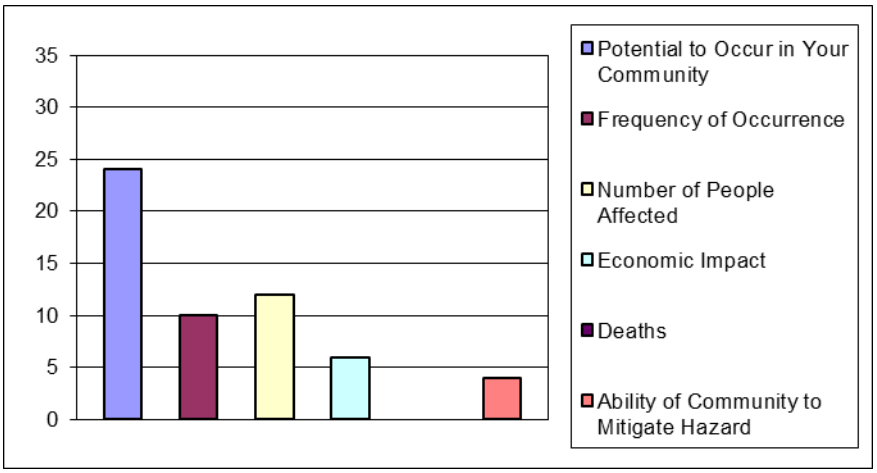
The following strategies are suggested to minimize the effects of Genesee County's number nine hazard, civil disturbance:

- Continued training for first responders
- Continued training for police and fire personnel
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

Mitigation Projects

Atlas Township	Project: Natural gas backup generator for Atlas Township Office/Hall which also serves as a Community Room and sub-station for Genesee County Sheriff Department. Project Description: To allow use as a safe haven room year round for residents needing shelter. Location of generator would be: 7386 S. Gale Road, Grand Blanc, MI. Proposed timeframe for implementation is 1-5 years. **Budget: $31,000.00** (Have currently received quote from Consumers Energy- waiting for quotes from 2 private contractors).

9 HAZARD: Infrastructure Failure



Infrastructure Failure

The failure of critical public or private utility infrastructure resulting in a temporary loss of essential functions and/or services.

Hazard Description

Infrastructure failure is ranked as the number nine hazard in Genesee County. Michigan's citizens are dependent on the public and private utility infrastructure to provide essential life supporting services such as electric power, heating and air conditioning, water, sewage disposal and treatment, storm drainage, communications, and transportation. When one or more of these independent, yet interrelated systems fail due to disaster or other cause, even for a short period of time, it can have devastating consequences. For example, when power is lost during periods of extreme heat or cold, people can die in their homes if immediate mitigative action is not taken. When the water or wastewater treatment systems in a community are inoperable, serious public health problems arise that must be addressed immediately to prevent outbreaks of disease. When storm drainage systems fail due to damage or capacity overload, serious flooding can occur.

These are just some examples of the types of infrastructure failures that can occur, and all of these situations can lead to disastrous public health and safety consequences if immediate mitigative actions are not taken. Typically, it is the most vulnerable members of society (i.e., the elderly, children, impoverished individuals, and people in poor health) that are the most heavily impacted by an infrastructure failure. If the failure involves more than one system, or is large enough in scope and magnitude, whole communities and possibly even regions can be

severely impacted. Refer to the "Dam Failure" and "Oil or Natural Gas Well/Pipeline Accidents" sections for more information on those particular types of infrastructure failure.

Genesee County Perspective:

Infrastructure failures are common in Genesee County. The most common infrastructure failure is loss of power. In our community, the elderly and handicapped, adult foster care homes, schools, and hospitals must be given special consideration when these types of events occur. From August 14 through August 17, 2003, parts of Genesee County experienced the nation's worst power blackout in history. Because of an overworked, outdated power grid system, cities from Toronto, Canada, to Cleveland, Ohio to New York City were in the dark. Eight states were affected by the blackout. Thousands of public water customers in the county were advised to boil water or use bottled water until August 19th when the water emergency ended. Genesee County received an emergency declaration for this infrastructure failure. Another incident occurred on August 29, 2003, when an electrical transformer failed. This shut down Detroit's water treatment plant at Lake Huron, and resulted in a second water emergency. Luckily, this second emergency only lasted about twelve hours.

Mitigation Strategies for Infrastructure Failure

The following strategies are suggested to minimize the effects of Genesee County's number nine hazard, infrastructure failure:

- Emergency generators
- Shelters
- Emergency water supply
- Maintain trimmed trees near power lines
- Public education
- Identify deficiencies in infrastructure
- Maintain and repair infrastructure
- Update Disaster Response Plan if necessary
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

New Mitigation Projects

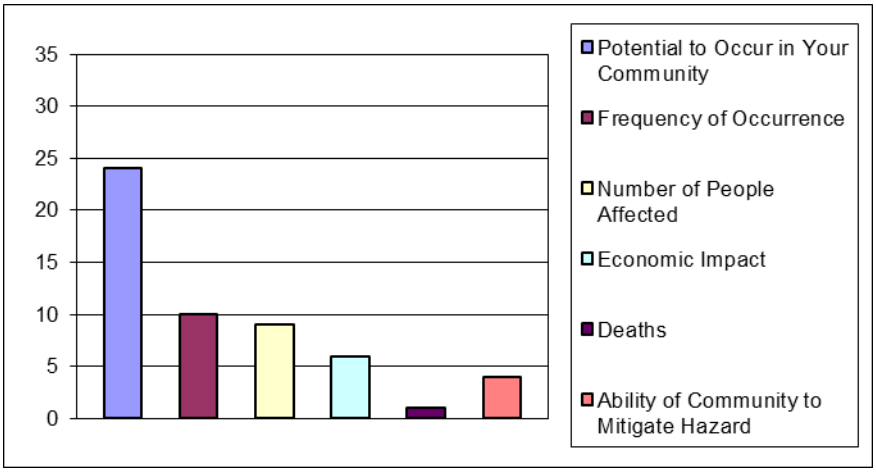
Atlas Township	Project: Natural gas backup generator for Atlas Township Office/Hall which also serves as a Community Room and sub-station for Genesee County Sheriff Department.

	Project Description: To allow use as a safe haven room year round for residents needing shelter. Location of generator would be: 7386 S. Gale Road, Grand Blanc, MI. Proposed timeframe for implementation is 1-5 years. **Budget: $31,000.00** (Have currently received quote from Consumers Energy- waiting for quotes from 2 private contractors.) Project: Dead Ash tree removal. Project Description: Dead ash trees affect road safety throughout the entire township, along various roads, streets, and neighborhoods. **Budget: $80,000.00** Project: Boat for water or ice rescue Project Description: For Fire Department to help with evacuation in the event of floods or dam failure within the Village of Goodrich. Proposed timeframe for implementation: 1-5 years. **Budget: $5,000.00**
Flushing Township	Project: Back-up Generator Project Description: Install a back-up generator in the Township Hall. Proposed timeframe for implementation: 1-5 years. **Budget: $80,000**
University of Michigan Flint	Project: Enhance First Street Residence Hall evacuation and sheltering Project Description: To include developing plans and specifications for construction of a storm shelter to house over 300 residents. Also develop a strategy that can be used to integrate plans for a shelter into any expansion of the residence hall. In addition, install two outdoor warning sirens to alert students/residents of severe weather. Following development of drawings for a shelter, construct a shelter to house residents. Proposed timeframe for implementation: 1-5 years. **Budget: $550,000** Project: Upgrading and improving the U of M Flint EOC and Department of Public Safety Project Description: Upgrading and providing improvements to the U of M Flint EOC. and Department of Public Safety operations. This includes moving the dispatch center and adding additional equipment to the center and EOC. Proposed timeframe for implementation: 1-5 years. **Budget: $500,000**

Mitigation Projects

City of Flint	The project includes stand-by power (for the Cedar Street pump station and reservoir) to ensure that the Flint water supply would not be interrupted during an emergency. Estimated costs include construction of a building, construction of generation equipment, engineering, and engineering inspection. **Estimated project cost: $1,000,000**
City of Flint	The project includes stand-by power (for the Westside pump station) to ensure that the Flint water supply would not be interrupted during an emergency. Estimated costs include engineering, construction, and construction inspection. **Estimated project cost: $500,000**
City of Flint	The project includes stand-by power (for the Torrey Road booster pumping station) to ensure that water main pressure remains constant for a high-elevation water district during an emergency. A preliminary engineering cost estimate was generated that reflects design engineering, construction, and construction inspection. **Estimated project cost: $100,000**
City of Flint	The project includes stand-by power (for the Flint Water Plant) to ensure that the Flint water supply would not be interrupted during an emergency. Estimated costs include engineering, construction, and construction inspection. **Estimated project cost: $1,800,000**

10 HAZARD: Oil and Natural Gas Well/Pipeline Accidents



Oil and Natural Gas Well/Pipeline Accidents

An uncontrolled release of oil or natural gas, or the poisonous by-product hydrogen sulfide, form production wells or pipelines.

Hazard Description

Accidents from oil and natural gas wells and pipelines are ranked as the number ten hazard in Genesee County. Oil and natural gas are produced from fields scattered across 61 counties in the Lower Peninsula. Since 1925, over 41,000 oil and natural gas wells have been drilled in Michigan, of which roughly half have produced oil and gas. To date, Michigan wells have produced approximately 1.2 billion barrels of crude oil and 3.6 trillion cubic feet of gas. The petroleum and natural gas industry is highly regulated and has a fine safety record, but the threat of accidental releases, fires and explosions still exists.

Michigan is both a major consumer and producer of natural gas and petroleum products. According to the Michigan Public Service Commission (MPSC), approximately 25% of the natural gas consumed in Michigan is produced within the state. The remaining 75% is imported by five interstate pipeline companies that have access to the major natural gas producing regions in North America. Michigan cycles more natural gas through its storage system than any other state. Michigan ranks 11th in the nation in production of natural gas, and ranks 6th in consumption at 937.2 billion cubic feet. Michigan's petroleum product consumption in 1997 was 189 million barrels, ranking it 10th nationally.

These figures underscore the fact that vast quantities of petroleum and natural gas are extracted from, transported through, and stored in the state, making many areas vulnerable to

petroleum and natural gas emergencies. Michigan's gas and petroleum networks are highly developed and extensive, representing every sector of the two industries – from wells and production facilities, to cross-country transmission pipelines that bring the products to market, to storage facilities, and finally to local distribution systems. Even though pipelines are by far the safest form of transportation for these products, the threat of fires, explosions, ruptures, and spills nevertheless exists.

Petroleum and natural gas pipelines can leak or erupt and cause property damage, environmental contamination, injuries, and even loss of life. The vast majority of pipeline accidents that occur in Michigan are caused by third party damage to the pipeline, often due to construction or some other activity that involves trenching or digging operations.

In addition to these hazards, many of Michigan's oil and gas wells contain extremely poisonous hydrogen sulfide (H2S) gas. Hydrogen sulfide is a naturally occurring gas mixed with natural gas or dissolved in the oil or brine and released upon exposure to atmospheric conditions. Over 1,300 wells in Michigan have been identified as having H2S levels exceeding 300 parts per million (ppm).

At concentrations of 700 ppm, as little as one breath of hydrogen sulfide can be deadly as seen in **Table 2-25**. Although hydrogen sulfide can be detected by a "rotten egg" odor in concentrations from .03 ppm to 150 ppm, larger concentrations paralyze a person's olfactory nerves so that odor is no longer an indicator of the hazard. Within humans, small concentrations can cause coughing, nausea, severe headaches, irritation of mucous membranes, vertigo, and loss of consciousness.

Hydrogen sulfide forms explosive mixtures with air at temperatures of 500 degrees Fahrenheit or above, and is dangerously reactive with powerful oxidizing materials. Hydrogen sulfide can also cause the failure of high-strength steels and other metals. This requires that all company and government responders be familiar not only with emergency procedures for the well site, but also with the kinds of materials that are safe for use in sour gas well response.

Table 2-25.	Physiological Responses to Hydrogen Sulfide (H2S)
10 ppm	Beginning eye irritation
50-100 ppm	Slight conjunctivitis and respiratory tract irritation after 1 hour of exposure
100 ppm	Coughing, eye irritation, loss of sense of smell after 2-15 minutes. Altered respiration, pain in the eyes and drowsiness after 15-30 minutes followed by throat irritation after 1 hour. Several hours of exposure results in gradual increase in severity of these symptoms and death may occur within the next 48 hours.
200-300 ppm	Marked conjunctivitis and respiratory tract irritation after 1 hour of exposure.
500-700 ppm	Loss of consciousness and possibly death in 30 minutes to 1 hour
700-1000 ppm	Rapid unconsciousness, cessation of respiration and death.
1000-2000 ppm	Unconsciousness at once, with early cessation of respiration and death in a few minutes. Death may occur even if the individual is removed to fresh air at once.

Source: American National Standards Institute, Standard: 237.2-1972

Genesee County Perspective:

There are 32 active wells in Genesee County. This is a relatively small quantity when compared to the State leader, Otsego County, with over 5,700 wells. Genesee County has 29 oil wells, 1 natural gas well, and 2 brine disposal wells. When drilling for gas or oil in certain geologic formations, a salt water solution becomes mixed with the gas or oil. This saltwater, or brine, must be separated out from the gas or oil. After the brine is pumped out from the gas or oil, it can be used for dust control on dirt roads if it meets a certain chemical composition. Otherwise, the brine is disposed of by injecting it into a non-productive well. This well is then referred to as a brine disposal well.

- On July 8, 2004, a lightning strike hit a tree and traveled down to the root system. It ignited a steel gas line in a nearby subdivision in Flint Township. The tree was hit around 2 a.m. and caused the gas line to explode from below the ground.

- On May 25, 2004, lightning struck an abandoned oil well storage tank in Otter Lake. It caused a valve rupture and fire, which was put out by a blanket-type foam.

- On August 27, 2003, a backhoe operator digging a utility line at a busy intersection in the City of Burton ruptured a gas main. The gas line erupted into flames and set the

backhoe on fire. The operator was not injured, but flames were visibly shooting out of a large hole near the Center Crossings Shopping Center.

- On July 3, 2001 a small explosion occurred when construction workers struck gas and electrical lines in a Flint Township subdivision.

Mitigation Strategies for Oil and Natural Gas Well/Pipeline Accidents

The following strategies are suggested to minimize the effects of Genesee County's number ten hazard, oil and natural gas well/pipeline accidents:

- Continued training for Hazardous Materials Response Team
- Upgrade response team equipment as needed
- Continued training for police and fire personnel and first responders
- Public education
- Update oil/gas inventory
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

11 HAZARD: Snow and Ice Storms

Snowstorms

A period of rapid accumulation of snow often accompanied by high winds, cold temperatures, and low visibility.

Hazard Description

As a result of being surrounded by the Great Lakes, Michigan experiences large differences in snowfall in relatively short distances. The annual mean accumulation ranges from 30 to 170 inches of snow. The highest accumulations are in the northern and western parts of the Upper Peninsula. In Lower Michigan, the highest snowfall accumulations occur near Lake Michigan and in the higher elevations of northern Lower Michigan. Blizzards are the most dramatic and perilous of all snowstorms, characterized by low temperatures and strong winds (35 miles per hour or greater) bearing enormous amounts of snow. Most of the snow accompanying a blizzard is in the form of fine, powdery particles that are wind-blown in such great quantities that, at times, visibility is reduced to only a few feet. Blizzards have the potential to result in property damage and loss of life. Just the cost of clearing the snow can be enormous.

Most of the severe winter weather events that occur in Michigan have their origin as Canadian and Arctic cold fronts that move across the state from the west or northwest. Michigan is susceptible to moderate snowfall and extreme cold, averaging 90-180 days per year below freezing in the Lower Peninsula, and over 180 days below freezing in most of the Upper Peninsula.

Genesee County also has to deal with ice and sleet storms. Ice storms are sometimes incorrectly referred to as sleet storms. Sleet is similar to hail only smaller and can be easily identified as frozen rain drops (ice pellets), which bounce when hitting the ground or other objects. Sleet does not stick to trees and wires, but sleet in sufficient depth does cause hazardous driving conditions. Ice storms are the result of cold rain that freezes on contact with the surface, coating the ground, trees, buildings, overhead wires and other exposed objects with ice, sometimes causing extensive damage. When electric lines are downed, households may be without power for several days, resulting in significant economic loss and disruption of essential services in affected communities.

Genesee County Perspective:

Genesee County had 36 recorded snowstorm incidents from 2000 to 2011, and based on those numbers the county is likely to have 3.3 snow storms per year. See **Table 2-26** for a detailed list of recorded incidents during recent years. On December 11, 2000, Genesee County, and

several other counties, sustained 14" of snow along with 45 M.P.H. winds in a 24-hour period. Up to 200 cars were stranded on I-75 just south of Flint during the storm. The County was unable to respond to accidents, medical emergencies and stranded motorists due to four-foot snow drifts, which created impassable roads. This was the third largest snowfall on record, and it was believed to be the first time in its 124 year history that the Flint Journal was unable to publish due to a weather event. A State of Emergency was requested closing down the entire county for a 24-hour period. A Federal Disaster Declaration was issued for Genesee and 26 other counties.

Then, on December 17, 2000, the county received more snow. In Flint, the weight of the accumulated snow collapsed the roof of a banquet room at a Ramada Inn. A home patio roof also gave way in Flint. The sheer volume of the snow was difficult to handle and the process of clearing the snow became tedious and expensive as there was almost no place to put it.

Table 2-26. Genesee County Snow & Ice Storms (2000-2013)

Location	Date	Type	Deaths	Injuries	Property Damage
Genesee Co.	2/18/2000	Heavy Snow	0	0	$ -
Genesee Co.	10/7/2000	Snow	0	0	$ -
Genesee Co.	12/5/2000	Snow	0	0	$ -
Genesee Co.	12/11/2000	Heavy Snow	0	1	$ 1,100,000
Genesee Co.	12/13/2000	Snow	0	0	$ 25,000
Genesee Co.	12/17/2000	Heavy Snow	0	0	$ 560,000
Genesee Co.	1/30/2002	Winter Storm	0	0	$ -
Genesee Co.	2/25/2002	Winter Storm	0	0	$ -
Genesee Co.	3/4/2003	Heavy Snow	0	0	$ -
Genesee Co.	4/3/2003	Ice Storm	1	2	$ 161,100,000
Genesee Co.	1/14/2004	Heavy Snow	0	0	$ -
Genesee Co.	1/26/2004	Winter Storm	0	0	$ -
Genesee Co.	1/20/2006	Winter Storm	0	0	$ -
Genesee Co.	2/5/2006	Winter Storm	0	0	$ -
Genesee Co.	12/1/2006	Ice Storm	0	0	$ -
Genesee Co.	1/14/2007	Ice Storm	0	0	$ 100,000
Genesee Co.	1/15/2007	Ice Storm	0	0	$ -
Genesee Co.	12/16/2007	Winter Storm	0	0	$ -
Genesee Co.	1/1/2008	Winter Storm	0	0	$ -
Genesee Co.	1/14/2008	Heavy Snow	0	0	$ -
Genesee Co.	1/15/2008	Heavy Snow	0	0	$ -
Genesee Co.	2/6/2008	Winter Storm	0	0	$ -
Genesee Co.	2/7/2008	Winter Storm	0	0	$ -
Genesee Co.	2/12/2008	Heavy Snow	0	0	$ -
Genesee Co.	12/19/2008	Winter Storm	0	0	$ -
Genesee Co.	4/5/2009	Winter Storm	0	0	$ -

Genesee Co.	4/6/2009	Winter Storm	0	0	$ -
Genesee Co.	2/9/2010	Heavy Snow	0	0	$ -
Genesee Co.	2/10/2010	Heavy Snow	0	0	$ -
Genesee Co.	2/22/2010	Heavy Snow	0	0	$ -
Genesee Co.	2/1/2011	Winter Storm	0	0	$ -
Genesee Co.	2/2/2011	Winter Storm	0	0	$ -
Genesee Co.	2/20/2011	Heavy Snow	0	0	$ -
Genesee Co.	2/21/2011	Heavy Snow	0	0	$ -
Genesee Co.	3/22/2011	Winter Storm	0	0	$ 15,000
Genesee Co.	3/23/2011	Winter Storm	0	0	$ -

NOAA

On January 5, 2014, a massive snow storm hit the region. Genesee County was at the epicenter of the storm and received about 18 inches of snow, with snow drifts making roads nearly impassable. Temperatures dropped to negative 45 degrees with the wind chill and roads were extremely icy. The majority of schools, businesses, and local governments were closed in Genesee County and surrounding areas. It was the largest snow storm that affected the County in almost forty years. Road crews worked around the clock trying to clear the snow, but over a week later, some schools were still closed and back roads remained impassable. Reported snowfall: Burton 13.2 inches; Flint: 17.1 inches; Flushing 14.5 inches; Goodrich: 11.8 inches; Grand Blanc: 13.9 inches, Linden: 16 inches; Swartz Creek: 18 inches.

On December 22, 2013, freezing rain came through the County, causing extensive freezing of trees, power lines, and roadways. The storm left more than 64,000 Genesee County residents without electricity. Even with crews working around the clock, many people did not regain power for close to a week. The ice made roads very dangerous and there were numerous downed and arcing power lines.

Vulnerability Assessment:

Costs associated with snow storms include deaths, injuries, loss of power, loss of revenues, damage to property, use of emergency personnel, and snow removal. Historic data for past snow storms in Genesee County, and a 2003 Salt Institute Study were used to calculate the average cost of a snowstorm. See the Vulnerability Assessment Chart below. According to the Federal Emergency Management Agency (FEMA), a death is estimated at $2,710,000, major injuries are estimated at $15,600, and minor injuries are $1,560.

Based on these figures, the estimated average cost of a snowstorm in Genesee County is expected to be $14,356,705. Since Genesee County experiences an average of 3.2 snowstorms per year, the average annual cost of snowstorms is estimated to be $47,377,127.

Breakdown of Costs for Genesee County Snow and Ice Storms	
Activation of Emergency Management*	$ 25,000
Response (plowing, tree removal, etc.)*	$ 846,658
Infrastructure Failure (road closure, car delays, etc.)*	$ 322,300
Property Damage	$ 1,800,000
Wages/Salaries Lost*	$ 7,257,386
State/Local Taxes Lost*	$ 383,804
Federal Taxes Lost*	$ 566,983
Retail Sales Lost*	$ 3,135,854
Minor Injuries @ $1,560 per person x 2	$ 3,120
Major Injuries @ $15,600 per person x 1	$ 15,600
Deaths @ $2,710,000 (average snowstorm in Genesee County does not cause a death)	$ -
Estimated Cost of One Average Genesee County Snowstorm:	**$ 14,356,705**
Number of Expected Snowstorms each Year:	**3.2**
Total Estimated Annual Cost of Snowstorms:	**$ 47,377,127**

***** Activation of Emergency Management figure based on estimate from the Michigan State Police

*Response figure based on the Oakland County Road Commission's formula of $333.33 per mile cost multiplied by Genesee County's 2,540 total roadway miles

*Infrastructure Failure figure based on 1 hour of delay during morning traffic on I-69 which is approximately 10,000 vehicles multiplied by FEMA's estimate of $32.23 cost of delay per vehicle

*Wages/Salaries Lost figure based on the 2003 Salt Institute Study formula of $16.64 per person factored for Genesee County's population

*State/Local Taxes Lost figure based on the 2003 Salt Institute Study formula of .88 per person factored for Genesee County's population

*Federal Taxes Lost figure based on the 2003 Salt Institute Study formula of $1.30 per person factored for Genesee County's population

*Retail Sales Lost figure based on the 2003 Salt Institute Study formula of $7.19 per person factored for Genesee County's population

Mitigation Strategies for Snow and Ice Storms

The following strategies are suggested to minimize the effects of Genesee County snow and ice storms:

- Increased weather radio coverage
- Distribution of weather radios
- Emergency generators for police and fire departments, special-needs facilities, and community shelters
- Enhance public awareness on correct safety procedures during snow and ice storms
- Stand-by power for water plants, pump stations, booster pumping stations

- Direct phone lines between airport control tower, airport fire department, airport police, and the Transportation Security Administration (TSA) checkpoint
- County/local utility tree-trimming program
- Shelters for mobile home communities
- Update Disaster Response Plan if needed
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

New Mitigation Projects

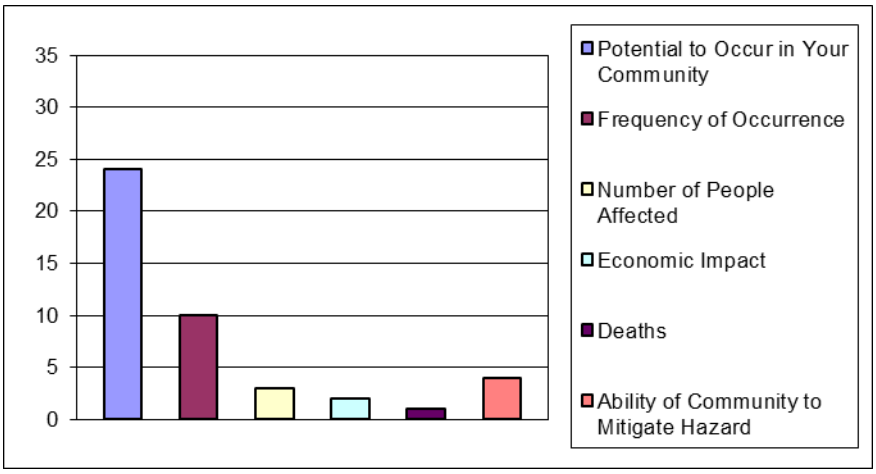
Atlas Township	Project: Natural gas backup generator for Atlas Township Office/Hall which also serves as a Community Room and sub-station for Genesee County Sheriff Department. Project Description: To allow use as a safe haven room year round for residents needing shelter. Location of generator would be: 7386 S. Gale Road, Grand Blanc, MI. Proposed timeframe for implementation is 1-5 years. **Budget: $31,000.00** (Have currently received quote from Consumers Energy- waiting for quotes from 2 private contractors). Project: Dead Ash tree removal. Project Description: Dead ash trees affect road safety throughout the entire township, along various roads, streets, and neighborhoods. **Budget: $80,000.00**
City of Linden	Project: Stand-alone generator for City Hall Project Description: The City of Linden's Police, Fire, and Department of Public Works are housed at the City Hall. Currently, if the power goes out in the city, the City Hall building loses power as well. This prevents emergency sirens from being turned on and emergency personnel would not be able to operate. City Hall is designated as an Incident Command Post; however, with a loss in power, this would not be possible. Proposed timeframe for implementation: 1-5 years. **Budget: $30,000.00**
Flushing Township	Project: Back-up Generator Project Description: Install a back-up generator in the Township Hall. Proposed timeframe for implementation: 1-5 years. **Budget: $80,000**

University of Michigan Flint	Project: Enhance First Street Residence Hall evacuation and Project Description: To include developing plans and specifications for construction of a storm shelter to house over 300 residents. Also develop a strategy that can be used to integrate plans for a shelter into any expansion of the residence hall. In addition, install two outdoor warning sirens to alert students/residents of severe weather. Following development of drawings for a shelter, construct a shelter to house residents. Proposed timeframe for implementation: 1-5 years. **Budget: $550,000**

Mitigation Projects

Bishop International Airport	This project includes a weather computer to help forecast snow, thunderstorms and high winds; lightning warning systems for the airfield, and a direct phone line from the FAA Control Tower to the Airport Fire Department, Airport Police and the security checkpoint. **Estimated project cost: not provided**
Goodrich Area Schools	The project includes two generators, emergency lighting, back-up air compressor, emergency radios, portable lighting and caution tape. **Estimated project cost: $5,000-$8,000**
Village of Lennon	The project includes a back-up generator for the Police Department**.** **Estimated project cost: $3,000**
Village of Lennon	The project includes a back-up generator for the Village Hall. **Estimated project cost: $3,000**

#12 HAZARD: Transportation (Bus, Airplane, Train)



Transportation (Bus, Airplane, Train) Accident

A crash or accident involving an air, land or water-based commercial passenger carrier resulting in death or serious injury.

Hazard Description

Transportation accidents are ranked as the number twelve hazard in Genesee County. In terms of commercial passenger transportation service, Michigan has approximately: 1) 19 airports that offer commercial air passenger service; 2) 130 certified intercity passenger bus carriers providing service to 220 communities; 3) 72 local bus transit systems serving 85 million passengers; 4) 19 marine passenger ferry services; and 5) 3 intercity rail passenger routes operating on 568 miles of track, along 3 corridors, serving 22 communities.

Air Transportation Accidents

There are four circumstances that can result in an air transportation accident: 1) an airliner colliding with another aircraft in the air; 2) an airliner crashing while in the cruise phase of a flight due to mechanical problems, sabotage, or other cause; 3) an airliner crashing while in the takeoff or landing phase of a flight; or 4) two or more airlines colliding with one another on the ground during staging or taxi operations. When responding to any of these types of air transportation accidents, emergency personnel may be confronted with a number of problems, such as: 1) suppressing fires; 2) rescuing and providing emergency first aid for survivors; 3) establishing mortuary facilities for victims; 4) detecting the presence of explosive or radioactive materials; 5) providing crash site security, crowd and traffic control, and protection of evidence.

Land Transportation Accidents

A land transportation accident in Michigan could involve a commercial intercity passenger bus, a local public transit bus, a school bus, or an intercity passenger train. Although these modes of land transportation have a good safety record, accidents do occur. Typically, bus accidents are caused by the bus slipping off the roadway in inclement weather, or colliding with another vehicle. Intercity passenger train accidents usually involve a collision with a vehicle attempting to cross the railroad tracks before the train arrives at the crossing. Unless the train accident results in a major derailment, serious injuries are usually kept to a minimum. Bus accidents, on the other hand, can be quite serious, especially if the bus has tipped over. Numerous injuries are a very real possibility in these types of situations.

Genesee County Perspective:

Genesee County is equipped with air, rail, and intercity bus passenger transportation facilities. Bishop International Airport (BIA) had 952,309 passengers for 2003. The facility is currently served by seven different airlines, and is predicted to be the third fastest growing airport in the nation during the period 2003 to 2008. The Flint Amtrak Terminal had 11,091 passengers for 2003. MDOT has partnered with Amtrak to improve local rail travel options. The Blue Water route, which makes stops in Flint, enables Genesee County residents to travel within the state, make day trips to Chicago, or connect with long-distance trains.

The Mass Transportation Authority (MTA) had 3,222,892 passengers for 2003. The MTA offers many transportation options, such as thirteen primary bus routes, the personalized Your Ride service for those unable to use the fixed routes, regional bus transportation to Oakland and Livingston Counties, and specialized services for the elderly and those with disabilities. In addition, several intercity bus lines operate out of the MTA's Transportation Complex in downtown Flint and provide out-of-town bus services. In the past, there have been transportation accidents that have occurred in the county, and the chance of accidents occurring again is high.

- In Flint, on May 18, 2004, a car collided with a Flint School District bus about 1 p.m. The bus was only occupied by the driver, who was not injured. The driver of the car was taken to a local hospital in serious condition.

- On September 21, 2003, a drunken woman struck a school bus around 3 p.m. after she swerved across the center line of the road. No children were on the bus, and neither driver was injured.

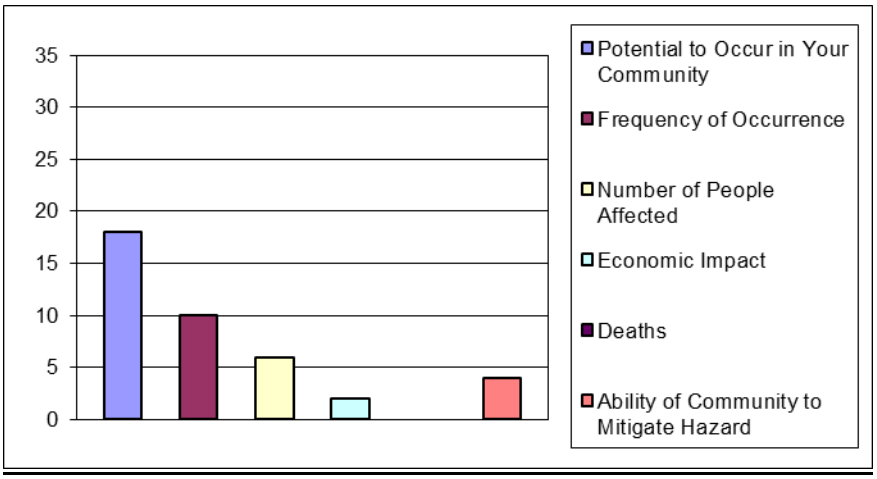
- On September 30, 2004, a plane crashed in a Gaines Township corn field after clipping three high-voltage power lines. The crash caused power loss to about 400 Consumers Energy customers nearby. The pilot was able to walk away from the crash uninjured.

Mitigation Strategies for Transportation Accidents (Bus, Airplane, Train)

The following strategies are suggested to minimize the effects of Genesee County's number twelve hazard, transportation accidents (bus, airplane, train):

- Continued training for first responders
- Enforce safety regulations
- Public education
- Safety training for transit, airplane, train operators
- Update Disaster Response Plan if needed
- Regular simulated response exercises covering all three modes

13 HAZARD: Drought



Drought

A water shortage caused by a deficiency of rainfall, generally lasting for an extended period of time.

Hazard Description

Drought is ranked as the number thirteen hazard in Genesee County. Drought is a normal part of the climate of Michigan and of virtually all other climates around the world – including areas with high and low average rainfall. Drought differs from normal arid conditions found in low rainfall areas in that aridity is a permanent characteristic of that type of climate.

Drought is the consequence of a natural reduction in the amount of precipitation expected over an extended period of time, usually a season or more in length. The severity of a drought depends not only on its location, duration, and geographical extent, but also on the water supply demands made by human activities and vegetation. This multi-faceted nature of the hazard makes it difficult to define a drought and assess when and where one is likely to occur.

Drought differs from other natural hazards in several ways. First, it is difficult to determine the exact beginning and end of a drought, since its effects may accumulate slowly and linger even after the event is generally thought of as being over. Second, the lack of a clear-cut definition of drought often makes it difficult to determine whether one actually exists, and if it does, its degree of severity. Third, drought impacts are often less obvious than other natural hazards, and they are typically spread over a much larger geographic area. Fourth, due primarily to the aforementioned reasons, most communities do not have in place any contingency plans for addressing drought. This lack of pre-planning can greatly hinder a community's response capability when a drought does occur.

Droughts can cause many severe impacts on communities and regions, including: 1) water shortages for human consumption, industrial, business and agricultural uses, power generation, recreation and navigation; 2) a drop in the quantity and quality of agricultural crops; 3) decline of water quality in lakes, streams and other natural bodies of water; 4) malnourishment of wildlife and livestock; 5) increase in wildfires and wildfire-related losses to timber, homes and other property; 6) declines in tourism in areas dependent on water-related activities; 7) declines in land values due to physical damage from the drought conditions and/or decreased economic or functional use of the property; 8) reduced tax revenue due to income losses in agriculture, retail, tourism and other economic sectors; 9) increases in insect infestations, plant disease, and wind erosion; and 10) possible loss of human life due to food shortages, extreme heat, fire, and other health-related problems such as diminished sewage flows and increased pollutant concentrations in surface water.

Genesee County Perspective:

Droughts occur regularly in Michigan and Genesee County is no exception. See **Table 2-27** for a list of recent droughts in Genesee County. Drought has a wide range of serious implications for Genesee County farmers and those who rely on them. First of all, there are over 1,050 farms in the county, with the average farm size being 136 acres. There are 56 nursery and greenhouse crop farms located in the county, along with over 30 orchards and 50 vegetable farms. Genesee County farms raised more than 500,000 bushels of wheat and over two million bushels of corn in 2002. The drought of 2001 drastically affected first-year Christmas tree seedlings, and will cause a reduced crop of Christmas trees in the near future. Nursery owners had to replant their Christmas trees because of all the destroyed seedlings. Drought also stunts the growth of produce and is responsible for plants getting sunburned. Average crop yields are greatly reduced during a drought, and drought-damaged produce is not always good to use as livestock feed. For example, if dairy cows are given drought-damaged corn, they will not eat as much and will therefore produce less milk. Poor quality feed can also cause stomach and foot problems for the animals.

Table 2-27. Genesee County Droughts

Location	Date	Crop Damage
Genesee Co.	7/1/2001	$ 150,000,000
Genesee Co.	9/1/2002	$ -

- In November of 2002, the United States Department of Agriculture issued a Weather Disaster that included Genesee County because of heavy crop losses due to drought.

- In September of 2001, Governor John M. Engler requested and received federal disaster help for 73 of Michigan's 83 counties because of drought. Michigan farmers experienced a 50% crop loss for 2001. The U. S. Department of Agriculture (USDA) granted Michigan's request to have most of the state's counties declared eligible for low-interest emergency farm loans through the USDA Farm Service Agency.

Mitigation Strategies for Drought

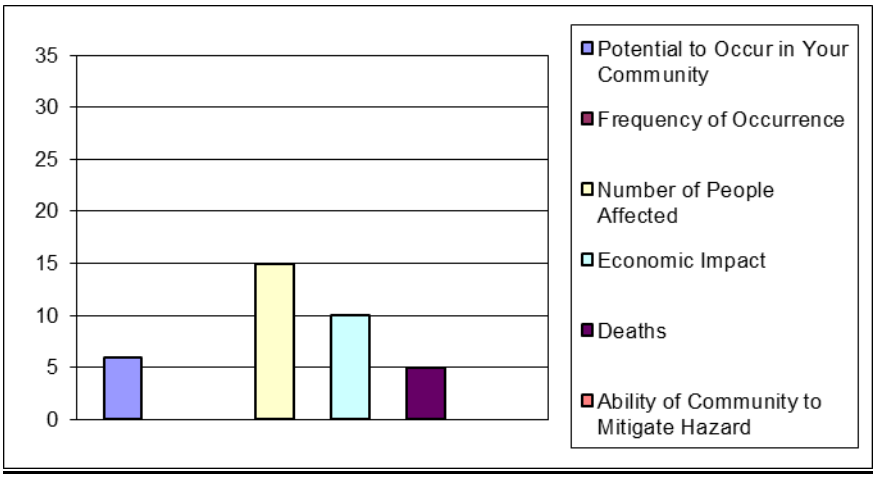
The following strategies are suggested to minimize the effects of Genesee County's number thirteen hazard, drought.

- Procure additional water supply
- Water rationing if necessary
- Public education on water conservation

Mitigation Projects

Atlas Township	Project: High pressure 10 inch water wells (electric). Project Description: To be used by the Fire Department to fight fires in various Township locations. Township would like eight wells. Proposed timeframe for implementation: 1-5 years. **Budget: Approximately $28,000.00 per well**

14 HAZARD: Nuclear Attack



Nuclear Attack

Any large-scale hostile action taken against the United States which involves nuclear weapons and results in destruction of military and/or civilian targets.

Hazard Description

Nuclear attack is ranked the number fourteen hazard in Genesee County. The United States is vulnerable to a number of national security threats from external, hostile forces. National security threats include nuclear attack, chemical and biological warfare, and terrorism. The potential for damage resulting from a national security emergency ranges from the relatively localized damage caused by a terrorist attack using weapons of mass destruction, to the catastrophic devastation that could be expected following a full-scale nuclear attack. This section focuses on the nuclear attack threat. Information on terrorism and other hostile acts of destruction are addressed in this document under the Hazard "Terrorism".

World events in recent years have greatly changed the nature of the nuclear attack threat against the United States. The breakup of and establishment of democratic forms of government in the former Soviet Union and other Soviet-Bloc nations in Eastern Europe has essentially ended the "Cold War" that shaped and influenced world politics since the late 1940s. That tremendous turn of events has, for all intents and purposes, reduced the need for the United States and former Soviet states to maintain huge stockpiles of nuclear weapons. The reduction in nuclear weapons stockpiles that has occurred over the past few years in both countries has diminished the threat of a full-scale, massive nuclear attack that would threaten the very existence of the world as we know it.

However, while the threat of attack is diminished, it is still a possibility due to the large number of nuclear weapons still in existence in present-day Russia and throughout the rest of the world. Even though an International Nuclear Non-Proliferation Treaty is in place, several countries are thought to be actively pursuing the development of nuclear weapons. In addition, internal instability and strife within Russia and some of its neighboring countries could cause the region to fall back under its previous form of government, which could potentially revive a larger-scale nuclear attack threat. Both Russia and U.S. nuclear weapons systems remain on high alert, which increases the risk of an accidental nuclear launch that could spawn a nuclear counter-attack. Given the state of Russia's aging nuclear technical systems, that scenario is not out of the realm of possibility.

Although the nature and scope of an attack at this time would likely be reduced from previous possibilities, the potential impact on the country would still be devastating. Despite the fact that it is based on a fully-armed and functional Soviet Union as an adversary, the Federal Emergency Management Agency (FEMA) attack planning guidance provided in the document "Nuclear Attack Planning Base 1990" (NAPB-90) remains the basis for the population protection strategy adopted for Michigan.

This strategy is incorporated in the Michigan Emergency Management Plan (MEMP) and most local Emergency Operations Plans (EOP). The NAPB report identifies potential aiming points or target areas throughout the United States. These targets were categorized into seven classifications: 1) commercial power plants; 2) chemical facilities; 3) counterforce military installations; 4) other military bases; 5) military support industries; 6) refineries; and 7) political targets. The potential size, or yield, and the height of burst were postulated for each target. The State of Michigan has 25 target areas. In addition, four target areas near the Ohio and Indiana borders directly affect Michigan jurisdictions. The NAPB report was an attempt by FEMA to develop a risk assessment of a potential attack upon the United States.

Targets are identified using specific criteria, part of which involved the target's importance to counterattack measures. For this reason, not all chemical facilities, for example, are included. Further, designation as a target area does not imply that all targets will be affected equally. The NAPB-90 planning base is, by design, a worse case nuclear scenario. Even though the situation in the former Soviet Union and its neighboring countries has changed dramatically, the NAPB report still contains some valid assumptions about a potential nuclear attack upon the United States.

Genesee County Perspective:

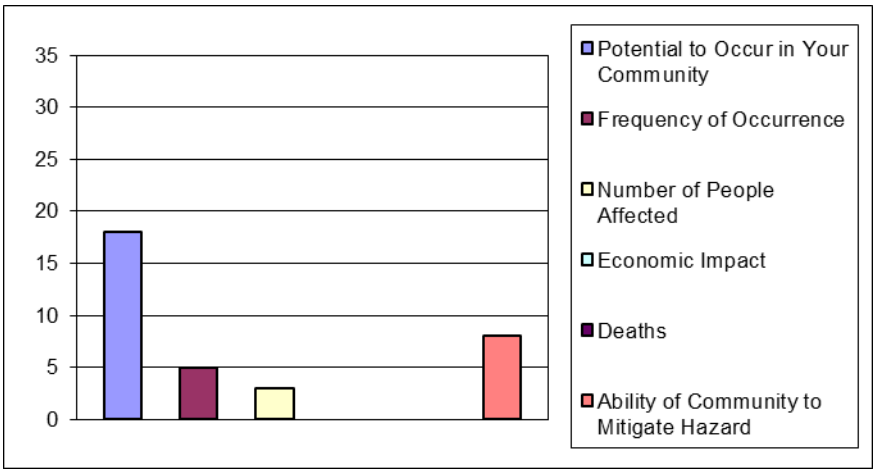
Although minor, this cannot be overlooked. Russia still maintains a fully capable nuclear arsenal and many smaller nations (some not friendly to the United States) are working towards a nuclear capability.

Mitigation Strategies for Nuclear Attack

The following strategies are suggested to minimize the effects of Genesee County's number fourteen hazard, nuclear attack:

- Warning sirens
- Continued training for first responders, and fire and police personnel
- Continued training for Hazardous Materials Response Team
- Update Disaster Response Plan
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

15 HAZARD: Scrap Tire Fires



Scrap Tire Fires

A large fire that burns scrap tires which are being stored for recycling or re-use.

Hazard Description

Scrap tire fires are ranked the number fifteen hazard in Genesee County. With the disposal of an estimated 250 million vehicle tires annually in the United States, management of scrap tires has become a major economic and environmental issue. Michigan generates some 7.5 to 9 million scrap tires each year. Although responsible means of disposal have become more common, tire dumps of the last forty years present environmental and safety hazards that will last into the foreseeable future. The estimated 797,500 scrap tires in Genesee County is an alarm for severe emergencies and disaster.

The State of Michigan has identified a total in excess of 15 million scrap tires in disposal sites scattered around the state. (Note: some estimates place the number at closer to 30 million scrap tires.) Issues pertaining to the management of scrap tire disposal sites are difficult and diverse. Whole tires are difficult to landfill because they tend to float to the surface, and are banned by many licensed landfills due to associated problems. In addition, scrap tires are breeding grounds for mosquitoes, which can reproduce at 4,000 times their natural rate in a scrap tire disposal site. From an emergency management perspective, the most serious problem that scrap tire disposal sites pose is that they can be a tremendous fire hazard if not properly designed and managed.

Genesee County Perspective:

With almost 800,000 scrap tires in Genesee County, a fire would be extremely dangerous and difficult to put out. Genesee County is the sixth largest scrap tire disposal site in the state, and a scrap tire fire could occur at any time. See **Table 2-28** below to compare Genesee County's site with other state sites.

Table 2-28. Scrap Tire Disposal Sites in Michigan

County	Known Tire Quantities	County	Known Tire Quantities	County	Known Tire Quantities
Alcona	2,500	Gratiot	38,500	Montcalm	7,000
Allegan	5,000,000	Hillsdale	302,500	Montmorency	70,000
Alpena	3,194	Houghton	500	Muskegon	111,700
Arenac	21,000	Ingham	5,899	Newaygo	37,000
Barry	5,000	Iosco	4,000	Oakland	13,000
Bay	24,600	Iron	3,500	Ogemaw	17,333
Benzie	10,000	Isabella	17,777	Osceola	3,500,400
Berrien	556,000	Jackson	79,500	Otsego	5,000
Branch	401,000	Kalamazoo	20,300	Ottawa	50,000
Calhoun	148,200	Kent	8,800	Presque Isle	4,500
Cass	10,000	Keweenaw	700	Roscommon	2,000
Cheboygan	5,500	Lapeer	17,000	Saginaw	296,500
Chippewa	10,000	Lenawee	58,350	St. Clair	33,000
Clare	3,700,000	Livingston	40,000	St. Joseph	66, 500
Clinton	7,000	Macomb	3,875	Sanilac	46,500
Delta	5,700	Marquette	18,221	Schoolcraft	2,000
Dickinson	17,000	Mecosta	6,000,000	Shiawassee	121,661
Genesee	**797,500**	Menominee	29,500	Tuscola	32,000
Gladwin	2,000	Midland	2,800	Van Buren	9,750
Gogebic	18,250	Missaukee	90,000	Washtenaw	157,500
Grand Traverse	81,500	Monroe	77,000	Wayne	925,546

Note: Inventory totals were compiled from 1992-1996. Tire quantities are estimated and will vary from year to year, as new tires are brought in and other tires are recycled or otherwise disposed. Source: Michigan Department of Environmental Quality, Waste Management Division.

Mitigation Strategies for Scrap Tire Fires

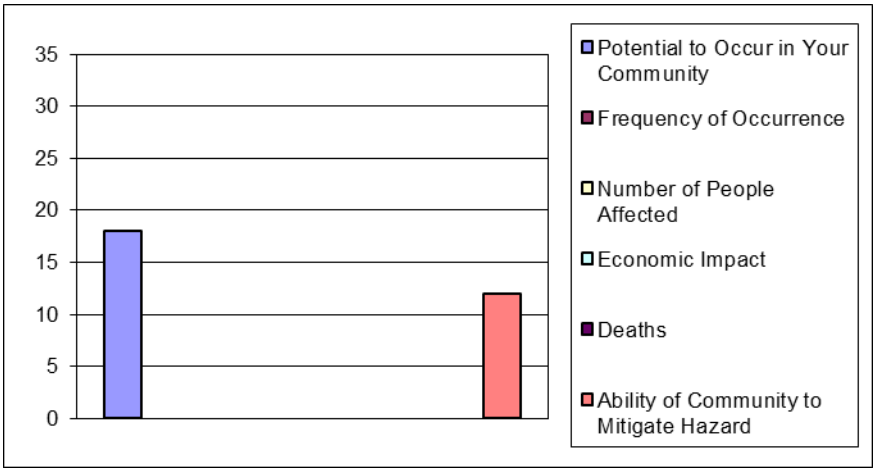
The following strategies are suggested to minimize the effects of Genesee County's number fifteen hazard, scrap tire fires:

- Enforce "no dumping" regulations
- Clean up abandoned lots
- Public education on tire recycling
- Continued training for first responders
- Inventory scrap tire sites

Mitigation Projects

Atlas Township	Project: High pressure 10 inch water wells (electric). Project Description: To be used by the Fire Department to fight fires in various Township locations. Township would like eight wells. Proposed timeframe for implementation: 1-5 years. **Budget: Approximately $28,000.00 per well**

16 HAZARD: Wildfires



Wildfires

An uncontrolled fire in grasslands, brush lands or forested areas.

Hazard Description

Wildfires are ranked as the number sixteen hazard in Genesee County. Forests cover approximately 49% (18.2 million acres) of Michigan's total land base. These vast forests provide Michigan with the largest state-owned forest system in the United States. In addition, Michigan has the fifth largest timberland acreage, with 4.2 million acres of softwoods and 13.1 million acres of hardwoods. That vast forest cover is a boon for both industry and recreation. However, it also makes many areas of Michigan highly vulnerable to wildfires. Although Michigan's landscape has been shaped by wildfire, the nature and scope of the wildfire threat has changed. Because Michigan's landscape has changed substantially over the last several decades due to wild land development, the potential danger from wildfires has become more severe.

Increased development in and around rural forested areas (a 63% increase in the number of rural homes during the 1980s) has increased the potential for loss of life and property from wildfires. There are simply not enough fire suppression forces available in rural areas to protect every structure from wildfire. Contrary to popular belief, lightning strikes are **not** the primary cause of wildfires in Michigan. Today, only about 2% of all wildfires in Michigan are caused by lightning strikes; the rest are caused by human activity. Outdoor burning is the leading cause of wildfires in Michigan. Most Michigan wildfires occur close to where people live and recreate, which puts both people and property at risk. The immediate danger from wildfires is the destruction of

timber, property, wildlife, and injury or loss of life to persons who live in the affected area or who are using recreational facilities in the area.

Genesee County Perspective:

Wildfires are likely to occur in Genesee County due to the substantial amount of outdoor activities that include burning of various materials. There were 178 reported wildfires in Genesee County in 2003. This number includes natural vegetation fires, forest, woods or wild land fires, brush or brush and grass mixture fires, grass fires, cultivated vegetation and crop fires, and cultivated trees or nursery stock fires. Grass fires accounted for about 57% of the reported wildfires in 2003, followed by approximately 30% of brush or brush and grass mixture fires.

- On May 5, 2003, firefighters put out a grass fire along I-69 in Clayton Township. Callers reported that the fire was just within a few feet of reaching homes in the Swartz Creek Meadows Mobile Home Park.

- On May 4, 2003, a burning brush fire that was left momentarily unattended by the homeowner, spread to two neighboring yards. The Swartz Creek Area Fire Department responded with two grass-fire units and a tanker.

- On April 16, 2003, Mundy Township firefighters put out a grass fire on U.S. 23. The blaze slowed traffic south of Grand Blanc Road.

- On August 7, 2001 homeowners with garden hoses worked with firefighters to battle a brush fire that burned within 10 feet of a mobile home park. The fire started in a ditch, and strong winds blew the fire across dried-out brush and trees toward the Riverside Mobile Home Park in Montrose Township.

Mitigation Strategies for Wildfires

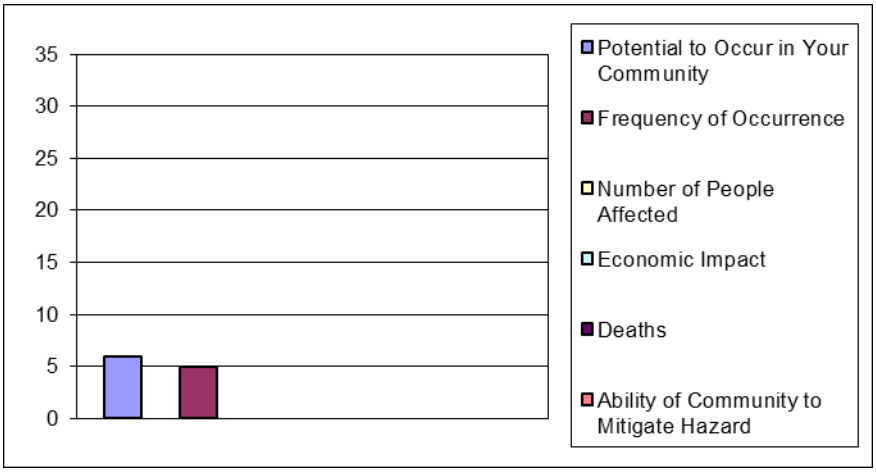
The following strategies are suggested to minimize the effects of Genesee County's number sixteen hazard, wildfires:

- Continued training for fire department personnel
- Upgrade firefighting equipment as needed
- Public education about wildfires
- Restrict outdoor burning
- Update Disaster Response Plan if necessary
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

Mitigation Projects

Atlas Township	Project: Dead Ash tree removal. Project Description: Dead ash trees affect road safety throughout the entire township, along various roads, streets, and neighborhoods. **Budget: $80,000.00** Project: High pressure 10 inch water wells (electric). Project Description: To be used by the Fire Department to fight fires in various Township locations. Township would like eight wells. Proposed timeframe for implementation: 1-5 years. **Budget: Approximately $28,000.00 per well**

17 HAZARD: Earthquakes



Earthquake

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

Hazard Description

Earthquakes are ranked as the number seventeen hazard in Genesee County. Earthquakes range in intensity from slight tremors to great shocks. They may last a few seconds to several minutes, or come as a series of tremors over a period of several days. The energy of an earthquake is released in seismic waves. Earthquakes usually occur without warning. In some instances, advance warnings of unusual geophysical events may be issued. However, scientists cannot yet predict exactly when or where an earthquake will occur. Earthquakes tend to strike repeatedly along fault lines, which are formed where large plates of the earth's crust below the surface constantly push and move against one another. Risk maps have been produced which show areas where an earthquake is more likely to occur. Earthquake monitoring is conducted by the United States Geological Survey (USGS), the National Oceanic and Atmospheric Administration (NOAA), and universities throughout the country.

The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Most casualties result from falling objects and debris. Disruption of communication systems and damage to electric power lines, gas, sewer and water mains can be expected. Water supplies can become contaminated by seepage around water mains. Damage to roadways and other transportation systems may create food and other resource shortages if transportation is interrupted. In addition, earthquakes may trigger other emergency situations such as fires and hazardous material spills, thereby compounding the situation.

Genesee County Perspective:

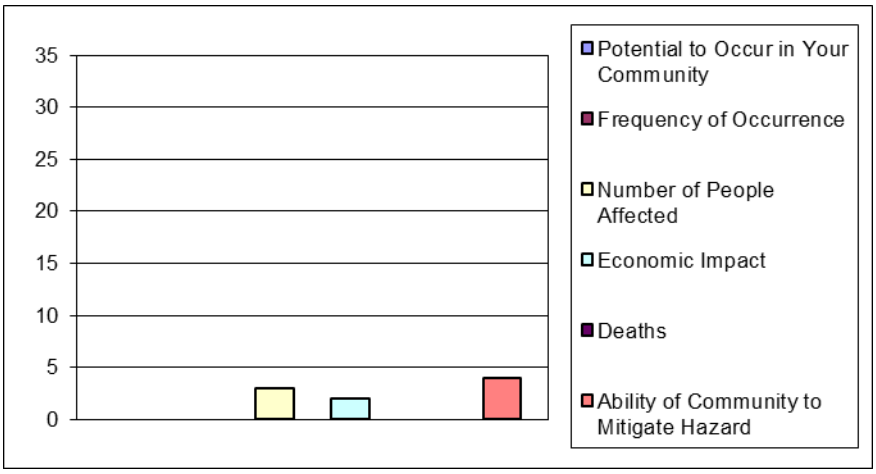
Earthquakes are not considered a threat because the nearest recorded fault line is no closer than the lower third of the state, and there is no record of an earthquake in Genesee County. Also, Michigan is only ranked number 36 out of 50 states on the Top Earthquake States List, with only 2 earthquakes from 1974 to 2003. (Alaska came in first with 12,053 earthquakes.) However, on August 9, 1947, an earthquake did hit a large area of south-central Michigan, affecting a total area of about 50,000 square miles, including points north to Muskegon and Saginaw. This is the closest recorded earthquake incident to Genesee County.

Mitigation Strategies for Earthquakes

The following strategies are suggested to minimize the effects of Genesee County's number seventeen hazard, earthquakes:

- Emergency generators
- Building code enforcement
- Update Disaster Response Plan if necessary
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

18 HAZARD: Nuclear Power Plant Accidents



Nuclear Power Plant Accidents

An actual or potential release of radioactive material at a commercial nuclear power plant or other nuclear facility, in sufficient quantity to constitute a threat to the health and safety of the off-site population.

Hazard Description

Nuclear power plant accidents are ranked the number eighteen hazard in Genesee County. Though the construction and operation of nuclear power plants are closely monitored and regulated by the Nuclear Regulatory Commission (NRC), accidents at these plants are considered a possibility and appropriate on-site and off-site emergency planning is conducted. An accident could result in the release of potentially dangerous levels of radioactive materials into the environment that could affect the health and safety of the public living near the nuclear power plant. A nuclear power plant accident might involve both a release of air borne radioactive materials and radioactive contaminate of the environment around the plant. The degree and area of environmental contamination could vary greatly depending on the type and amount of radioactivity and weather conditions. Response to a nuclear power plant accident requires specialized personnel who have been trained to handle radioactive materials safely, who have specialized equipment to detect and monitor radiation, and who are trained in personal radiation exposure control.

Genesee County Perspective:

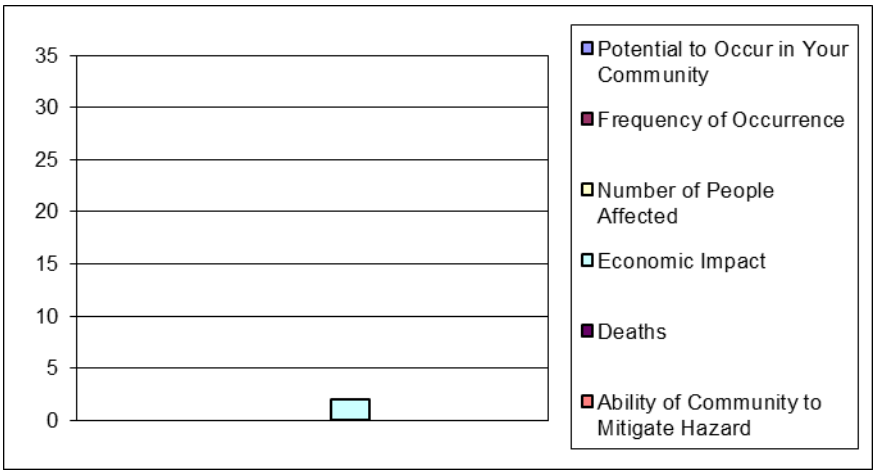
Nuclear power plant accidents are not considered a threat in Genesee County, due to the fact that none exist in the county. The closest one is about 95 miles away from Flint. It is the Fermi 2 Nuclear Power Station located in Newport, Michigan. There are also two other nuclear power plant facilities operating in Michigan. These are the Cook Nuclear Plant, which is located north of Bridgman along Lake Michigan, and the Palisades Nuclear Plant near South Haven. The Cook facility is about 190 miles from Flint, and the Palisades facility is about 185 miles from Flint. Michigan's fourth nuclear facility, Big Rock Point, was located near Charlevoix, but stopped generating electricity in 1997. The facility was scheduled to be turned into a "Greenfield" area in 2004.

Mitigation Strategies for Nuclear Power Plant Accidents

The following strategies are suggested to minimize the effects of Genesee County's number eighteen hazard, nuclear power plant accidents:

- Continued training for Hazardous Materials Response Team
- Continued training for first responders, fire and police personnel
- Public education
- Updated Disaster Response Plan if necessary
- Wireless Emergency Alerts warn anyone in the area with a WEA-capable phone in the case of an extreme or imminent danger

19 HAZARD: Subsidence (Sinkholes)



Subsidence (Sinkholes)

The lowering or collapse of the land surface caused by natural or human-induced activities that erode or remove subsurface support.

Hazard Description

Subsidence is ranked as the number nineteen hazard in Genesee County. Subsidence can be caused by a variety of natural or human-induced activities. Natural subsidence occurs when the ground collapses into underground cavities produced by the solution of limestone or other soluble materials by groundwater. Human-induced subsidence is caused principally by groundwater withdrawal, drainage of organic soils, and underground mining.

In the United States, these activities have caused nearly 17,000 square miles of surface subsidence, with groundwater withdrawal (10,000 square miles of subsidence) being the primary culprit. In addition, approximately 18% of the Unites States land surface is underlain by cavernous limestone, gypsum, salt, or marble, making the surface of these areas susceptible to sinkholes. Generally, subsidence poses a greater risk to property than to life. Nationally, the average annual damage from all types of subsidence is conservatively estimated to be at least $125 million. The National Research

Council estimates of annual damage from various types of subsidence is outlined in **Table 2-29**.

Table 2-29. Land Subsidence: Estimated Annual National Damage	
Type of Subsidence	Annual Damage
Drainage of organic soils	$40,000,000.00
Underground fluid withdrawal	$35,000,000.00
Underground mining	$30,000,000.00
Natural compaction	$10,000,000.00
Sinkholes	$10,000,000.00
Hydro compaction (collapsible soils)	N/A
Total:	$125,000,000.00

In Michigan, the primary cause of subsidence is underground mining. Although mine subsidence is not as significant a hazard in Michigan as in other parts of the country, many areas in Michigan are potentially vulnerable to mine subsidence hazards. Mine subsidence is a geologic hazard that can strike with little or no warning and can result in very costly damage. Mine subsidence occurs when the ground surface collapses into underground mined areas. In addition, the collapse of improperly stabilized mine openings is also a form of subsidence. Mine subsidence generally affects very few people, unlike other natural hazards that may impact a large number of people.

Mine subsidence can cause damage to buildings, disrupt underground utilities, and be a potential threat to human life. In extreme cases, mine subsidence can literally swallow whole buildings or sections of ground into sinkholes, endangering anyone that may be present at that site. Mine subsidence may take years to manifest. Examples of collapses occurring 100 years after mines were abandoned have been documented in several areas of the country.

Genesee County Perspective:

Although subsidence cannot be entirely discounted, it is not considered a serious threat in Genesee County due to our stable bedrock and distance from susceptible areas. However, there have been a few recent incidents of small-scale sinkholes caused by the aging infrastructure.

The Goodrich Dam in the Village of Goodrich has had several small sinkholes that have started to grow, causing the dam to weaken further.

The City of Flint, the City of Burton, and Grand Blanc Township have had sinkholes in roads and residential yards from drainpipe and construction issues.

Although the sinkholes that Genesee County experiences are not developing through natural causes, they are becoming a growing issue as the infrastructure continues to age without the funds to make the proper improvements.

Mitigation Strategies for Subsidence

The following strategies are suggested to minimize the effects of Genesee County's number nineteen hazard, subsidence:

- Identify possible subsidence locations such as old mines
- Restrict building in possible subsidence locations

HAZARD MITIGATION PLAN:
ACTION PLAN AND PLAN MAINTENANCE

Action Plan

As part of the development of this plan, staff requested that local units of governments submit hazard mitigation projects for their municipality. Staff evaluated these projects and included them in the plan for hazards they will help mitigate. Staff also used this information to develop mitigation strategies (actions) that can be implemented to help mitigate hazards. The following list of mitigation actions and projects was presented to the Genesee County Hazard Mitigation Advisory Committee on November 15, 2005 and reviewed during the update process. The following charts identify specific mitigation actions for each hazard, their implementing agency, a proposed timeline for implementation, and relative priority level. Included in the considerations were the cost of the projects compared with past events.

In addition to mitigation project types, an evaluation and summary of hazard-related actions that local communities have taken for improving the general well-being and future mitigation efforts were completed.

Focus on the Expansion of Existing Authorities, Policies, Programs, and Resources

As part of the implementation and updating of the plan, during the five-year plan period, an annual workshop will be held to discuss current activities and projects being undertaken. There will also be a discussion regarding future projects needed in each community and county-wide.

The goal of hazard mitigation is to reduce future impacts to property and residents, and lessen disruption to local services. Mitigation efforts should be ongoing in order to adapt to the needs of the communities and residents. In addition, efforts should include efficiencies in which residents can benefit during times of emergency. The majority of local units in Genesee County feel that the best ways to expand existing authorities, policies, programs and resources are through coordination with other agencies and local units, and educating the public. For existing authorities, policies, programs, and resources for individual communities, as well as how they can be expanded upon, please see the Community Profiles (beginning on Page 25).

The local units placed a high importance on working with other local governments as well as the State in order to improve upon and expand the current policies, programs, activities, and

resources. The State mirrors this sentiment in their Plan in section 4a "Mitigation Tools and Measures":

> "Successful implementation of a program to reduce vulnerability to hazards must, out of necessity, be a joint cooperative effort between the State and local governments. State government provides the means (i.e. enabling laws and local governing authority) for regulating land development, and local governments put that means to use and actually make land use development decisions."
>
> "For land use/development decision-making to be effective in limiting or eliminating hazard risk and vulnerability, local and state actions must be carefully coordinated. The State must ensure, through appropriate legislation and rules/regulations, that local governments have the necessary means to effectively guide and manage land use change and development."
>
> "Local governments, in turn, must make good land use decisions and exercise prudent stewardship of the land development process within their communities. Adequate guidance, oversight, and enforcement at the local level are critically important to successfully mitigating hazard risk and vulnerability" (Mitigation Tools and Measures, Page 545 and 546).

Coordination between neighboring local governments and the State is perhaps the most effective way for communities to improve and expand each jurisdiction's existing authorities, policies, programs, and resources.

The State of Michigan's Plan also acknowledges some of the challenges in implementing effective hazard mitigation techniques:

> "Political, social and economic pressure at the local level often leads to approval of land uses and developments that may not be appropriate for a particular site or area. In some instances, code enforcement may be a problem. In others, adequate funding may not be available to support planning or regulatory activities, or there may be a lack of community support for such activities. The end result is that local communities may not be able to effectively utilize the measures they have at their disposal" (Mitigation Tools and Measures, Page 546).

The local jurisdictions in Genesee County feel that their biggest set-back is the lack of available funding for large-scale hazard mitigation projects and for educating and training the public.

Relative Priority Levels

Top: Mitigation actions for hazards that pose the greatest threat and likelihood of affecting the community and which are eligible for federal FEMA Hazard Mitigation funding.

High: Mitigation actions for hazards that pose the greatest threat and likelihood of affecting the community.

Medium: Mitigation actions for hazards that pose a moderate threat and likelihood of affecting the community.

Low: Mitigation actions for hazards that pose the least threat and likelihood of affecting the community.

Implementing Agency Codes

Agencies in bold type are the lead agencies.				
* indicates the agency has a project listed.				
Local refers to the local unit of government.				
Local ERA refers to local emergency response agencies such as police, fire, and medical.				
Local DPW refers to the local department of public works.				
County refers to county agencies such as the Road Commission, Office of Emergency Management and Drain Commission.				
State refers to various state agencies such as MDOT and the DNR.				
Federal refers to federal agencies.				
Utilities refers to private utilities such as power and phone companies.				
Private refers to businesses and associations such as television and radio stations, scrap yards and trailer park associations.				
Transport Agency refers to transport truck shipping companies.				
Transit Agency refers to public and private agencies involved with mass transit, including schools.				

Potential Funding Source

HMGP: Hazard Mitigation Grant Program*

FMAP: Flood Mitigation Assistance Program*

PDMP: Pre-Disaster Mitigation Program*

1. Inclement Weather

INCLEMENT WEATHER (TORNADOES, THUNDERSTORMS, HAIL, LIGHTNING, SEVERE WINDS AND SNOWSTORMS)				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Enhance Storm Warning System	**Genesee County Emergency Management ***, Local *, Local ERA and Private *	1 to 10 years, as needed	Top	HMGP
Emergency Generators	**Genesee County Emergency Management,** Local *, Local DPW and Local ERA	1 to 5 years, as needed	Top	HMGP
Storm Shelters	**Genesee County Emergency Management ***, Local ERA , and Private	1 to 10 years, as needed	Top	HMGP
Distribution of NOAA Radios	**Genesee County Emergency Management** and Local	Ongoing	Top	HMGP
Elderly Assistance Programs	**Genesee County Emergency Management**, Local and State	Ongoing	High	
Weather Spotter Training	**Genesee County Emergency Management** and Local ERA	Ongoing	High	
Updated Disaster Response Plan	**Genesee County Emergency Management** and Local ERA	1 to 5 years, as needed	High	
Tree trimming Program	**Genesee County Road Commission**, Local DPW, and Utility	Ongoing	High	
Public Education for Disaster Preparedness	**Genesee County Emergency Management, Local ERA**, Local, Local DPW, and Utility	Ongoing	High	

Winter Weather Awareness Training	Genesee County Emergency Management	Ongoing		
SKYWARN Training	Genesee County Emergency Management	Ongoing		
Mass Notification System				
NFIP	Local Units	Ongoing		

2. Structure Fires

STRUCTURE FIRES				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Enhance Emergency Response System	**Genesee County Emergency Management**, Local, and Local ERA	1 to 10 years, as needed	Top	HMGP
Update Fire Fighting Equipment	**Local** and Local ERA	1 to 5 years, as needed	Top	HMGP
Public Education on Fire Safety	**Genesee County Emergency Management**, Local, and Local ERA	Ongoing	High	
Maintain Mutual Aid Agreements	**Genesee County Emergency Management**, Local, and Local ERA	Ongoing	High	
Enforce Fire Code	**Genesee County Emergency Management** and Local ERA	Ongoing	High	
Arson Education	**Genesee County Emergency Management**, Local, and Local ERA	Ongoing	High	
Training For Responders	**Local ERA**	Ongoing	High	

Demolitions	Local Units and GC Land Bank			
Local Building Official Training	GC Emergency Management			

3. Riverine Flooding

RIVERINE FLOODING				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Join FEMA Flood Insurance Program – Map The Flood Plain	Local Units of Government	1 to 5 years, as needed	Top	HMGP
Mitigation Assistance Program For Structures In The Flood Plain	**Genesee County Emergency Management *** and Local	1 to 10 years, as needed	Top	HMGP, FMAP, PDMP
Identify Structures In The Flood Plain	**Local**	1 to 5 years, as needed	Top	HMGP
River Flood Control Measures	**Genesee County Emergency Management** and Local	1 to 10 years, as needed	Top	HMGP, FMAP
Emergency Generators	**Genesee County Emergency Management**, Local *, Local DPW, and Local ERA	1 to 5 years, as needed	Top	HMGP
Public Education for Disaster Preparedness	**Genesee County Emergency Management**, Local, Local ERA, and Utility	Ongoing	High	
Enforce Zoning Regulations Regarding The Flood Plain	**Local**	Ongoing	High	
Amend Zoning Regulations To Prohibit New Development In The Flood Plain	**Local**	1 to 5 years, as needed	High	
Update Disaster Response Plan	**Genesee County Emergency Management** and Local ERA	1 to 5 years, as needed	High	
Will Consider Hazard Mitigation in Future Master Plan Updates	**All 33 Local Units of Government listed in Appendix C and on page 2**	According to Master Plan update schedule	High	

4. Extreme Temperatures

EXTREME TEMPERATURES				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Emergency Generators	**Genesee County Emergency Management**, Local *, Local DPW, and Local ERA	1 to 5 years, as needed	Top	HMGP
Community Shelters	**Local** and Local ERA	1 to 10 years, as needed	Top	HMGP
Distribution of NOAA Radios	**Genesee County Emergency Management** and Local	Ongoing	Top	HMGP
Public Education for Disaster Preparedness	**Genesee County Emergency Management**, Local, Local ERA, and Utility	Ongoing	High	
Elderly Assistance Programs	**Genesee County Emergency Management**, Local, and State	Ongoing	High	

4. Hazardous Materials Incidents (Transportation)

HAZARDOUS MATERIAL INCIDENTS – TRANSPORTATION				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Repair of Critical Infrastructure	**Genesee County Road Commission** , Local DPW, and State	1 to 10 years, as needed	Top	HMGP
Update Response Equipment	**Local ERA**	1 to 5 years, as needed	Top	HMGP
Updated Disaster Response Plan	**Genesee County Emergency Management** and Local ERA	1 to 5 years, as needed	High	
Safety Training For Transport Operators	**Transport Agency**	Ongoing	High	
Training For Responders	**Local ERA**	Ongoing	High	
Public Education	**Genesee County Emergency Management,** Local DPW, State, and Transport Agency	Ongoing	High	

5. Public Health Emergencies

PUBLIC HEALTH EMERGENCIES				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Immunization Programs	**Local**, Local ERA, State, and Federal	Ongoing	Top	HMGP
Training For Responders	**Genesee County Emergency Management** and Local ERA	Ongoing	High	
Public Education for Disaster Preparedness	**Local**, Local ERA, State, and Federal	Ongoing	High	

6. Dam Failure

DAM FAILURES				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Assess Dam Integrity	**Local,** County, State	1 to 5 years, as needed	Top	HMGP
Repair of Critical Dams	**Local *,** County, State	1 to 10 years, as needed	Top	HMGP
Identify Area Potentially Affected By Hazard	**Local,** County, State	1 to 5 years, as needed	Top	HMGP
Public Education	Genesee County Emergency Management, State, and Local	1 to 5 years, as needed	High	

7. Tornadoes

INCLEMENT WEATHER (TORNADOES, THUNDERSTORMS, HAIL, LIGHTNING, SEVERE WINDS AND SNOWSTORMS)				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Enhance Storm Warning System	**Genesee County Emergency Management ***, Local *, Local ERA and Private *	1 to 10 years, as needed	Top	HMGP
Emergency Generators	**Genesee County Emergency Management,** Local *, Local DPW and Local ERA	1 to 5 years, as needed	Top	HMGP
Storm Shelters	**Genesee County Emergency Management ***, Local ERA , and Private	1 to 10 years, as needed	Top	HMGP
Distribution of NOAA Radios	**Genesee County Emergency Management** and Local	Ongoing	Top	HMGP
Elderly Assistance Programs	**Genesee County Emergency Management**, Local and State	Ongoing	High	
Weather Spotter Training	**Genesee County Emergency Management** and Local ERA	Ongoing	High	
Updated Disaster Response Plan	**Genesee County Emergency Management** and Local ERA	1 to 5 years, as needed	High	
Tree trimming Program	**Genesee County Road Commission**, Local DPW, and Utility	Ongoing	High	
Public Education for Disaster Preparedness	**Genesee County Emergency Management, Local ERA**, Local, Local DPW, and Utility	Ongoing	High	

7. Terrorism

TERRORISM				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Prepare Vulnerability Studies for Critical Infrastructure	Local, Local DPW, County, State, and Utility	1 to 5 years, as needed	Medium	
Training For Responders	Local ERA	Ongoing	Medium	
Enforce Homeland Security Directives	Local, Local ERA, County, State, Federal, and Utility	Ongoing	Medium	
Updated Disaster Response Plan	County and Local ERA	1 to 5 years, as needed	Medium	
Training For Critical Infrastructure Employees	Local, Local ERA, Local DPW, County, State, Federal, and Utility	Ongoing	Medium	

8. Hazardous Materials Incidents (Fixed Sites)

HAZARDOUS MATERIALS INCIDENTS - FIXED SITES				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Public Education for Disaster Preparedness	County, Local, and Local ERA	Ongoing	Medium	
Training For Responders	Local ERA	Ongoing	Medium	
Update Hazardous Material Inventory	Local, Local ERA, and State	Ongoing	Medium	
Update Disaster Response Plan	County and Local ERA	1 to 5 years, as needed	Medium	

9. Civil Disturbance

CIVIL DISTURBANCES				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Training For Responders	Local ERA	Ongoing	High	

9. Infrastructure Failure

INFRASTRUCTURE AILURE				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Emergency Generators	**Genesee County Emergency Management**, Local *, Local DPW, and	1 to 5 years, as needed	Top	HMGP
Community Shelters	**Local** and Local ERA	1 to 10 years, as needed	Top	HMGP
Analysis of Infrastructure	**Local**, Local DPW, County and Utility	Ongoing	Top	HMGP
Repair of Critical Infrastructure	**Local ***, Local DPW, County and Utility	1 to 10 years, as needed	Top	HMGP, FMAP
Public Education for Disaster Preparedness	**Genesee County Emergency Management**, Local, Local ERA, and Utility	Ongoing	High	
Infrastructure Maintenance Program	**Local**, Local DPW, County and Utility	Ongoing	High	
Tree Trimming Program	**Genesee County Road Commission** , Local DPW, Utility	Ongoing	High	
Updated Disaster Response Plan	**Genesee County Emergency Management** and Local ERA	1 to 5 years, as needed	High	
Elderly Assistance Programs	**Genesee County Emergency Management**, Local, and State	Ongoing	High	

10. Oil or Natural Gas Well/Pipeline Accidents

OIL OR NATURAL GAS WELL/PIPELINE ACCIDENTS				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Training For Responders	Local ERA	Ongoing	Medium	
Update Response Equipment	Local ERA	1 to 10 years, as needed	Medium	
Update Inventory Of Oil and Natural Gas Well	County, State, and Local	1 to 5 years, as needed	Medium	

11. Snow and Ice Storms

INCLEMENT WEATHER (TORNADOES, THUNDERSTORMS, HAIL, LIGHTNING, SEVERE WINDS AND SNOWSTORMS)				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Enhance Storm Warning System	**Genesee County Emergency Management ***, Local *, Local ERA and Private *	1 to 10 years, as needed	Top	HMGP
Emergency Generators	**Genesee County Emergency Management,** Local *, Local DPW and Local ERA	1 to 5 years, as needed	Top	HMGP
Storm Shelters	**Genesee County Emergency Management ***, Local ERA , and Private	1 to 10 years, as needed	Top	HMGP
Distribution of NOAA Radios	**Genesee County Emergency Management** and Local	Ongoing	Top	HMGP
Elderly Assistance Programs	**Genesee County Emergency Management**, Local and State	Ongoing	High	
Weather Spotter Training	**Genesee County Emergency Management** and Local ERA	Ongoing	High	
Updated Disaster Response Plan	**Genesee County Emergency Management** and Local ERA	1 to 5 years, as needed	High	
Tree trimming Program	**Genesee County Road Commission**, Local DPW, and Utility	Ongoing	High	
Public Education for Disaster Preparedness	**Genesee County Emergency Management, Local ERA**, Local, Local DPW, and Utility	Ongoing	High	

12. Transportation Accidents (Bus, Airplane, Train)

TRANSPORTATION (BUS, AIRPLANE, TRAIN)				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Enhance Storm Warning System	**Private** *	1 to 5 years	Top	HMGP
Training For Responders	**Local ERA**	Ongoing	High	
Simulated Response Exercise	**Genesee County Emergency Management** and Local ERA	Ongoing	High	
Updated Disaster Response Plan	**Genesee County Emergency Management** and Local ERA	1 to 5 years, as needed	High	
Safety Training for Transit Operators	**Transit Agency**	Ongoing	High	
Public Education	**Genesee County Emergency Management,** Local, Local ERA and Transit	Ongoing	High	

13. Drought

DROUGHT				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Water Ration Program For Drought Conditions	Local	Ongoing	Medium	
Water Conservation Program	Local	Ongoing	Medium	
Public Education for Disaster Preparedness	Local, Local DPW, and County	Ongoing	Medium	

14. Nuclear Attack

NUCLEAR ATTACK				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Enhance Warning System	Local, Local ERA, County, Federal, and Private	1 to 10 years, as needed	Low	HMGP
Updated Disaster Response Plan	Local, Local ERA, and County	1 to 5 years, as needed	Low	
Training For Responders	County and Local ERA	Ongoing	Low	

15. Scrap Tire Fires

SCRAP TIRE FIRES				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Inventory Scrap Tire Storage Facilities	Local, County, and State	1 to 5 years, as needed	Low	
Training For Responders	Local ERA	Ongoing	Low	
Proper Disposal Education and Enforcement	Local, County, State, and Private	1 to 5 years, as needed	Low	

16. Wildfires

WILDFIRES				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Public Education for Disaster Preparedness	County, State, and Local	Ongoing	Medium	
Update Disaster Response Plan	County and Local ERA	1 to 5 years, as needed	Medium	
Training For Responders	Local ERA	Ongoing	Medium	
Update Fire Fighting Equipment	Local ERA	1 to 10 years, as needed	Medium	
Ban Open Burning	County, State, and Local	1 to 5 years, as needed	Medium	

17. Earthquakes

EARTHQUAKES				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Emergency Generators	Local, Local DPW, and County	1 to 10 years, as needed	Low	HMGP
Updated Disaster Response Plan	Local, Local ERA, and County	1 to 5 years, as needed	Low	
Enforce Building Codes	Local	Ongoing	Low	

18. Nuclear Power Plant Accidents

NUCLEAR POWER PLANT ACCIDENTS				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Emergency Generators	County, Local, Local DPW, and Local ERA	1 to 10 years, as needed	Low	HMGP
Updated Disaster Response Plan	Local, Local ERA, and County	1 to 5 years, as needed	Low	
Training For Responders	County and Local ERA	Ongoing	Low	

19. Subsidence (Sinkholes)

SUBSIDENCE (SINKHOLES)				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
Identify Potential Subsidence Locations	Local and County	1 to 5 years, as needed	Low	
Restrict Development In Potential Subsidence Locations	Local	Ongoing	Low	

ALL HAZARDS				
Mitigating Action	**Implementing Agency**	**Proposed Implementation Timeline**	**Relative Priority Level**	**Potential Funding Source**
County Hazard Mitigation Project Manager	County	1 to 5 years	Low	
Increase Morgue Capacity	County	1 to 5 years	Low	

While this plan was developed and approved as a multi-jurisdictional document, local units of government are responsible for submitting project applications to FEMA, providing the local match for projects, and implementing the Hazard Mitigation strategies and projects.

	General Hazard Mitigation Actions	County Hazard Mitigation Proj. Mgr.	Increase Morgue Capacity	Emergency Generators	Enhance Warning System	Distribute NOAA Radios	Public Education Programs	Tree Trimming Program	Updated Disaster Response Plan	Elderly Assistance Programs	Community Shelters	Weather Spotter Training	Enforce Fire/ Zoning/ Bldg. Codes	Training for Responders	Arson Education	Maintain Mutual Aid Agreements	Acquire and Update Equipment	Maintenance & Repair Programs	Further Study of Hazard	100% Area FEMA Flood Insurance Prog.	Restrict Development Hazard Area	River Flood Control Measures	Mitigate Floodplain Structures	Simulated Hazard Response Exercises	Safety Training Transit Operator	Repair of Critical Infrastructure/Dams	Ban Open Burning	Immunization Programs	Enforce Homeland Security Directives	Training Critical Infrastructure Emp.	Water Ration Program in Droughts	Water Conservation Program
	Hazards																															
1	Inclement Weather	L	L	T	T	T	H	H	H	H	T	H																				
2	Structure Fires	L	L				H						H	H	H	H	T	H														
3	Hazardous Materials Incidents (Transportation)	L	L				H		H					H			T	H							H	T						
4	Public Health Emergencies	L	L				H							H														T				
5	Riverine Flooding	L	L	T			H		H				H							T	T	T	T									
6	Dam Failure	L	L				H												T							T						
7	Infrastructure Failure	L	L	T			H	H	H	H	T							H								T						
8	Transportation (Bus, Airplane, Train)	L	L		T		H		H					H										H	H							
9	Extreme Temperatures	L	L	T		T	H			H	T																					
10	Civil Disturbance	L	L											H																		
11	Hazardous Materials Incidents (Fixed Sites)	L	L				M		M					M					M													
12	Terrorism	L	L						M					M					M										M	M		
13	Drought	L	L				M																								M	M
14	Oil or Natural Gas Well/ Pipeline Accidents	L	L											M			M		M													
15	Wildfires	L	L				M		M					M			M										M					
16	Nuclear Attack	L	L		L				L					L																		
17	Scrap Tire Fires	L	L				L						L	L					L													
18	Nuclear Power Plant Accidents	L	L	L					L					L																		
19	Earthquakes	L	L	L					L				L																			
20	Subsidence	L	L																L		L											

Priority Level	Top = T	High = H	Medium = M	Low = L

	Specific Hazard Mitigation Projects / Hazards	Bendle Public Schools—Two generators, emergency lighting, back-up air compressor	Bishop Airport—Weather computer, lightning warning systems	City of Flint—Stand-by power for Cedar Street Pump Station and reservoir	City of Flint—Stand-by power for Westside Pump Station	City of Flint—Stand-by power for Torrey Road Booster Pumping Station	City of Flint—Stand-by power for the Flint Water Plant	City of Flint—Removal and replacement of Thread Dam	City of Flint—Removal and replacement of Hamilton Dam	Gaines Township—Storm warning sirens	Genesee Co. Emergency Mngmnt.—A minimum of 100 storm warning sirens	Genesee Co. Emergency Mngmnt.—Relocation of mobile home parks in flood-prone areas	Genesee Co. Emergency Mngmnt.—Tornado shelters for mobile home parks	Genesee Intermediate School District—Portable generator for back-up power	Genesee Intermediate School District—Structural reinforcement for three special-needs buildings	Goodrich Area Schools—Two generators, emergency lighting, back-up air compressor	Village of Goodrich—Work on the Goodrich Dam relating to floodgates, stabilization, etc.	Grand Blanc Township—Three weather sirens	Village of Lennon—Repair of broken weather siren	Village of Lennon—Back-up generator for the Police Department	Village of Lennon—Back-up generator for the Village Hall
1	Inclement Weather	T	T							T	T		T	T	T	T		T	T	T	T
2	Structure Fires																				
3	Hazardous Materials Incidents (Transportation)																				
4	Public Health Emergencies	H		H	H	H	H							H		H				H	H
5	Riverine Flooding	T										T		T		T				T	T
6	Dam Failure							T	T								T				
7	Infrastructure Failure	T		T	T	T	T	T	T					T		T	T			T	T
8	Transportation (Bus, Airplane, Train)		T																		
9	Extreme Temperatures	T												T		T				T	T
10	Civil Disturbance																				
11	Hazardous Materials Incidents (Fixed Sites)																				
12	Terrorism	M												M		M				M	M
13	Drought																				
14	Oil or Natural Gas Well/Pipeline Accidents																				
15	Wildfires																				
16	Nuclear Attack	L												L		L				L	L
17	Scrap Tire Fires																				
18	Nuclear Power Plant Accidents	L												L		L				L	L
19	Earthquakes	L												L		L				L	L
20	Subsidence																				

Priority Level	Top = T	High = H	Medium = M	Low = L

Genesee County Hazard Mitigation Plan Maintenance

This plan is a dynamic document that may need to be amended as needs arise (new funding becomes available or a change in hazard priority do to a hazard event). The Genesee County Emergency Management and Homeland Security Office is the agency responsible for monitoring, evaluating, and updating the plan. An annual notice in January will be posted at the Genesee County Courthouse, on the county's website, and will also be sent to all local units of government requesting comment on plan contents and projects to be amended into the plan. In February, staff will conduct a review of the plan. The review will be specific to the goals and objectives section, the hazard assessment and mitigation section, and any comments and projects that have been received. This review process will help staff determine if the plan needs to be amended. If necessary, staff will prepare amendments to the plan for review and approval at the March meeting of the Genesee County Hazard Mitigation Advisory Committee. The proposed amendments will be posted on the plan's website for public view and comment. The public will have an additional opportunity to comment on the plan and plan amendments at the March meeting prior to approval.

Once every five years, staff must submit an updated plan to FEMA. In August of the fourth year of the plan, a notice will be posted at the Genesee County Courthouse, posted on the plan's website, and will be sent to all local units of government requesting comment on plan contents and projects to be amended into the plan. In September, staff will conduct a review of the plan. The review will be specific to the goals and objectives section, the hazard assessment and mitigation section, and any comments and projects that have been received. This review process will help staff determine if the plan needs to be amended or have a major update. If staff determines that the plan only needs to be amended, staff will prepare the amendments to the plan for review and approval at the March meeting of the Genesee County Hazard Mitigation Advisory Committee. The proposed amendments will be posted on the plan's website for public review and comment. The public will have an additional opportunity to comment on the plan and plan amendments at the March meeting prior to approval. At this meeting, staff will involve the public and will ask for public input. A copy of the amended plan will be sent to FEMA for review and approval.

If the plan requires a major revision, staff will follow similar procedures as used in the development of this plan. (Please see the "Plan Development Work Items and Meetings" section on page 3.) This process will include the development of goals and objectives for the plan, hazard identification, hazard prioritization, vulnerability determination, identification of mitigating actions, and public involvement at the beginning, middle, and end of plan development. The updated plan will be reviewed and approved at the March Genesee County Hazard Mitigation Advisory Committee meeting. The public will have an additional opportunity to comment on the plan update at the March meeting prior to approval. At this meeting, staff will involve the public and will ask for public input. A copy of the updated plan will be sent to FEMA for review and approval.

Incorporating the Recommendations of the Genesee County Hazard Mitigation Plan into Community Plans

The Genesee County Hazard Mitigation Plan includes eleven cities, seventeen townships, and five villages. (See list on page 2.) During the development of the original hazard mitigation plan, staff contacted each local unit of government and asked if they would consider including recommendations from the Genesee County Hazard Mitigation Plan into the next update of their master and zoning plans.

Each one of the local units of government in Genesee County agreed to consider this request, and signed a Genesee County Hazard Mitigation Plan form which states that fact. The table on page 162 lists these local units of government along with information on the next updates of their zoning and master plans. See Appendix C for copies of the local units' signed Genesee County Hazard Mitigation Plan forms. Also, see page 232 for a table listing the local units of government that submitted projects and signed forms.

An assessment of the implementation of the recommendations of the Hazard Mitigation Plan into their master plans and zoning plans was conducted by staff as part of the update. They are also required to notify surrounding units of government and entities that have requested notification when they are beginning their master plan review process. The Genesee County Emergency Management and Homeland Security Office will submit a request to each local unit covered by this plan to be notified when the local unit begins their review process. Staff will review the local units' master plans and recommend the incorporation of hazard mitigation plan recommendations.

Genesee County Local Unit of Government	Next Master Plan Update	Next Zoning Plan Update	Signed Form
Argentine Township	2010	2010	yes
Atlas Township	2007	As needed	yes
City of Burton	2008	Updated in 2003	yes
Clayton Township	To be decided	To be decided	yes
City of Clio	2006	Done in 2003	yes
City of Davison	2010	2006	yes
Davison Township	2010	As needed	yes
City of Fenton	2006	As needed	yes
Fenton Township	Annual amendments	Done in 2002	yes
City of Flint	Working on timeline	Concurrent with Master Plan	yes
Flint Township	2007	2007	yes
City of Flushing	2008	Done in 2002	yes
Flushing Township	2010	Yearly	yes
Forest Township	Done in 2002	now	yes
Gaines Township	2006	2007	yes
Village of Gaines	2006	2007	yes
Genesee Township	2009	2010	yes
Village of Goodrich	2006	As needed	yes
City of Grand Blanc	2007	2007	yes
Grand Blanc Township	2010	2010	yes
Village of Lennon	2006	Updated in 2002	yes
City of Linden	2006	2006	yes
City of Montrose	2010	As needed	yes
Montrose Township	2006	2006	yes
City of Mt. Morris	2006	Amended in 2003	yes
Mt. Morris Township	2008	As needed	yes
Mundy Township	2007	2006	yes
Village of Otisville	2009	2009	yes
Village of Otter Lake	No Master Plan	2007	yes
Richfield Township	2010	As needed	yes
City of Swartz Creek	2010	2006	yes
Thetford Township	To be decided	To be decided	yes
Vienna Township	2011	2011	yes

	Genesee County Local Units of Government	Atlas Township- Natural Gas back-up generator for the Township Office/Hall	Atlas Township- Dead Ash tree removal	Atlas Township- Drainage Improvements	Atlas Township- High pressure 10 inch water wells (electric)	Atlas Township- Boat for water or ice rescue	Atlas Township- Emergency warning sirens	City of Linden- Stand-alone generator for City Hall	Davison Township- Warning Sirens	Fenton Township- Emergency Shelter	Flushing Township- Back-up Generator	Flushing Township- Tornado Sirens	Flushing Township- Dredge Brent Creek & Cole Creek	Flushing Township- Back-up Generator	Forest Township- Warning Sirens
1	Argentine Township														
2	Atlas Township	X	X	X	X	X	X								
3	City of Burton														
4	Clayton Township														
5	City of Clio														
6	City of Davison														
7	Davison Township								X						
8	City of Fenton														
9	Fenton Township								X						
10	City of Flint														
11	Flint Township														
12	City of Flushing													X	
13	Flushing Township										X	X	X	X	
14	Forest Township														X
15	Gaines Township														
16	Village of Gaines														
17	Genesee Township														
18	Village of Goodrich														
19	City of Grand Blanc														
20	Grand Blanc Twp.														
21	Village of Lennon														
22	City of Linden							X							
23	City of Montrose														
24	Montrose Township														
25	City of Mt. Morris														
26	Mt. Morris Township														
27	Mundy Township														
28	Village of Otisville														
29	Village of Otter Lake														
30	Richfield Township														
31	City of Swartz Creek														
32	Thetford Township														
33	Vienna Township														

	Genesee County Local Units of Government	Bendle Public Schools—Two generators, emergency lighting, back-up air compressor	Bishop Airport—Weather computer, lightning warning systems	City of Flint—Stand-by power for Cedar Street Pump Station and reservoir	City of Flint—Stand-by power for Westside Pump Station	City of Flint—Stand-by power for Torrey Road Booster Pumping Station	City of Flint—Stand-by power for the Flint Water Plant	City of Flint—Removal and replacement of Thread Dam	City of Flint—Removal and replacement of Hamilton Dam	Gaines Township—Storm warning sirens	Genesee Co. Emergency Mngmnt.—A minimum of 100 storm warning sirens	Genesee Co. Emergency Mngmnt.—Relocation of mobile home parks in flood-prone areas	Genesee Co. Emergency Mngmnt.—Tornado shelters for mobile home parks	Genesee Intermediate School District—Portable generator for back-up power	Genesee Intermediate School District—Structural reinforcement for three special-needs buildings	Goodrich Area Schools—Two generators, emergency lighting, back-up air compressor	Village of Goodrich—Work on the Goodrich Dam relating to floodgates, stabilization, etc.	Grand Blanc Township—Three weather sirens	Village of Lennon—Repair of broken weather siren	Village of Lennon—Back-up generator for the Police Department	Village of Lennon—Back-up generator for the Village Hall
1	Argentine Township																				
2	Atlas Township																				
3	City of Burton																				
4	Clayton Township																				
5	City of Clio																				
6	City of Davison																				
7	Davison Township																				
8	City of Fenton																				
9	Fenton Township																				
10	City of Flint			X	X	X	X	X	X												
11	Flint Township																				
12	City of Flushing																				
13	Flushing Township																				
14	Forest Township																				
15	Gaines Township									X											
16	Village of Gaines																				
17	Genesee Township																				
18	Village of Goodrich															X	X				
19	City of Grand Blanc																				
20	Grand Blanc Twp.																	X			
21	Village of Lennon																		X	X	X
22	City of Linden																				
23	City of Montrose																				
24	Montrose Township																				
25	City of Mt. Morris																				
26	Mt. Morris Township																				
27	Mundy Township																				
28	Village of Otisville																				
29	Village of Otter Lake																				
30	Richfield Township																				
31	City of Swartz Creek																				
32	Thetford Township																				
33	Vienna Township																				

APPENDIX A

Meeting Information
&
Surveys

Genesee-Lapeer-Shiawassee RegionV Planning and Development Commission

ROOM 223 – 1101 BEACH STREET FLINT, MICHIGAN 48502-1470
TELEPHONE (810) 257-3010 FAX (810) 257-3185

DEREK BRADSHAW
FISCAL OFFICER

HAZARD MITIGATION PLAN
TUESDAY, April 2th, 2013
2:00 P.M.
GCMPC Conference 222 Room, 2nd Floor

A-G-E-N-D-A

I. Timeline

II. Committee Formulation

III. Hazard Mitigation Training/Requirements

IV. Hazard Mitigation Federal & State Regulations

V. Other Business

Hazard Mitigation

GENESEE & LAPEER COUNTY PLAN UPDATE

What is Hazard Mitigation?

- Hazard Mitigation is any sustained action taken to reduce or eliminate long-term risk to life and property from a hazardous event within Genesee and Lapeer Counties.
- Mitigation planning is a process for states and communities to identify policies, activities and tools to implement mitigation actions.

Hazard Mitigation & The Federal Government

- The federal government provides supplementary financial assistance for the implementation of cost-effective hazard mitigation measures that will permanently reduce or eliminate the long-term risk to human life and property from natural, technological, or human-caused disasters and their effects.

Plan Update Preparation

- The Genesee and Lapeer County Hazard Mitigation Plan is currently being updated, using information gathered through hazard identification, hazard assessment, evaluation of past mitigation strategies, and public involvement.
- The plan must be **re-adopted** by all local units of government in order to be eligible to continue receiving Federal Hazard Mitigation funding.

The Mitigation Process

- The Hazard Mitigation process for Genesee and Lapeer Counties identifies hazards that may bring harm to a community by taking the necessary action to reduce or eliminate the amount of damage caused by a disaster before it strikes.

The Purpose of a Hazard Mitigation Plan

The purpose of the Genesee and Lapeer County Hazard Mitigation Plan is to:

- Save lives and protect property.
- Preserve and protect an area's environment and economy.
- Preserve and maintain an area's essential services and quality of life.
- Provide information to citizens, businesses, and officials.
- Guide project implementation and funding of projects

It is important for communities to be covered under the Hazard Mitigation Plan.

Hazard Mitigation Goals :

- Continue to prevent loss of life.
- Improve responses and recoveries for man made and natural disasters.
- Enhance early warning systems.
- Maintain essential public services.
- Enhance public awareness.
- Protect public health, welfare, and safety.
- Protect the environment.
- Continue to provide resources for effective mitigation of hazardous material incidents.

What Is A Hazard Analysis?

- A **hazard analysis** is used as the first step in a process used to assess risk. The result of a hazard analysis is the identification of different types of hazards and their potential damage.
- The analysis incorporates historical data, social factors, geographic and climatic factors, population data and public perception to determine a community's vulnerability to specific hazards.

Why Do We Do A Hazard Analysis?

A hazard analysis is performed in Genesee & Lapeer Counties to:

- Identify persons, property, and important features in an area.
- Identify notable hazards affecting an area.
- Identify the extent of risk to vulnerable areas from identified hazards.

Updating Hazard Analysis

Updating the current Hazard Mitigation Plan will assist staff to:

- Assess current and anticipated vulnerabilities to specific hazards.
- Help incorporate new hazard mitigation data.
- Help prepare and mobilize communities for current and future hazardous events.

Additional Requirements

- The updated plan must describe the status of hazard mitigation actions in the previous plan by identifying those that have been completed or not completed.
- The updated plan must include brief community profiles for each community served under the plan.
- The updated plan must also identify the position, department, or agency responsible for implementing and administering the actions (for each jurisdiction).
- The updated plan must identify potential funding sources and expected time frames for completion

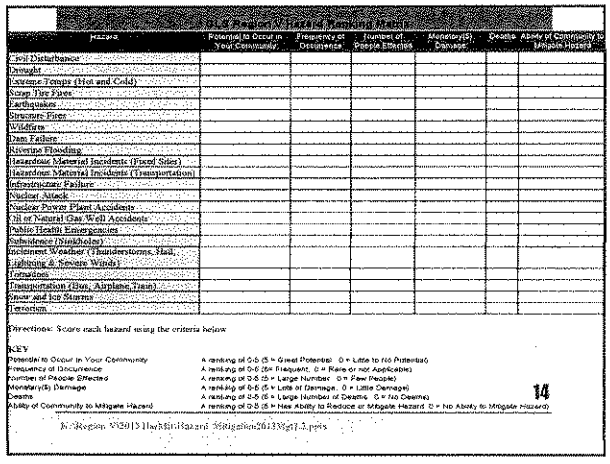
Public Input Session

- The Genesee County Metropolitan Planning Commission (GCMPC) is committed to ensuring that citizen input will figure prominently throughout the Hazard Mitigation update process.
- During this process, an overview of the Hazard Mitigation plan update will be discussed.
- Comments from the public will be taken into consideration and implemented into the plan update.

The Hazard Mitigation Matrix

The matrix is used to assess the level of threat a hazard poses to an area, or community, using the following 3 factors:

1. Potential for the hazard to occur in the community or area.
2. Effects of the hazard on the community, economy, and people within the area.
3. Ability of the community to mitigate the hazard before disaster strikes.



Hazards	Potential to Occur in Your Community	Frequency of Occurrence	Number of People Effected	Monetary(s) Damage	Deaths	Ability of Community to Mitigate Hazard
Civil Disturbance						
Drought						
Extreme Temps (Hot and Cold)						
Home Fire Fires						
Earthquakes						
Structure Fires						
Wildfire						
Dam Failure						
Riverine Flooding						
Hazardous Material Incidents (Fixed Sites)						
Hazardous Material Incidents (Transportation)						
Infrastructure Failure						
Nuclear Attack						
Nuclear Power Plant Accidents						
Oil or Natural Gas Well Accidents						
Public Health Emergencies						
Subsidence (Sinkholes)						
Inclement Weather (Thunderstorms, Hail, Lightning & Severe Winds)						
Tornadoes						
Transportation (Bus, Airplane, Train)						
Snow and Ice Storms						
Terrorism						

Directions: Score each hazard using the criteria below

KEY

Potential to Occur in Your Community	A ranking of 0-5 (5 = Great Potential 0 = Little to no Potential)
Frequency of Occurrence	A ranking of 0-5 (5= Frequent, 0 = Rare or not Applicable)
Number of People Effected	A ranking of 0-5 (5 = Large Number 0 = Few People)
Monetary(s) Damage	A ranking of 0-5 (5 = Lots of Damage, 0 = Little Damage)
Deaths	A ranking of 0-5 (5 = Large Number of Deaths 0 = No Deaths)
Ability of Community to Mitigate Hazard	A ranking of 0-5 (5 = Has Ability to Reduce or Mitigate Hazard 0 = No Ability to Mitigate Hazard)

Next Steps... Vulnerability Assessment

Perform a vulnerability assessment of top hazards:

- A vulnerability assessment gives quantitative estimates of the people and property in the community that are vulnerable to each hazard.
- The Hazard Ranking Matrix will help assist staff to determine a community's vulnerability with each hazard and ranking.

Update Mitigation Strategies

Mitigation Strategies in Genesee and Lapeer Counties will be updated to determine if:

- Previous hazards have been identified.
- Preventative regulations are set forth for development in hazardous locations.
- Designs and construction have been alerted for mitigation purposes.
- Early warning and public educational programs have been implemented.

Final Steps...

- **Public Involvement** - A public meeting will be held in mid-August for early public involvement to bring diverse viewpoints and values into the decision-making process for plan update preparation.
- **Plan Preparation** - An update to the original Hazard Mitigation Plan will be prepared using the information gathered through hazard identification, hazard assessment, evaluation of mitigation strategies, and public involvement.
- **Plan Completion & Review** - Following final approval from the committee, the Hazard Mitigation Plan update must be adopted by all local units of government in order to be eligible for federal mitigation funding.

Questions?

GLS Region V
Planning and Development Commission
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Flint, Michigan 48502
Phone: (810)257-3010
Email:
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Staff

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Fax: (810)257-3185
Website:

GENESEE COUNTY HAZARD MITIGATION MEETING

Thursday, May 9, 2013

(Please Print)

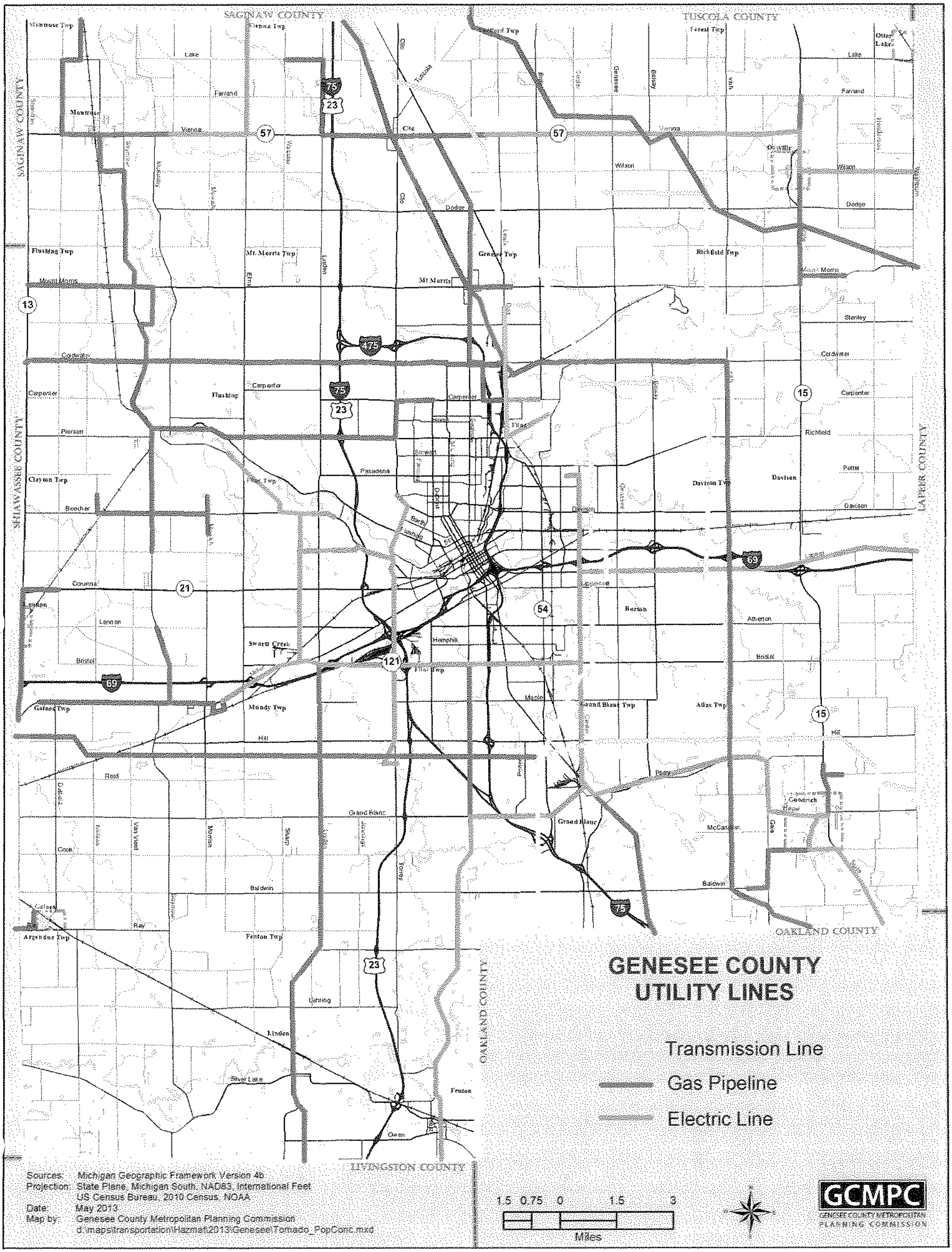
Name/Organization	Address	Email Address	Phone
Jenifer Boyer GCHD			
SKIP DAVIS DAVISON FIRE			
April Swartout Gen. Co. Health Dept.			
Tom Osterholzer Burton Police Dept.			
GAIL NOVAK PHELPS			
BRENT WRIGHT			
Ed Blight	Swartz Creek 4011 W. Hill Rd.	eblight@mundytwp-mi.gov	
Steve Sitar	HMC	ssitar1@hurleymc.com	
BRUCE TREVITHICK GCMCA	ONE HURLEY PLAZA	btrevithick@gcmedcontrol.org	810-262-2555

GENESEE COUNTY HAZARD MITIGATION MEETING

Tuesday, June 4, 2013

(Please Print)

Name/Organization	Address	Email Address	Phone
Jon Boyce GCEMHSD			424-4403
GAIL PHELPS		gaphelps@umflint.edu	
Tom Osterholzer Burton Police		t.osterholzer@burtonmi.gov	
BRENT WRIGHT		bwright@cityofflint.com	787-6537
Ed Blight + Hazmat		eblight@mundytwp-mi.gov	577-5453
✓ April Swartout		aswartout@gchd.us	424-4441
David Thibeault		dthibeault@gcdcwws.com	600-4154
BRUCE TREVITHICK		BTREVITHICK@GCMEDCONTROL.org	262-232-5555
✓ SKIP DAVIS	Fire Data	WD2SKIP@CHARTER.NET	810 397 0995


GENESEE COUNTY
UTILITY LINES
Transmission Line
Gas Pipeline
Electric Line
SAGINAW COUNTY
TUSCOLA COUNTY
SHIAWASSEE COUNTY
LAPEER COUNTY
OAKLAND COUNTY
LIVINGSTON COUNTY
Sources: Michigan Geographic Framework Version 4b
Projection: State Plane, Michigan South, NAD83, International Feet
US Census Bureau, 2010 Census, NOAA
Date: May 2013
Map by: Genesee County Metropolitan Planning Commission
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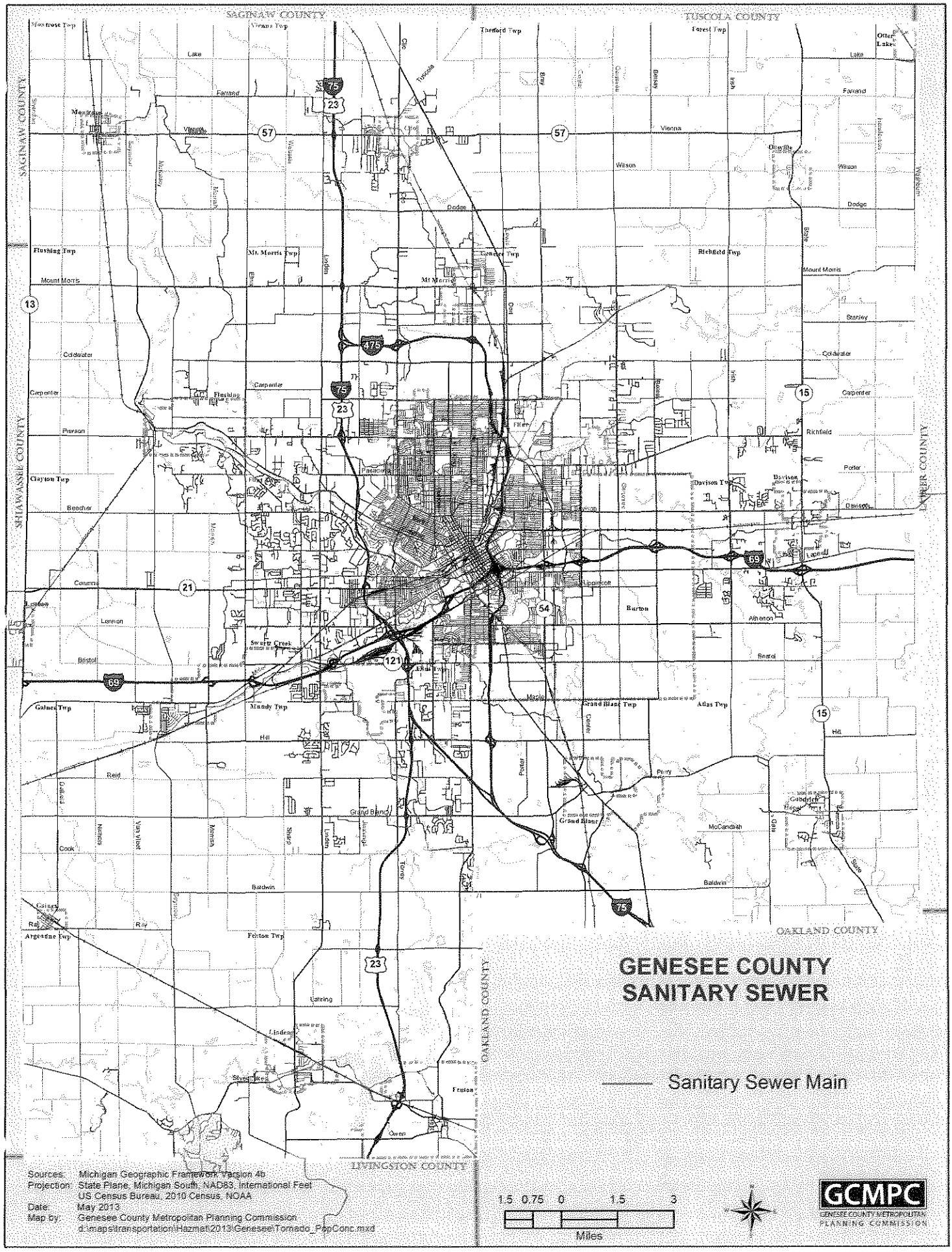
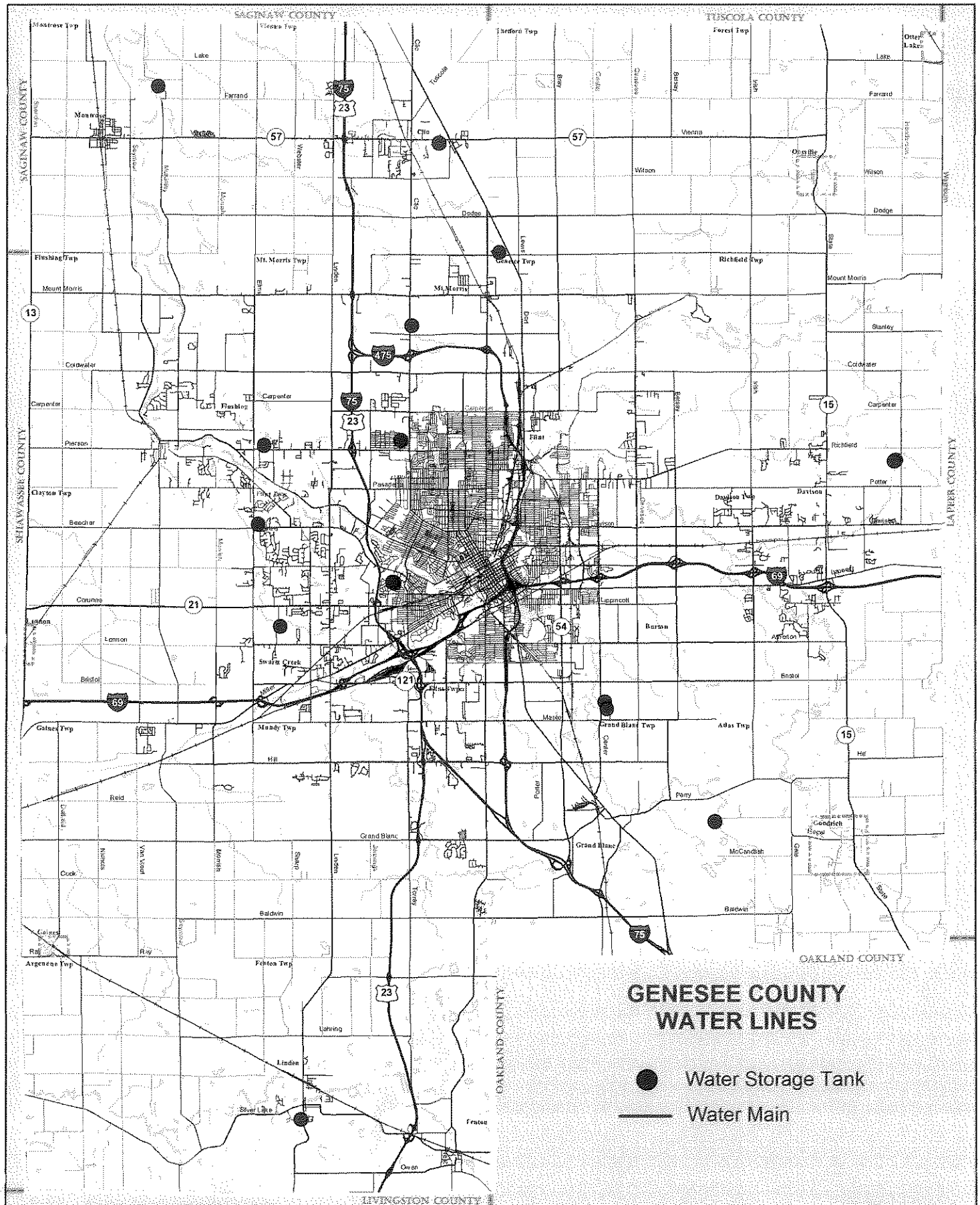
Miles
GCMPC
GENESEE COUNTY METROPOLITAN PLANNING COMMISSION



GENESEE COUNTY SANITARY SEWER

Sanitary Sewer Main



Sources: Michigan Geographic Framework Version 4b
Projection: State Plane, Michigan South, NAD83, International Feet
US Census Bureau, 2010 Census, NOAA
Date: May 2013
Map by: Genesee County Metropolitan Planning Commission
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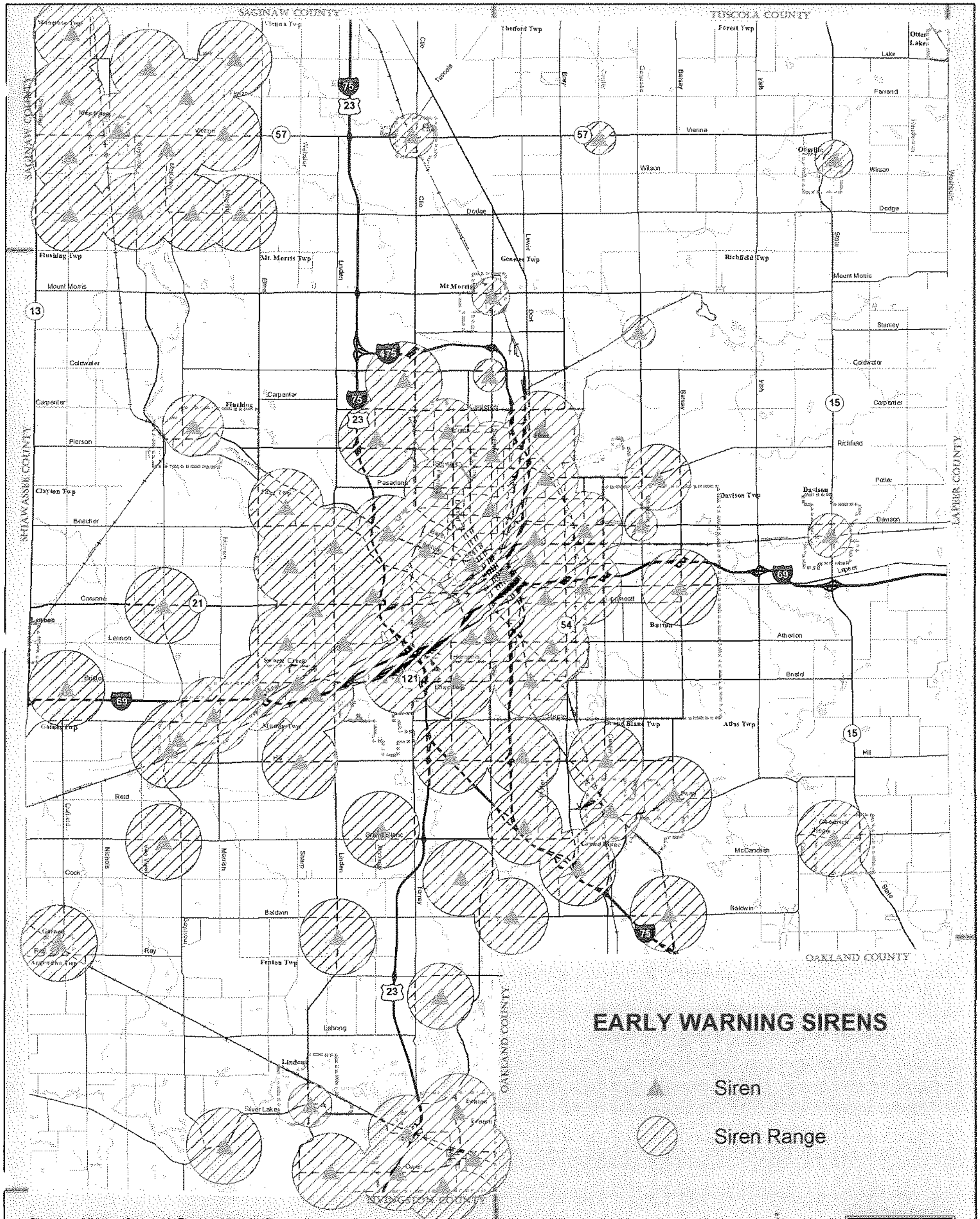

Sources: Michigan Geographic Framework Version 4b
Projection: State Plane, Michigan South, NAD83, International Feet
Date: May 2013
Map by: Genesee County Metropolitan Planning Commission
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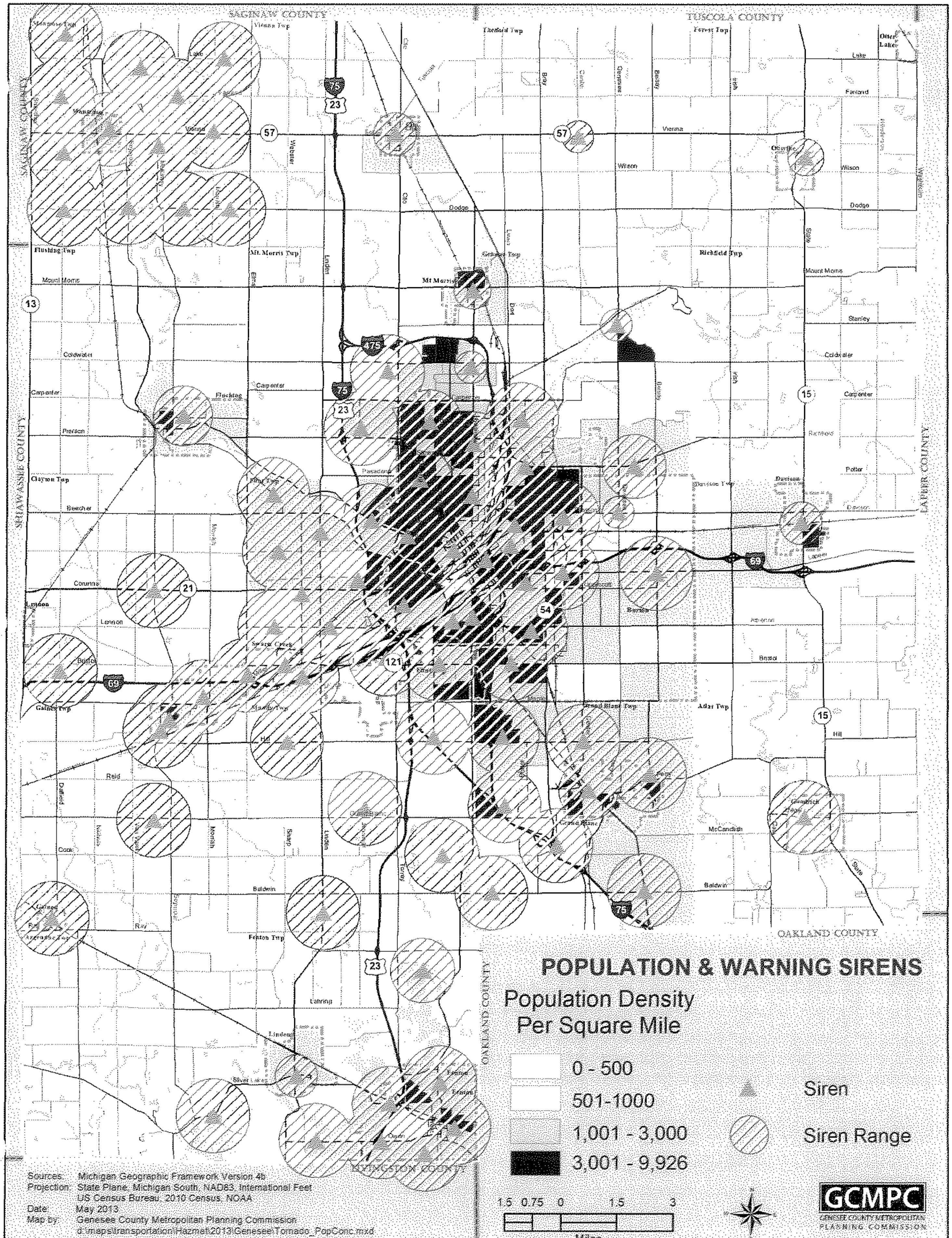
GCMPC
GENESEE COUNTY METROPOLITAN PLANNING COMMISSION


POPULATION & WARNING SIRENS
Population Density Per Square Mile
0 - 500
501-1000
1,001 - 3,000
3,001 - 9,926
Siren
Siren Range
Sources: Michigan Geographic Framework Version 4b
Projection: State Plane, Michigan South, NAD83, International Feet
US Census Bureau, 2010 Census, NOAA
Date: May 2013
Map by: Genesee County Metropolitan Planning Commission
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1.5 0.75 0 1.5 3
Miles
GCMPC
GENESEE COUNTY METROPOLITAN PLANNING COMMISSION
SAGINAW COUNTY
TUSCOLA COUNTY
SHIAWASSEE COUNTY
LAPEER COUNTY
OAKLAND COUNTY
LIVINGSTON COUNTY
Thetford Twp
Forest Twp
Flushing Twp
Mt. Morris Twp
Richfield Twp
Clayton Twp
Davison Twp
Gaines Twp
Mundy Twp
Grand Blanc Twp
Atlas Twp
Fenton Twp
Argentine Twp
Flushing
Mt Morris
Davison
Swartz Creek
Burton
Grand Blanc
Linden
Fenton
Vienna
Wilson
Dodge
Mount Morris
Stanley
Coldwater
Carpenter
Pierson
Potter
Beecher
Corunna
Lennon
Bristol
Atherton
Hill
Reid
McCandlish
Baldwin
Rolston
Silver Lake
Lake
Farrand
Pasadena

Genesee-Lapeer-Shiawassee Region V Planning and Development Commission

ROOM 223 – 1101 BEACH STREET FLINT, MICHIGAN 48502-1470
TELEPHONE (810) 257-3010 FAX (810) 257-3185

DEREK BRADSHAW
FISCAL OFFICER

June 12, 2013

MEMORANDUM

TO: Elected Officials and Committee Members

FROM: Christine A. Durgan, Assistant Director

SUBJECT: **Genesee County Hazard Mitigation Plan Update**

GLS Region V Planning and Development Commission staff is currently preparing an update to the Genesee County Hazard Mitigation Plan (Plan). As with all geographic areas, Genesee County is vulnerable to a wide range of natural and human-related hazards, and has experienced these disasters in the past. The Plan update will provide an understanding of threatening disasters; identify and discuss the County's vulnerability to identified hazards; and outline the County's options and strategies to reduce overall damage.

Genesee County's Plan update is being developed in cooperation with the Office of the Genesee County Sheriff's Emergency Management and Homeland Security Division, the Genesee County Hazard Mitigation Advisory Committee and the Michigan State Police. This Plan will meet the Federal Emergency Management Administration's (FEMA) required criteria for a multi-jurisdictional hazard mitigation plan.

After adoption by Genesee County, each local unit of Genesee County government is required by to also adopt the Plan at the local community level in order to be eligible to apply for future hazard mitigation funds. Local units of government who do not adopt the Plan will not be considered eligible to apply for this type of funding.

Staff will be holding a public meeting on Thursday, June 27th, 2013 at 10:00 a.m. in the Harris Auditorium on the third floor of the Genesee County Administration Building. We will be providing information regarding the Plan update and requesting input regarding the Plan. We hope you will be able to attend.

For further details, please contact me at (810) 257-3010.

Public Meeting Announcement for Genesee County Residents

A public meeting will be held Thursday, June 27th, 2013 at 10:00 a.m. in the Harris Auditorium on the third floor of the Genesee County Administration Building, 1101 Beach Street Flint, Michigan.

The GLS Region V Planning and Development Commission, in cooperation with the Office of the Genesee County Sheriff's Emergency Management and Homeland Security Division, is developing an updated version of its hazard mitigation plan for Genesee County. Each county must have an approved hazard mitigation plan in order to be eligible for federal hazard mitigation project funding.

This meeting is an opportunity for the public to learn about the Hazard Mitigation Planning Process and to provide input on Genesee County hazards.

GLS Region V will furnish reasonable auxiliary aids and services to individuals with disabilities upon request. Individuals with disabilities requiring auxiliary aids for services should contact by writing or calling the following:

Christine A. Durgan, Assistant Director
Genesee County Metropolitan Planning Commission,
Room 223, 1101 Beach Street Flint, MI 48502
(810)257-3010
Michigan Relay Center: 1-800-649-3777 or 711

"An Equal Opportunity Organization"

Order Confirmation

Ad Order Number 0004634045

THE FLINT JOURNAL
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1101 BEACH ST SUITE 223	1101 BEACH ST SUITE 223	*Sales Rep.*	kjones
FLINT MI 48502 USA	FLINT MI 48502 USA	*Order Taker*	kjones
(810) 766-6540	(810) 766-6540	*Order Source*	
		Special Pricing	None

FAX
AGunsell@co.genesee.mi.us

Tear Sheets	0	*Net Amount*	$247.53
Proofs	0	*Tax Amount*	$0.00
Affidavits	1	*Total Amount*	$247.53
Blind Box		*Payment Method*	
Promo Type		*Payment Amount*	$0.00
Materials		*Amount Due*	$247.53

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Cost	$21.59		
Run Dates	6/16/2013		
Sort Text	PUBLICMEETINGANNOUNCEMENTFORGENESEECOUNT		

Product	Flint Journal::	*Placement/Class*	Announcements - Announcemer
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Ad Content Proof

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"An Equal Opportunity Organization"

STATE OF MICHIGAN)
County of Genesee ss Dawn Sutton

Being duly sworn deposes and say he/she is Principal Clerk of

THE FLINT JOURNAL
DAILY EDITION

a newspaper published and circulated in the County of Genesee and otherwise qualified according to Supreme Court Rule; and that the annexed notice, taken from said paper, has been duly published in said paper on the following day(days)

June 14 A.D. 20 13

Sworn to and subscribed before me this 19th day of June 20 13

Janice M. Ringler

JANICE M. RINGLER
Notary Public, State of Michigan
County of Kent
My Commission Expires: 10/03/2014
Acting in the County of Kent

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GENESEE COUNTY HAZARD MITIGATION PLAN UPDATE PUBLIC MEETING

Thursday, June 27, 2013

(Please Print)

Name/Organization	Address	Email Address	Phone
DAVID GUIGEAR MUNOY TOWNSHIP	3478 MUNOY AVE SC 48473	dave.guigear@munoytwp-mi.gov	810-655-4631
Edward Blight Mundy Township	4011 W. Hill Rd Swartz Creek 48473	eblight@mundytwp-mi.gov	810-577-5453
Tom OSTerholzer Burton Police	4090 MANOR dr Burton mi	tOSTerholzer@burtonmi.gov	810 742-654
ROBERT C JOHNSON	MT MORRIS TWP.		
Jenifer Boyer GCSD-EMHSD		jboyer@co.genesee.mi.us	424-4403
Tracey Tucker	1490 S Dye Flint MI 48532	Htucker@flinttownship.org	287-1059
Tom Darnell	city of Mt Morris	citymanager@cityofmtmorris.org	686-2160
BRUCE TREVITHICK	GEN. CO. MED CONTROL	BTREVITHICK@gcMEDCONTROL.org	262-2555
Chris Gehringer	Clayton Twp	Supervisor@ClaytonTownship.ORG.	424-2685
Keith Edwards	Grand Blanc Twp	edwards@twp.grand-blanc.mi.us	
Mary Ann Price	forest Twp	mprice@foresttwp.com	631-6040

GENESEE COUNTY HAZARD MITIGATION PLAN UPDATE PUBLIC MEETING

Thursday, June 27, 2013

(Please Print)

Name/Organization	Address	Email Address	Phone
GAIL NOVAK PHELPS	UM FLINT EHS SAGINAW MI	gailnova@umflint.edu	
DAVID STAMM.	5405 S. SAGINAW ST. FLINT, MICH. 48507	STAMM@TWP.GENESEE.MI.US	424-2702
Steven Fuhr	7244 W. Genesee Rd.		
WAYNE BATES	" " "		
Larry Green	MT MORRIS TWP SUPERVISOR		785-9138
JEFF ROTH	MT. MORRIS City	jroth@cityofmtmorris.org	810-6868380
KURT SOPER	DAVISON TWP		810 653 4156
Joe Madore	Richfield Twp		653-3564

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Genesee County Hazard Mitigation Plan Update

Region V Planning and Development Commission in cooperation with the Office of the Genesee County Sheriff's Emergency Management and Homeland Security Division

Public Input Session

- The Region V Planning and Development Commission is committed to ensuring that citizen input will figure prominently throughout the Hazard Mitigation Plan update process.
- During this process, an overview of the Hazard Mitigation plan update will be discussed.
- Comments from the public will be taken into consideration and implemented into the plan during the update process.

What is Hazard Mitigation??

- Hazard Mitigation is any sustained action taken to reduce or eliminate long-term risk to life and property from a hazardous event within Genesee County.
- Mitigation planning is a process for states and communities to identify policies, activities and tools to implement mitigation actions.

The Mitigation Process

- The Hazard Mitigation process for Genesee County identifies hazards that may bring harm to a community by taking the necessary action to reduce or eliminate the amount of damage caused by a disaster before it strikes.

The Purpose of a Hazard Mitigation Plan

The purpose of the Genesee County Hazard Mitigation Plan is to:

- Save lives and protect property.
- Preserve and protect an area's environment and economy.
- Preserve and maintain an area's essential services and quality of life.
- Provide information to citizens, businesses, and officials.
- Guide project implementation and funding of projects.

It is important for communities to be covered under the Hazard Mitigation Plan.

Hazard Mitigation & The Federal Government

» The federal government provides supplementary financial assistance for the implementation of cost-effective hazard mitigation measures that will permanently reduce or eliminate the long-term risk to human life and property from natural, technological, or human-caused disasters and their effects.

Update Mitigation Strategies

Mitigation Strategies in Genesee County will be updated to determine if:

» Previous hazards have been identified to include information on previous occurrences of hazard events and the probability of reoccurrences.

» Preventative regulations are set forth for development in hazardous locations.

» Early warning and public educational programs have been implemented.

Additional Requirements

» The updated plan must describe the status of hazard mitigation actions in the previous plan by identifying those that have been completed or not completed.

» The updated plan must include brief community profiles for each community served under the plan.

» The updated plan must also identify the position, department, or agency responsible for implementing and administering the actions (for each jurisdiction).

» The updated plan must identify potential funding sources and expected time frames for completion.

Final Steps...

» **Plan Preparation** - An update to the original Hazard Mitigation Plan will be prepared using the information gathered through hazard identification, hazard assessment, evaluation of mitigation strategies, and public involvement.

» **Plan Completion & Review** - Following final approval from the committee, the Hazard Mitigation Plan update must be adopted by all local units of government in order to be eligible for federal mitigation funding.

What Is A Hazard Analysis?

» A hazard analysis is used as the first step in a process used to assess risk. The result of a hazard analysis is the identification of different types of hazards and their potential damage.

» The analysis incorporates historical data, social factors, geographic and climatic factors, population data and public perception to determine a community's vulnerability to specific hazards.

Supporting Data Summary

» Hazards for Genesee County were selected for inclusion in this plan based upon records of historical occurrence, known risks, and guidance provided by the County Hazard Mitigation Review Committee and by the Michigan State Police Emergency Management and Homeland Security Division.

Why Do We Do A Hazard Analysis?

A hazard analysis is performed in Genesee County to:

» Identify persons, property, and important features in an area.

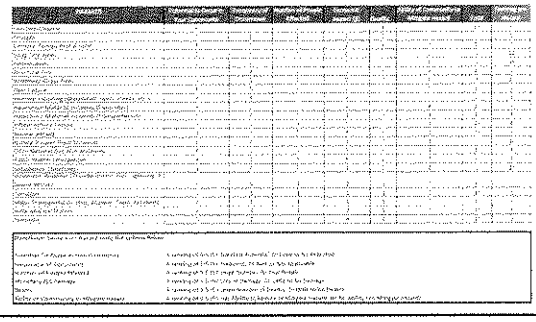
» Identify notable hazards affecting an area.

» Identify the extent of risk to vulnerable areas from identified hazards.

Hazard Rankings Definitions

- **Potential to Occur in Your Community**
  Has the hazard ever occurred in the past or could it happen in the future?
- **Frequency of Occurrence**
  How often has this hazard happened before?
- **Number of People Affected**
  How many residents have been affected by this hazard in the past or could be affected in the future?
- **Economic Impact**
  What types of damage did this hazard cause? What was the associated cost in property and lives?
- **Deaths**
  How many lives were taken by the hazard in past incidents?
- **Ability of Genesee County to Mitigate the Hazard**
  What can Genesee County do to reduce the hazard's effects the next time it happens?

GC Original Rankings

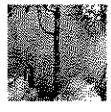


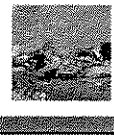
Weighted Final Hazard Rankings

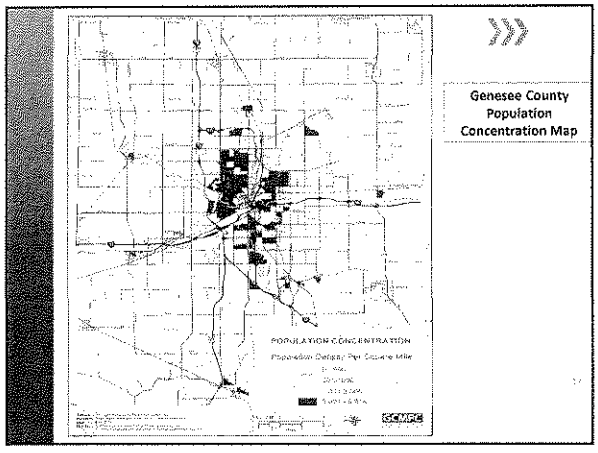
HAZARD	Final Hazard Ranking	Final Score
Inclement Weather	1	77
Structure Fire	2	74
Riverine Flooding (Watershed, Rivers, Creeks etc.)	3	73
Extreme Temps	4	71
Hazardous Mat Incidents (Trans)	4	71
Public Health Emergencies	5	64
Dam Failure	6	63
Tornadoes	7	62
Terrorism	7	62
Hazardous Mat Incidents (Fixed Site)	8	60
Civil Disturbance	9	56
Infrastructure Failure	9	56
Oil or Natural Gas Well Accidents	10	54
Snow and Ice Storms	11	53
Transportation Accidents	12	44
Drought	13	40
Nuclear Attack	14	26
Scrap Tire Fires	15	14
Wildfires	16	10
Earthquakes	17	11
Nuclear Power Plant Accidents	18	9
Subsidence (Sinkholes)	19	3

Genesee County Hazard Mitigation Plan Update
Proposed List of Hazards

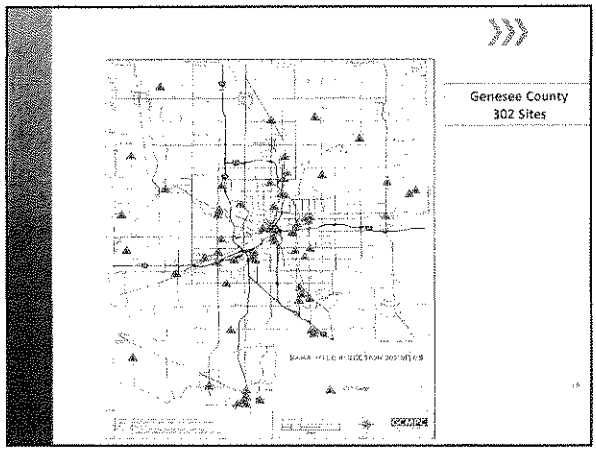
1. Inclement Weather
2. Riverine Flooding (Watershed, Rivers, Creeks)
3. Structure Fire
4. Public Health Emergencies
5. Extreme Temps
6. Hazardous Material Incidents-Transportation
7. Dam Failure
8. Terrorism
9. Infrastructure Failure
10. Tornadoes
11. Oil or Natural Gas Well Accidents
12. Civil Disturbance
13. Hazardous Material Incidents (Fixed)
14. Snow and Ice Storms
15. Nuclear Attack
16. Drought
17. Major Transportation Accidents (Bus, Airplane, Train)
18. Scrap Tire Fires
19. Wildfires/Grassfires
20. Earthquakes
21. Nuclear Power Plant Accidents
22. Subsidence (Sinkholes)



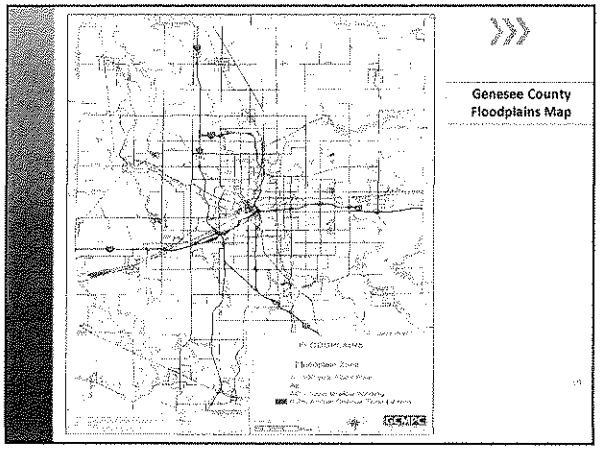




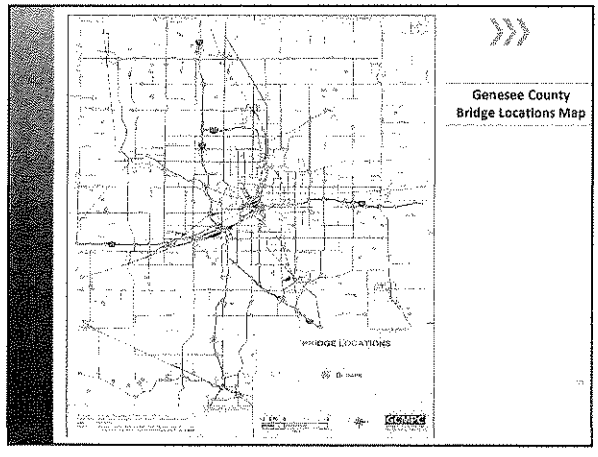
Genesee County
Population
Concentration Map



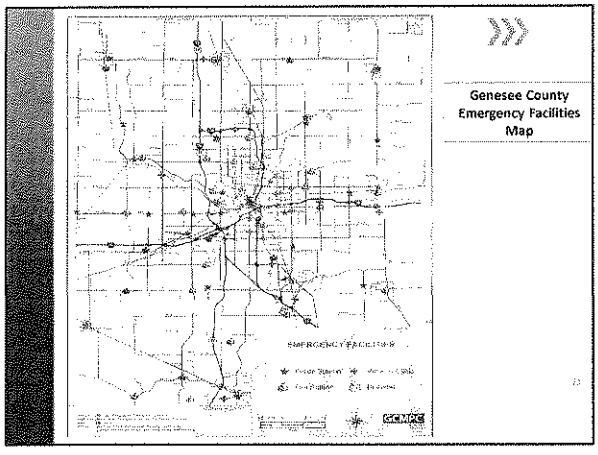
Genesee County
302 Sites



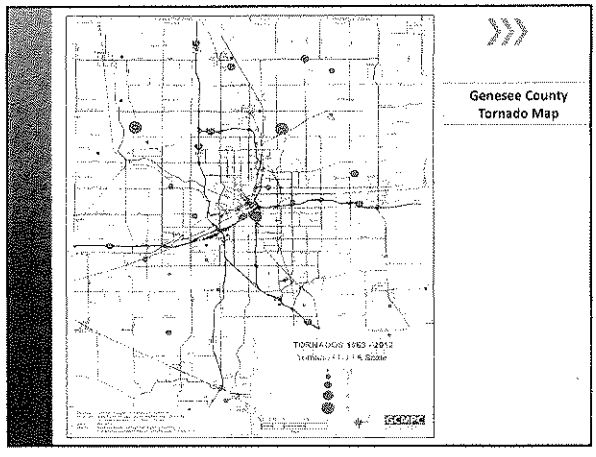
Genesee County
Floodplains Map



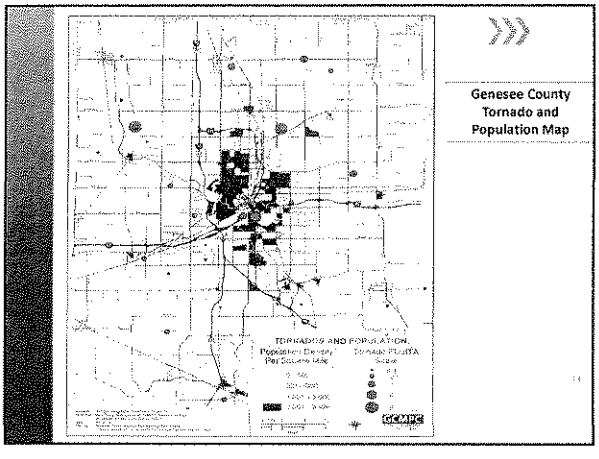
Genesee County
Bridge Locations Map



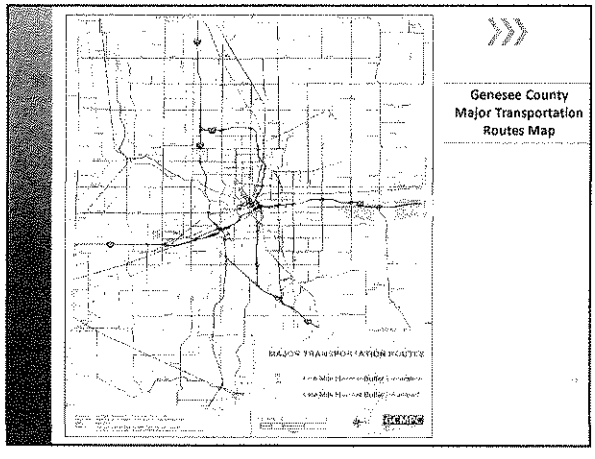
Genesee County Emergency Facilities Map



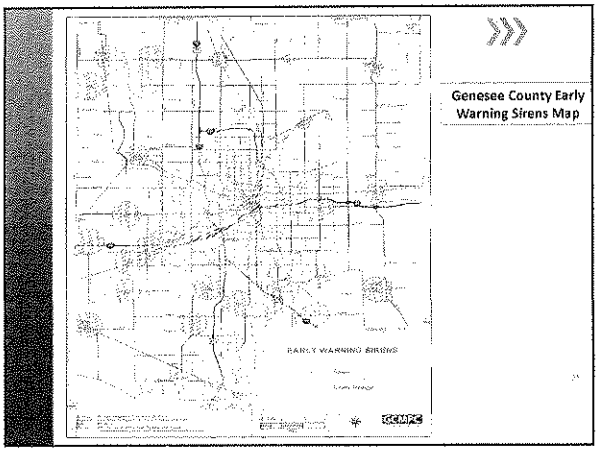
Genesee County Tornado Map



Genesee County Tornado and Population Map



Genesee County Major Transportation Routes Map

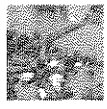


Genesee County Early Warning Sirens Map

Genesee County Hazard Mitigation Plan Update

GOALS

- Prevent loss of life
- Enhance early warning systems
- Enhance public awareness
- Improve response & recovery for man-made/natural disasters
- Protect public health, welfare, & safety



OBJECTIVES

- Increase/enhance warning systems & coverage
- Limit development in floodplains
- Provide additional storm shelters/services
- Continue to enhance coordination between response agencies
- Enhanced public education

Questions?

GLS Region V
Planning and Development
Commission
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Flint, Michigan 48502
Phone: (810)257-3010
Email:
gcmpc@co.genesee.mi.us

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and Homeland Security
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Phone: (810)257-3064
Email:
jboyer@co.genesee.mi.us

Genesee-Lapeer-Shiawassee Region V Planning and Development Commission

ROOM 223 – 1101 BEACH STREET FLINT, MICHIGAN 48502-1470
TELEPHONE (810) 257-3010 FAX (810) 257-3185

DEREK BRADSHAW
FISCAL OFFICER

GENESEE COUNTY HAZARD MITIGATION PLAN REVIEW COMMITTEE
Tuesday, July 16th, 2013
9:00 A.M.
Emergency Management and Homeland Security Conference Room,
Genesee County Administration Building

A-G-E-N-D-A

I. Mapping and Data Update

II. Website Update

III. Applications for Hazard Mitigation Projects

IV. Other Business

GENESEE COUNTY HAZARD MITIGATION MEETING

Tuesday, July 16, 2013

(Please Print)

Name/Organization	Address	Email Address	Phone
SKID DAVIS	10441 DAVISON RD DAVISON, MI 48423	WD2SKID@CHARTER.NET	810-392-0995
GAIL NOVAK PHELPS	UM FLINT	gailnova@umflint.edu	
Claire Wilke	GCMPC		
Chris Dingens	Gempc		
April Swartout	GCHD	aswartout@gchd.us	810-424-4499
Jennifer Boyer	GCSD - EMHSD	jboyer@co.genesee.mi.us	424-4403
BRUCE TREVITHICK	GCMCA		
David Thibeault	GC Water & Waste	dthibeault@gcdcwws.com	810-624-1914

Genesee County Hazard Mitigation Plan
Proposed Hazard Mitigation Project Request Form

Contact Information for Proposed Project

Applicant Agency: _____

Contact Person: _____

Title: _____

Project Description

Please attach additional pages if necessary.

Estimated Project Cost:			**Please attach a location map for this project.**
Proposed Timeframe for Implementation:	1 to 5 years	6 to 10 years	11 or more years

Genesee County Hazard Mitigation Plan
Proposed Hazard Mitigation Project Request Form

Project Alternatives

Project Alternative 1:

Estimated Project Cost:

Please attach a location map for this project.

Project Alternative 2:

Estimated Project Cost:

Please attach a location map for this project.

Proposed Timeframe for Implementation:	1 to 5 years	6 to 10 years	11 or more years

Table 4: Eligible Activities by Program

Eligible Activities	HMGP	PDM	FMA	RFC	SRL
1. Mitigation Projects	√	√	√	√	√
Property Acquisition and Structure Demolition	√	√	√	√	√
Property Acquisition and Structure Relocation	√	√	√	√	√
Structure Elevation	√	√	√	√	√
Mitigation Reconstruction					√
Dry Floodproofing of Historic Residential Structures	√	√	√	√	√
Dry Floodproofing of Non-residential Structures	√	√	√	√	
Minor Localized Flood Reduction Projects	√	√	√	√	√
Structural Retrofitting of Existing Buildings	√	√			
Non-structural Retrofitting of Existing Buildings and Facilities	√	√			
Safe Room Construction	√	√			
Infrastructure Retrofit	√	√			
Soil Stabilization	√	√			
Wildfire Mitigation	√	√			
Post-Disaster Code Enforcement	√				
5% Initiative Projects	√				
2. Hazard Mitigation Planning	√	√	√		
3. Management Costs	√	√	√	√	√

Additional information regarding eligible projects for HMGP is included in Part VIII A.8 and A.9; for FMA, see Part VIII C.3; for RFC, see Part VIII D.1; and for SRL, see Part VIII E.1.

Costs for eligible activities must be reasonable, allowable, allocable, and necessary as required by 2 CFR Part 225, Cost Principles for State, Local, and Indian Tribal Governments, 44 CFR Section 13.22, applicable program regulations, and this guidance.

The following activities are not eligible as stand-alone activities but are eligible only when included as a functional component of eligible mitigation activities:

- For **HMGP** and **PDM,** permanently installed generators and/or related equipment purchases (e.g., generator hook-ups), when the generator directly relates to the hazards being mitigated and is part of a project (the 5% Initiative allows for the stand-alone purchase of permanently installed generators);
- Real property or easements purchases required for the completion of an eligible mitigation project. For safe room projects, no real property or easement purchase is eligible; and
- Studies that are integral to the development and implementation of a mitigation project, including hydrologic and hydraulic, engineering, or drainage studies.

D.1.1 Mitigation Projects

This section briefly describes the mitigation projects eligible under one or more of the five HMA programs. Table 4 summarizes the eligibility of the following project types for each program:

- **Property Acquisition and Structure Demolition** – The voluntary acquisition of an existing at-risk structure and, typically, the underlying land, and conversion of the land to open space through the demolition of the structure. The property must be deed-restricted in perpetuity to open space uses to restore and/or conserve the natural floodplain functions. For property acquisition and structure demolition projects, see Part IX A.

- **Property Acquisition and Structure Relocation** – The voluntary physical relocation of an existing structure to an area outside of a hazard-prone area, such as the Special Flood Hazard Area (SFHA) or a regulatory erosion zone and, typically, the acquisition of the underlying land. Relocation must conform to all applicable State and local regulations. The property must be deed-restricted in perpetuity to open space uses to restore and/or conserve the natural floodplain functions. For property acquisition and structure relocation projects, see Part IX A.

- **Structure Elevation** – Physically raising an existing structure to the Base Flood Elevation (BFE) or higher if required by FEMA or local ordinance. Structure elevation may be achieved through a variety of methods, including elevating on continuous foundation walls; elevating on open foundations, such as piles, piers, posts, or columns; and elevating on fill. Foundations must be designed to properly address all loads and be appropriately connected to the floor structure above, and utilities must be properly elevated as well. FEMA encourages Applicants and subapplicants to design all structure elevation projects in accordance with the American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI) 24-05, *Flood Resistant Design and Construction*. For additional information about structure elevation projects, see Part IX E.

- **Mitigation Reconstruction** – The construction of an improved, elevated building on the same site where an existing building and/or foundation has been partially or completely demolished or destroyed. Mitigation reconstruction is only permitted for structures outside of the regulatory floodway or coastal high hazard area (Zone V) as identified by the existing best available flood hazard data. Activities that result in the construction of new living space at or above the BFE will only be considered when consistent with the Mitigation Reconstruction requirements. Such activities are only eligible under SRL.

  Mitigation reconstruction projects cannot be combined with other activity types within the same project subapplication. To ensure the subapplication scope, schedule, and budget adhere to programmatic requirements, a mixture of activity types other than mitigation reconstruction within the subapplication is not permitted. Applicants must indicate within the mitigation activity section of their subapplication why they are electing to utilize mitigation reconstruction, and have not chosen the other available activity types. For additional information about mitigation reconstruction projects, see Part IX D.

- **Dry Floodproofing** – Techniques applied to keep structures dry by sealing the structure to keep floodwaters out. For all dry floodproofing activities, FEMA encourages Applicants and subapplicants to design all dry floodproofing projects in accordance with ASCE/SEI 24-05.

- **Dry Floodproofing of Historic Residential Structures** is permissible only when other techniques that would mitigate to the BFE would cause the structure to lose its status as a Historic Structure, as defined in 44 CFR Section 59.1.
- **Dry Floodproofing of Non-residential Structures** must be performed in accordance with NFIP Technical Bulletin (TB) 3-93, *Non-Residential Floodproofing—Requirements and Certification*, and the requirements pertaining to dry floodproofing of non-residential structures found in 44 CFR Sections 60.3(b)(5) and (c)(4).

- **Minor Localized Flood Reduction Projects** – Projects to lessen the frequency or severity of flooding and decrease predicted flood damages, such as the installation or modification of culverts and stormwater management activities such as creating retention and detention basins. These projects must not duplicate the flood prevention activities of other Federal agencies and may not constitute a section of a larger flood control system.
  - For **RFC** and **SRL**, at least 50 percent of the structures directly benefiting from this mitigation activity must be NFIP-insured. In addition, these projects must primarily benefit RFC or SRL structures, respectively. Documentation must be provided in the subapplication to satisfy this requirement.
- **Structural Retrofitting of Existing Buildings** – Modifications to the structural elements of a building to reduce or eliminate the risk of future damage and to protect inhabitants. The structural elements of a building that are essential to protect in order to prevent damage include foundations, load-bearing walls, beams, columns, building envelope, structural floors and roofs, and the connections between these elements.
- **Non-structural Retrofitting of Existing Buildings and Facilities** – Modifications to the non-structural elements of a building or facility to reduce or eliminate the risk of future damage and to protect inhabitants. Non-structural retrofits may include bracing of building contents to prevent earthquake damage or the elevation of heating and ventilation systems.
- **Safe Room Construction** – Safe room construction projects are designed to provide immediate life-safety protection for people in public and private structures from tornado and severe wind events, including hurricanes. For HMA, the term "safe room" only applies to extreme wind (combined tornado and hurricane) residential, non-residential, and community safe rooms; tornado community safe rooms; and hurricane community safe rooms. This type of project includes retrofits of existing facilities or new safe room construction projects, and applies to both single and multi-use facilities. For additional information, see Part IX C.
- **Infrastructure Retrofit** – Measures to reduce risk to existing utility systems, roads, and bridges.
- **Soil Stabilization** – Projects to reduce risk to structures or infrastructure from erosion and landslides, including installing geo-textiles, stabilizing sod, installing vegetative buffer strips, preserving mature vegetation, decreasing slope angles, and stabilizing with rip rap and other means of slope anchoring. These projects must not duplicate the activities of other Federal agencies.

- **Wildfire Mitigation** – Projects to mitigate the risk to at-risk structures and associated loss of life from the threat of future wildfire through:
  - **Defensible Space for Wildfire** – Projects creating perimeters around homes, structures, and critical facilities through the removal or reduction of flammable vegetation. For additional information, see Part IX B.3.1.
  - **Application of Ignition-resistant Construction** – Projects that apply ignition-resistant techniques and/or non-combustible materials on new and existing homes, structures, and critical facilities. For additional information, see Part IX B.3.2.
  - **Hazardous Fuels Reduction** – Projects that remove vegetative fuels proximate to the at-risk structure that, if ignited, pose significant threat to human life and property, especially critical facilities. For additional information, see Part IX B.3.3.
- **Post-Disaster Code Enforcement** – Projects designed to support the post-disaster rebuilding effort by ensuring that sufficient expertise is on hand to ensure appropriate codes and standards, including NFIP local ordinance requirements, are utilized and enforced. For additional information, see Part VIII A.8.
- **5% Initiative Projects** – These projects provide an opportunity to fund mitigation actions that are consistent with the goals and objectives of the State or Tribal (Standard or Enhanced) and local mitigation plans and meet all HMGP program requirements, but for which it may be difficult to conduct a standard BCA to prove cost effectiveness. For additional information, see Part VIII A.10.

Note: The requirements of Part IX A of this guidance and of 44 CFR Part 80 govern only real property acquisition for open space purposes, and do not apply to real property acquisition associated with other mitigation projects. Unlike acquisition for open space purposes, acquisition associated with the construction of a mitigation project may involve the local jurisdiction's use of its power of eminent domain to take certain, limited property interests necessary to construct the project. Prior to applying for such projects Applicants and subapplicants must consult with FEMA for further direction because different requirements and procedures will apply.

D.1.2 Hazard Mitigation Planning

Mitigation plans are the foundation for effective hazard mitigation. A mitigation plan is a demonstration of the commitment to reduce risks from natural hazards and serves as a strategic guide for decisionmakers as they commit resources.

The mitigation planning process includes hazard identification and risk assessment leading to the development of a comprehensive mitigation strategy for reducing risks to life and property. The mitigation strategy section of the plan identifies a range of specific mitigation actions and projects being considered to reduce risks to new and existing buildings and infrastructure. This section includes an action plan describing how identified mitigation activities will be prioritized, implemented, and administered.

Planning activities funded under HMA are designed to develop State, Tribal, and local mitigation plans that meet the planning requirements outlined in 44 CFR Part 201. A mitigation planning subgrant award must result in a mitigation plan adopted by the jurisdiction(s) and approved by FEMA prior to the end of the Period of Performance (POP).

For **FMA**, funds shall only be used to support the flood hazard portion of State, Tribal, or local mitigation plans to meet the criteria specified in 44 CFR Part 201. Funds are only available to support these activities in communities participating in the NFIP.

For links to mitigation planning and risk assessment resources, see Part X C.2.

D.1.3 Management Costs

Management costs are any indirect costs and administrative expenses that are reasonably incurred by a Grantee or subgrantee in administering a grant or subgrant award.

Eligible Applicant or subapplicant management cost activities may include:

- Solicitation, review, and processing of subapplications and subgrant awards;
- Subapplication development and technical assistance to subapplicants regarding engineering feasibility, BCA, and EHP documentation;
- Geocoding mitigation projects identified for further review by FEMA;
- Delivery of technical assistance (e.g., plan reviews, planning workshops, training) to support the implementation of mitigation activities;
- Managing grants (e.g., quarterly reporting, closeout);
- Technical monitoring (e.g., site visits, technical meetings);
- Purchase of equipment, per diem and travel expenses, and professional development that is directly related to the implementation of HMA programs; and
- Staff salary costs directly related to performing the activities listed above.

Management costs are only awarded in conjunction with project or planning grants and subgrants. For a link to more geocoding information, see Part X C.3. For more information regarding management costs for **HMGP**, see Part VIII A.4. For **PDM**, **FMA**, **RFC**, and **SRL**, FEMA may provide up to 25 percent of the Applicant's anticipated management costs, upon the award and final approval of the first subgrant. The remaining management costs will be obligated as additional subgrants are awarded.

D.2 Ineligible Activities

The following list provides examples of activities that are not eligible for HMA funding:

- Projects that do not reduce the risk to people, structures, or infrastructure;
- Projects that are dependent on another phase of a project(s) in order to be effective and/or feasible (i.e., not a stand-alone mitigation project that solves a problem independently or constitutes a functional portion of a solution);
- Projects for which actual physical work such as groundbreaking, demolition, or construction of a raised foundation has occurred prior to award or final approval. Projects for which demolition and debris removal related to structures proposed for acquisition or mitigation reconstruction has already occurred may be eligible when such activities were initiated or completed under the FEMA Public Assistance program to alleviate a health or safety hazard as a result of a disaster;

- Projects for preparedness activities or temporary measures (e.g., sandbags, bladders, geotubes, or portable generators);
- Projects constructing new buildings or facilities, with the exception of safe room construction and mitigation reconstruction;
- Projects that create revolving loan funds;
- Activities required as a result of negligence or intentional actions, or those intended to remedy a code violation, or the reimbursement of legal obligations such as those imposed by a legal settlement, court order, or State law;
- All projects located in a CBRS Unit or in OPAs, other than property acquisition and structure demolition or relocation projects for open space under PDM, FMA, RFC, and SRL. For details on property acquisition and structure demolition or relocation projects for open space within a CBRS Unit or OPAs see Part IX A.2;
- Activities on Federal lands or associated with facilities owned by another Federal entity;
- Major flood control projects related to the construction, demolition, or repair of dams, dikes, levees, floodwalls, seawalls, groins, jetties, breakwaters, and erosion projects related to beach nourishment or re-nourishment;
- Projects for hazardous fuels reduction in excess of 2 miles from structures;
- Projects that address unmet needs from a disaster that are not related to mitigation;
- Retrofitting facilities primarily used for religious purposes, such as places of worship (or other projects that solely benefit religious organizations). A place of worship may, however, be included in a property acquisition and structure demolition or relocation project provided that the project benefits the entire community, such as when the whole neighborhood or community is being removed from the hazard area;
- Activities that only address man-made hazards;
- Projects that address, without an increase in the level of protection, operation, deferred or future maintenance, repairs, or replacement of existing structures, facilities, or infrastructure (e.g., dredging, debris removal, replacement of obsolete utility systems, bridges, and facility repair/rehabilitation);
- Projects for the purpose of:
  - Landscaping for ornamentation (trees, shrubs, etc);
  - Site remediation of hazardous materials (with the exception eligible activities, such as the abatement of asbestos and/or lead-based paint and the removal of household hazardous wastes to an approved landfill);
  - Water quality infrastructure;
  - Address ecological or agricultural issues;
  - Protection of the environment and/or watersheds;
  - Forest management;

- Prescribed burning or clear-cutting;
- Creation and maintenance of fire breaks, access roads, or staging areas; and
- Irrigation systems;

- Mapping, flood studies, and planning activities, such as plan revisions/amendments or risk assessments, when they do not result in a FEMA-approved mitigation plan;
- Studies not directly related to the design and implementation of a proposed mitigation project; and
- Preparedness measures and response equipment (e.g., response training, electronic evacuation road signs, interoperable communications equipment).

All projects must also comply with any additional project-specific guidance provided in Part IX.

D.3 Cost Effectiveness

Mitigation projects must be cost effective to be eligible for HMA funding as demonstrated by a FEMA-validated BCA. A BCA evaluates the future benefits (projected losses avoided) of the project in relation to the project costs. This evaluation results in a Benefit-Cost Ratio (BCR). If the future benefits are equal to or greater than the cost, then the BCR is equal to or greater than 1.0 and a proposed activity is considered cost effective. If the benefits are less than the cost, then the BCR is less than 1.0 and the proposed activity is not considered cost effective. Only project subapplications with a BCR of 1.0 or greater will be considered for HMA funding. For purposes of performing the BCA, the total cost must include annual maintenance costs for the proposed mitigation activity even though maintenance costs are not eligible project costs.

For **HMGP** only, an expedited cost-effectiveness determination is available for property acquisition and structure demolition or relocation projects when certain conditions are met. For structures identified in a riverine SFHA on the current effective Flood Insurance Rate Map (FIRM) and declared substantially damaged due to the impacts of flooding by a local authority having such jurisdiction, property acquisition and structure demolition or relocation is considered cost effective and a BCA is not required to be submitted for the structure.

For 5% Initiative subapplications for HMGP funding, a narrative description of the project's cost effectiveness must be provided in lieu of a BCA. For more information on the 5% Initiative, see Part VIII A.10.

FEMA BCA procedures are governed by Office of Management and Budget (OMB) Circular A-94, *Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs*. For additional BCA resources, see Part X C.4.

D.4 Feasibility and Effectiveness Requirement

Mitigation projects funded by HMA must be both feasible and effective at mitigating the risks of the hazard(s) for which the project was designed. A project's feasibility is demonstrated through conformance with accepted engineering practices, established codes, standards, modeling techniques, or best practices. Effective mitigation measures funded under HMA provide a long-term or permanent solution to a risk from a natural hazard.

Genesee-Lapeer-Shiawassee Region V Planning and Development Commission

ROOM 223 – 1101 BEACH STREET FLINT, MICHIGAN 48502-1470
TELEPHONE (810) 257-3010 FAX (810) 257-3185

DEREK BRADSHAW
FISCAL OFFICER

GENESEE COUNTY HAZARD MITIGATION PLAN REVIEW COMMITTEE
Thursday, August 22, 2013
9:00 A.M.
Emergency Management and Homeland Security Conference Room,
Genesee County Administration Building

A-G-E-N-D-A

I. Mapping and Data Update

II. Update on Hazard Mitigation Project Request Proposals

III. Other Business

LAPEER COUNTY HAZARD MITIGATION PLAN UPDATE PUBLIC MEETING

Thursday, August 22, 2013

(Please Print)

Name/Organization	Address	Email Address	Phone
Christine Dragan	GCMPC		
Claire Wilke	GCMPC		
Jennifer Boyer	GCSD - EM/HSD	jboyer@co.genesee.mi.us	424-4403
SKIP DAVIS	GENESEE COUNTY FIRE CHIEFS	WD2SKIP@CHARTER.NET	810 397 0775
BRENT WRIGHT	CITY OF FLINT	bwright@cityofflint.com	810-787-6537
April Swartout	GCHD	aswartout@gchd.us	810-424-4441
David Thibeault	GCDCWWS	dthibeault@gcdcwws.com	810-732-7870

Genesee-Lapeer-Shiawassee Region V Planning and Development Commission

ROOM 223 – 1101 BEACH STREET
TELEPHONE (810) 257-3010

FLINT, MICHIGAN 48502-1470
FAX (810) 257-3185

DEREK BRADSHAW
FISCAL OFFICER

GENESEE COUNTY HAZARD MITIGATION PLAN UPDATE – LOCAL MEETINGS

Mundy Township Hall	Atlas Township Hall	Flushing Township Hall	Richfield Township
3478 Mundy Avenue	7386 S. Gale Road	6542 N. Seymour Road	G5381 N. State Road
Date: 10/22/13	Date: 10/22/13	Date: 10/23/13	Date: 10/24/13
Time: 10:00 AM	Time: 2:00 PM	Time: 2:00 PM	Time: 2:00 PM

A-G-E-N-D-A

I. Introductions

II. Overview of Hazard Mitigation Update Process

III. Importance of Community Input

IV. Community Profile Information

V. Discussion

GENESEE COUNTY HAZARD MITIGATION PLAN UPDATE
Local Unit Meetings – Mundy Township Hall
October 22, 2013
10:00 AM

(Please Print)

Name	Organization	Email Address	Phone
Ryan Volz	Fenton TWP Fire	rvolz@fentontownship.org	8106291911
JOHN RINGWELSKI	FLINT TWP	JRINGWELSKI@FLINTTOWNSHIP.ORG	
Jen Boyer	GCSD- EMHSD	jboyer@co.genesee.mi.us	424-4403
Claire Wilke	GCMPC	wilke1c@co.genesee.mi.us	810-760-6504
Chris Durgan	GCMPC		

GENESEE COUNTY HAZARD MITIGATION PLAN UPDATE
Local Unit Meetings – Mundy Township Hall
October 22, 2013
10:00 AM

(Please Print)

Name	Organization	Email Address	Phone
Ed Blight	Mundy Twp. F.D.	eblight@mundytwp-mi.gov	810-577-5453
[illegible]	ARGENTINE		8107355058
Tom Broecker	Fenton Twp.	tbroecker@fentontownship.org	810-629-1537
Luanne Kondel	Village of Gaines	gainesvillage@gmail.com	989-271-8386
Brian Will	LINDEN	fire@LINDENmi.us	810-523-6075

GENESEE COUNTY HAZARD MITIGATION PLAN UPDATE
Local Unit Meetings – Atlas Township Hall
October 22, 2013
2:00 PM

(Please Print)

Name	Organization	Email Address	Phone
Jakki Sidge	Village of Goodrich	administrator@villageofgoodrich.com	810 636 2570
Sheila Kaufman-Jones	Atlas Twp	SKjones@atlastownship.org	
FRED FORYS	ATLAS Twp FIRE	chief@ATLASFire.org	810 636 2723
AMY PLANCK	CITY OF MONTROSE	interimmanager@cityofmontrose.us	810 639 6168
claire Wilke	GCMPC	wilkec@co.genesee.mi.us	810-766-6504
chris Durgan	GCMPC		

GENESEE COUNTY HAZARD MITIGATION PLAN UPDATE
Local Unit Meetings – Flushing Township Hall
October 23, 2013
2:00 PM

(Please Print)

Name	Organization	Email Address	Phone
Tracey Tucker	Charter Twp of Flint	Htucker@Flinttownship.org	810-600-3234
Jenifer Boyer	GCSD- EMHSD		
George Taylor	Montrose Twp Fire	george.taylor2@yahoo.com	810-397-2877
Julia Morford	Charter Twp of ~~Flint~~ Flushing	Juliem@ft.comcastbiz.net	810-659-0800
MARYION LEE	" " " "	Maryion.Lee@Comcast.net	810-659-0800
Claire Wilke	GCMPC	wilke1c@co.genesee.mi.us	810-766-6564
Chris Durgan	GCMPC		

GENESEE COUNTY HAZARD MITIGATION PLAN UPDATE
Local Unit Meetings – Richfield Township Hall

October 24, 2013
2:00 PM

(Please Print)

Name	Organization	Email Address	Phone
Mary Ann Price	Forest Twp.	mprice@foresttwp.com	810-631-6040
Donald Harris	City of Davison	dharris@cityofdavison.org	810 653 4196
Steven P. Solomon	City of Grand Blanc	spdchief@cityofgrandblanc.com	810-694-1111
Larry Green	MT Morris Twp supervisor	lgreen@mtmorristwp.org	1-810-785-9130
Tony Craig	Richfield Twp	Police chief@Richfieldtwp.org	810-653-3565
Joe Madore	" "	Supervisor@richfieldtwp.org	653-3564
Teri Webber	Richfield Twp	clerk@richfieldtwp.org	653 3564
Bob Cairnduff	City of Fenton FD	bcairnduff@cityoffentonfire.org	810-577-1112
Claire Wilke	GCMPC	wilke1c@co.genesee.mi.us	810-760-6504
Chris Durgan	GCMPC		

Genesee County Hazard Mitigation Plan Update
Local Unit Participation Form

I, _____, recognized the importance of Hazard Mitigation Planning for _____. Our community has had opportunity to provide input into the Plan Update.
(Community Name)

In the past five years, my community has done the following to prevent or mitigate hazards: *(for example: built a tornado shelter, drainage improvements, implemented Hazard Mitigation Policy)*

_____
_____
_____
_____
_____
_____
_____

To prevent or mitigate future hazards, our community would like to: *(for example: move structures out of the flood plain, stabilize sod)*

_____
_____
_____
_____
_____
_____
_____

My community's hazard priorities are: *(for example: inclement weather, dam failure, snow and ice storms)*

_____
_____
_____
_____
_____
_____
_____

My community's prioritized hazard mitigation strategies are: *(for example: map floodplains, retrofit existing structures in the floodplain)*

_____
_____
_____
_____
_____
_____
_____

Additional comments:

_____
_____
_____
_____
_____
_____
_____
_____

Name: _____

Title: _____

Community: _____

Date: _____

Public Input Announcement for Genesee County Residents

The GLS Region V Planning and Development Commission, in cooperation with the Office of the Genesee County Sheriff's Emergency Management and Homeland Security Division, have updated the Hazard Mitigation Plan for Genesee County. Each county must have an approved Hazard Mitigation Plan in order to be eligible for Federal Hazard Mitigation Project funding.

A public input open house regarding the update to the Genesee County Hazard Mitigation Plan will be held Wednesday, December 11, 2013, from 5:30 PM to 7:00 PM, in the basement Training Room of the Genesee County Administration Building, 1101 Beach Street, Flint, MI.

This open house is an opportunity for the public to comment on and ask questions about the draft update to the Hazard Mitigation Plan for Genesee County. Copies of the Draft Genesee County Hazard Mitigation Plan will be made available for review on December 2, 2013 at the Genesee County Metropolitan Planning Commission, Room 223, 1101 Beach Street, Flint, MI. Copies will also be available at the Genesee District Library, G4195 W. Pasadena Avenue, at all local municipal offices and online at www.gcmpc.org. The 30 day public comment period for the draft Genesee County Hazard Mitigation Plan will begin December 2, 2013 and end January 3, 2014.

GLS Region V will furnish reasonable auxiliary aids and services to individuals with disabilities upon request. Individuals with disabilities requiring auxiliary aids for services should contact by writing or calling the following:

Christine A. Durgan, Assistant Director
Genesee County Metropolitan Planning Commission,
Room 223, 1101 Beach Street, Flint, MI 48502
(810) 257-3010
Michigan Relay Center: 1-800-649-3777 or 711

"An Equal Opportunity Organization"

COMMENTS CONCERNING
THE DRAFT 2013 GENESEE COUNTY HAZARD MITIGATION PLAN

The comment period for the Draft Genesee County Hazard Mitigation Plan is December 2, 2013 to January 3, 2014. Please submit comments by January 3, 2014. If you would like a written response to your comment, please provide a mailing address for staff's response. Thank you.

PLEASE MAIL / FAX / EMAIL TO:

Christine A. Durgan, Assistant Director
Genesee County Metropolitan Planning Commission
Community Development Program
Room 223, 1101 Beach Street
Flint, MI 48502

TELEPHONE: (810) 257-3010
FAX: (810) 257-3185
EMAIL: wilke1c@co.genesee.mi.us

GENESEE COUNTY HAZARD MITIGATION PLAN
PUBLIC INPUT OPEN HOUSE
Wednesday, December 11, 2013 – 5:30 pm-7:00 pm

(Please Print)

Name/Organization	Address	Email Address	Phone
David W. Martin Veteran Security Co.	418 S. Main St. Davison	sgtdave@hotmail.com	810 691 0854
Jenifer Boyer Genesee Co SD-EMHSD			
PAMELA CRAWFORD MOTT CC DPS	1401 E. COURT ST FLINT	PAMELA.CRAWFORD@MCC.EDU	810-232-8131
MAXINE DANIELS Gen Co IT			
Joe White GC IT			

Genesee-Lapeer-Shiawassee RegionV Planning and Development Commission

ROOM 223 – 1101 BEACH STREET FLINT, MICHIGAN 48502-1470
TELEPHONE (810) 257-3010 FAX (810) 257-3185

DEREK BRADSHAW
FISCAL OFFICER

MEMORANDUM

TO: Citizens of Genesee and Lapeer Counties and Community Organizations

FROM: Claire Wilke, Associate Planner
Genesee County Metropolitan Planning Commission

DATE: September 9, 2013

SUBJECT: **Request for Hazard Mitigation Survey Participation**

Genesee and Lapeer Counties are updating their Hazard Mitigation Plans and would like the input of citizens and community organizations in this process. The plan identifies potential disasters that could impact your community. The goal of this survey is to determine what is important to each community and to get the public's perspective on hazard mitigation. The responses will be compiled and included in the community portion of the plan updates. If you would prefer to take the survey online, please go to: http://www.surveymonkey.com/s/6L9N8TM

Please complete online, or return the completed survey to the Region V Planning and Development Commission by 5 PM on September 16th. Please send Attention: Claire Wilke, 1101 Beach Street, Room 223, Flint, MI, 48502.

Please see enclosed survey

k:\region v\2013 hazmit\memo for public participation survey.doc

Hazard Mitigation Plan Update Public Participation Survey

1. Which city, village, or township are you from?

   _____

2. Are you a member of a community organization?

   ___Yes

   ___No

   If "yes," which organization(s)? _____

3. In the past five years, has your community experienced or been impacted by a natural or man-made disaster?

   ___ Yes

   ___ No

   If "yes," please explain _____

4. How concerned are you about the possibility of your community being impacted by a disaster?

   ___ Not concerned

   ___ Moderately concerned

   ___ Extremely concerned

5. What hazards do you feel could most impact your community? (Choose two).

   ___Public Heath Emergencies
   ___Civil Disturbance
   ___Major Transportation Accidents
   ___Extreme Temperatures
   ___Snow and Ice Storms
   ___Hazardous Material Incidents (Transportation)
   ___Hazardous Material Incidents (Fixed Site)
   ___Riverine Flooding
   ___Terrorism
   ___Structure Fires
   ___Subsidence (Sinkholes)
   ___Dam Failure
   ___Wildfires
   ___Scrap Tire Fires
   ___Infrastructure Failure
   ___Oil or Natural Gas Well Accidents
   ___Inclement Weather
   ___Nuclear Attack
   ___Drought
   ___Nuclear Power Plant Accidents
   ___Tornadoes
   ___Earthquake

Continued on back

6. What steps could be taken to reduce or eliminate the risk of future hazard damages in your community?

_____

_____

_____

_____

Thank you for taking the time to complete this survey.

Genesee-Lapeer-Shiawassee RegionV Planning and Development Commission

ROOM 223 – 1101 BEACH STREET FLINT, MICHIGAN 48502-1470
TELEPHONE (810) 257-3010 FAX (810) 257-3185

DEREK BRADSHAW
FISCAL OFFICER

MEMORANDUM

TO: Local Government Officials

FROM: Claire Wilke, Associate Planner
Genesee County Metropolitan Planning Commission

DATE: September 9, 2013

SUBJECT: **Request for Hazard Mitigation Survey Participation**

The GLS Region V Planning and Development Commission staff is requesting your participation in the enclosed survey as part of the process for updating Genesee and Lapeer Counties multijurisdictional Hazard Mitigation Plans. The goal of this survey is to determine what is important to each specific municipality and to understand the steps that are being taken to prevent or mitigate hazards in the community. The responses will be compiled and included in the Community Profile section of the updated plan. If you would prefer to take the survey online, please go to: http://www.surveymonkey.com/s/RSBTS66

Please complete online, or return a completed survey to the Region V Planning and Development Commission by 5 PM on September 16th. Please send Attention: Claire Wilke, 1101 Beach Street, Room 223, Flint, MI, 48502.

Please see enclosed survey

k:\region v\2013 hazmit\memo for government officials survey.doc

Hazard Mitigation Plan Update Government Participation Survey

1. Which city, village, or township do you represent?

   _____

2. In the past five years, has your community experienced or been impacted by a natural or man-made disaster?

   ___ Yes

   ___ No

   If "yes," please explain _____

3. How concerned are you about the possibility of your community being impacted by a disaster?

   ___ Not concerned

   ___ Moderately concerned

   ___ Extremely concerned

4. What hazards do you feel could most impact your community? (Choose two).

   ___Public Heath Emergencies
   ___Civil Disturbance
   ___Major Transportation Accidents
   ___Extreme Temperatures
   ___Snow and Ice Storms
   ___Hazardous Material Incidents (Transportation)
   ___Hazardous Material Incidents (Fixed Site)
   ___Riverine Flooding
   ___Terrorism
   ___Structure Fires
   ___Subsidence (Sinkholes)
   ___Dam Failure
   ___Wildfires
   ___Scrap Tire Fires
   ___Infrastructure Failure
   ___Oil or Natural Gas Well Accidents
   ___Inclement Weather
   ___Nuclear Attack
   ___Drought
   ___Nuclear Power Plant Accidents
   ___Tornadoes
   ___Earthquakes

5. What has your community done in the last five years to prevent or mitigate hazards?

   _____
   _____
   _____
   _____

Continued on back

6. Have there been any policies/projects put into place?

___Yes

___No

If "yes," what were they?

_____

_____

_____

_____

7. Are you willing to incorporate Hazard Mitigation into future community plans?

___Yes

___No

8. How can existing community policies/programs be improved to accomplish hazard mitigation?

_____

_____

_____

_____

9. What steps could be taken to reduce or eliminate the risk of future hazard damages in your community?

_____

_____

_____

_____

Thank you for taking the time to complete this survey.

√

Hazard Mitigation Plan Update Emergency Management Coordinators Survey

1. Which city, village, or township do you represent?
   Argentine Township

2. Have there been any policies/projects put into place? (For example: implemented a Hazard Mitigation Policy, or made drainage improvements).
   ✓ Yes
   ___ No
   If "yes," what were they?
   Have changed building permit forms to ask about floodplains and prevent building in them

3. Do you have any specific ideas about policies or projects that your community could implement in the future? (For example: make Hazard Mitigation a priority in the Master Plan, or move structures out of the flood plain).
   don't allow building in floodplain, new maps show people in floodplains

4. Are you willing to incorporate Hazard Mitigation planning techniques into future community plans?
   ✓ Yes
   ___ No

5. How can existing community policies/programs be improved to accomplish hazard mitigation? (For example: provide training to improve preparedness of citizens and emergency response teams).
   building inspector goes to Haz training. Hold trainings for fire & police staff, could expand to all first responders and citizens.

√

Hazard Mitigation Plan Update Emergency Management Coordinators Survey

1. Which city, village, or township do you represent?
   Atlas Township

2. Have there been any policies/projects put into place? (For example: implemented a Hazard Mitigation Policy, or made drainage improvements).
   ___Yes
   ✓ No
   If "yes," what were they?

3. Do you have any specific ideas about policies or projects that your community could implement in the future? (For example: make Hazard Mitigation a priority in the Master Plan, or move structures out of the flood plain).
   new siren, trying to bring community together to plan hazard mitigation actions/educate people on what to do.

4. Are you willing to incorporate Hazard Mitigation planning techniques into future community plans?
   ✓ Yes
   ___No

5. How can existing community policies/programs be improved to accomplish hazard mitigation? (For example: provide training to improve preparedness of citizens and emergency response teams).
   provide training to improve preparedness of citizens

Goodrich, schools, Twp, "what would we do in a major disaster event"

√

Hazard Mitigation Plan Update Emergency Management Coordinators Survey

1. Which city, village, or township do you represent?
   City of Davison

2. Have there been any policies/projects put into place? (For example: implemented a Hazard Mitigation Policy, or made drainage improvements).
   ___Yes
   ___No
   If "yes," what were they?
   rated as a munic. by state for operations & preparation, adding fire station that covers city. Feel very well-prepared

   inter local agreements 3 police dept. – crash department & accident investigation, detective services- crime/breakins, etc.

3. Do you have any specific ideas about policies or projects that your community could implement in the future? (For example: make Hazard Mitigation a priority in the Master Plan, or move structures out of the flood plain).
   expand current

4. Are you willing to incorporate Hazard Mitigation planning techniques into future community plans?
   √ Yes
   ___No

5. How can existing community policies/programs be improved to accomplish hazard mitigation? (For example: provide training to improve preparedness of citizens and emergency response teams).
   city, 2 twp, school district continued and expanded cooperation

Hazard Mitigation Plan Update Emergency Management Coordinators Survey

1. Which city, village, or township do you represent?
   City of Flint

2. Have there been any policies/projects put into place? (For example: implemented a Hazard Mitigation Policy, or made drainage improvements).
   ___Yes
   ✓ No
   If "yes," what were they?

3. Do you have any specific ideas about policies or projects that your community could implement in the future? (For example: make Hazard Mitigation a priority in the Master Plan, or move structures out of the flood plain).
   get hazard plans/critical facility plans on file, identify critical facilities

4. Are you willing to incorporate Hazard Mitigation planning techniques into future community plans?
   ✓ Yes
   ___No

5. How can existing community policies/programs be improved to accomplish hazard mitigation? (For example: provide training to improve preparedness of citizens and emergency response teams).
   updating them, education - business community/watchgroup training (policies & programs)

✓

Hazard Mitigation Plan Update Emergency Management Coordinators Survey

1. Which city, village, or township do you represent?
   City of Fluvanna

2. Have there been any policies/projects put into place? (For example: implemented a Hazard Mitigation Policy, or made drainage improvements).
   ___Yes
   ✓ No
   If "yes," what were they?

3. Do you have any specific ideas about policies or projects that your community could implement in the future? (For example: make Hazard Mitigation a priority in the Master Plan, or move structures out of the flood plain).
   update master plan to include Hazard Mitigation

4. Are you willing to incorporate Hazard Mitigation planning techniques into future community plans?
   ✓ Yes
   ___No

5. How can existing community policies/programs be improved to accomplish hazard mitigation? (For example: provide training to improve preparedness of citizens and emergency response teams).
   Link on website to FEMA for general citizens to become informed
   Educate community.

✓

Hazard Mitigation Plan Update Emergency Management Coordinators Survey

1. Which city, village, or township do you represent?
   City of Grand Blanc

2. Have there been any policies/projects put into place? (For example: implemented a Hazard Mitigation Policy, or made drainage improvements).
   ✓ Yes
   ___ No
   If "yes," what were they?
   Emergency preparedness and response policies

3. Do you have any specific ideas about policies or projects that your community could implement in the future? (For example: make Hazard Mitigation a priority in the Master Plan, or move structures out of the flood plain).
   NO

4. Are you willing to incorporate Hazard Mitigation planning techniques into future community plans?
   ✓ Yes
   ___ No

5. How can existing community policies/programs be improved to accomplish hazard mitigation? (For example: provide training to improve preparedness of citizens and emergency response teams).
   improve communication between departments

✓

Hazard Mitigation Plan Update Emergency Management Coordinators Survey

1. Which city, village, or township do you represent?
   City of Montrose

2. Have there been any policies/projects put into place? (For example: implemented a Hazard Mitigation Policy, or made drainage improvements).
   ✓ Yes
   ___ No
   If "yes," what were they?
   installed warning siren 2013

3. Do you have any specific ideas about policies or projects that your community could implement in the future? (For example: make Hazard Mitigation a priority in the Master Plan, or move structures out of the flood plain).
   mock disaster, prevention of hazards related to train running through city, prevent flooding of ditches by train tracks

4. Are you willing to incorporate Hazard Mitigation planning techniques into future community plans?
   ✓ Yes
   ___ No

5. How can existing community policies/programs be improved to accomplish hazard mitigation? (For example: provide training to improve preparedness of citizens and emergency response teams).
   add to master plan and zoning ordinances

Hazard Mitigation Plan Update Emergency Management Coordinators Survey

1. Which city, village, or township do you represent?
   City of Swartz Creek

2. Have there been any policies/projects put into place? (For example: implemented a Hazard Mitigation Policy, or made drainage improvements).
   ___Yes
   ___No
   If "yes," what were they?
   ongoing training, strong drainage standards in place, maintain warning sirens

3. Do you have any specific ideas about policies or projects that your community could implement in the future? (For example: make Hazard Mitigation a priority in the Master Plan, or move structures out of the flood plain).
   disconnect / improve keep stormwater out of sewer system to prevent over flows.

4. Are you willing to incorporate Hazard Mitigation planning techniques into future community plans?
   ✓ Yes
   ___No

5. How can existing community policies/programs be improved to accomplish hazard mitigation? (For example: provide training to improve preparedness of citizens and emergency response teams).
   public education - distribute information. Flood is a big issue. continue to work with the county to make infrastructure improvements

Hazard Mitigation Plan Update Emergency Management Coordinators Survey

1. Which city, village, or township do you represent?
   Clio

2. Have there been any policies/projects put into place? (For example: implemented a Hazard Mitigation Policy, or made drainage improvements).
   ✓ Yes
   ___ No
   If "yes," what were they?
   fire authority updated emergency response plan
   Clio Area Local Emergency Operations Plan

3. Do you have any specific ideas about policies or projects that your community could implement in the future? (For example: make Hazard Mitigation a priority in the Master Plan, or move structures out of the flood plain).
   The city could consider including a chapter on Hazard Mitigation in its Master Plan, or other plans. construction projects.

4. Are you willing to incorporate Hazard Mitigation planning techniques into future community plans?
   ___ Yes
   ___ No
   The incorporation of Hazard Mitigation in future community plans maybe considered, but I cannot commit to this practice at this time.

5. How can existing community policies/programs be improved to accomplish hazard mitigation? (For example: provide training to improve preparedness of citizens and emergency response teams).
   Awareness; public education

/

Hazard Mitigation Plan Update Emergency Management Coordinators Survey

1. Which city, village, or township do you represent?
   forest township

2. Have there been any policies/projects put into place? (For example: implemented a Hazard Mitigation Policy, or made drainage improvements).
   ✓ Yes
   ___ No
   If "yes," what were they?
   in the process of updating hazard mitigation plan, looking into policies for warning shelters

3. Do you have any specific ideas about policies or projects that your community could implement in the future? (For example: make Hazard Mitigation a priority in the Master Plan, or move structures out of the flood plain).
   put back up generators in fire hall and township hall.

4. Are you willing to incorporate Hazard Mitigation planning techniques into future community plans?
   ✓ Yes
   ___ No

5. How can existing community policies/programs be improved to accomplish hazard mitigation? (For example: provide training to improve preparedness of citizens and emergency response teams).
   would require more funding, very willing to improve

Hazard Mitigation Plan Update Emergency Management Coordinators Survey

1. Which city, village, or township do you represent?
   Gains Township

2. Have there been any policies/projects put into place? (For example: implemented a Hazard Mitigation Policy, or made drainage improvements).
   ✓ Yes
   ___ No
   If "yes," what were they?
   addition of sirens

3. Do you have any specific ideas about policies or projects that your community could implement in the future? (For example: make Hazard Mitigation a priority in the Master Plan, or move structures out of the flood plain).
   NO

4. Are you willing to incorporate Hazard Mitigation planning techniques into future community plans?
   ✓ Yes
   ___ No

5. How can existing community policies/programs be improved to accomplish hazard mitigation? (For example: provide training to improve preparedness of citizens and emergency response teams).
   shared services

Hazard Mitigation Plan Update Emergency Management Coordinators Survey

1. Which city, village, or township do you represent?
   Genesee Township

2. Have there been any policies/projects put into place? (For example: implemented a Hazard Mitigation Policy, or made drainage improvements).
   ___Yes
   ✓ No
   If "yes," what were they?

3. Do you have any specific ideas about policies or projects that your community could implement in the future? (For example: make Hazard Mitigation a priority in the Master Plan, or move structures out of the flood plain).
   Make Hazard Mitigation a priority in the Master Plan

4. Are you willing to incorporate Hazard Mitigation planning techniques into future community plans?
   ✓ Yes
   ___No

5. How can existing community policies/programs be improved to accomplish hazard mitigation? (For example: provide training to improve preparedness of citizens and emergency response teams).
   provide both training and preparedness emergency response.

Hazard Mitigation Plan Update Emergency Management Coordinators Survey

1. Which city, village, or township do you represent?
   Grand Blanc Township

2. Have there been any policies/projects put into place? (For example: implemented a Hazard Mitigation Policy, or made drainage improvements).
   ✓ Yes
   ___ No
   If "yes," what were they?
   drainage improvements, added/updated warning sirens

3. Do you have any specific ideas about policies or projects that your community could implement in the future? (For example: make Hazard Mitigation a priority in the Master Plan, or move structures out of the flood plain).
   NO

4. Are you willing to incorporate Hazard Mitigation planning techniques into future community plans?
   ✓ Yes
   ___ No

5. How can existing community policies/programs be improved to accomplish hazard mitigation? (For example: provide training to improve preparedness of citizens and emergency response teams).
   coordinating efforts with first responders, other local units, the county and the state.

✓

Hazard Mitigation Plan Update Emergency Management Coordinators Survey

1. Which city, village, or township do you represent?
   Montrose Township

2. Have there been any policies/projects put into place? (For example: implemented a Hazard Mitigation Policy, or made drainage improvements).
   ✓ Yes
   ___ No
   If "yes," what were they?
   call E.M, coordinate., added sirens, contract with city

3. Do you have any specific ideas about policies or projects that your community could implement in the future? (For example: make Hazard Mitigation a priority in the Master Plan, or move structures out of the flood plain).
   NO

4. Are you willing to incorporate Hazard Mitigation planning techniques into future community plans?
   ✓ Yes
   ___ No

5. How can existing community policies/programs be improved to accomplish hazard mitigation? (For example: provide training to improve preparedness of citizens and emergency response teams).
   work with the city of Montrose for training of first responders

✓

Hazard Mitigation Plan Update Emergency Management Coordinators Survey

1. Which city, village, or township do you represent?
   Mount Morris Township

2. Have there been any policies/projects put into place? (For example: implemented a Hazard Mitigation Policy, or made drainage improvements).
   ___Yes
   ✓ No
   If "yes," what were they?
   Have policies for blight/trash debris, not new.

3. Do you have any specific ideas about policies or projects that your community could implement in the future? (For example: make Hazard Mitigation a priority in the Master Plan, or move structures out of the flood plain).
   Mock disasters, trainings countywide that's required with procedures

4. Are you willing to incorporate Hazard Mitigation planning techniques into future community plans?
   ✓ Yes
   ___No

5. How can existing community policies/programs be improved to accomplish hazard mitigation? (For example: provide training to improve preparedness of citizens and emergency response teams).
   Better coordination throughout the county. Mock disasters/training. Would need a lot more money

✓

Hazard Mitigation Plan Update Emergency Management Coordinators Survey

1. Which city, village, or township do you represent?
   Richfield Township

2. Have there been any policies/projects put into place? (For example: implemented a Hazard Mitigation Policy, or made drainage improvements).
   ___Yes
   ✓ No
   If "yes," what were they?

3. Do you have any specific ideas about policies or projects that your community could implement in the future? (For example: make Hazard Mitigation a priority in the Master Plan, or move structures out of the flood plain).
   getting warningsiren

4. Are you willing to incorporate Hazard Mitigation planning techniques into future community plans?
   ✓ Yes
   ___No

5. How can existing community policies/programs be improved to accomplish hazard mitigation? (For example: provide training to improve preparedness of citizens and emergency response teams).
   improve communication with first responders, educate the public, hold more training activities, etc.

✓

Hazard Mitigation Plan Update Emergency Management Coordinators Survey

1. Which city, village, or township do you represent?
   Medford Township

2. Have there been any policies/projects put into place? (For example: implemented a Hazard Mitigation Policy, or made drainage improvements).
   ✓ Yes
   ___ No
   If "yes," what were they?
   continual talking about what can be done/planning/training
   changed policy to keep senior center open when schools are closed.

3. Do you have any specific ideas about policies or projects that your community could implement in the future? (For example: make Hazard Mitigation a priority in the Master Plan, or move structures out of the flood plain).
   buy generator for senior center for a warming center.

4. Are you willing to incorporate Hazard Mitigation planning techniques into future community plans?
   ✓ Yes
   ___ No

5. How can existing community policies/programs be improved to accomplish hazard mitigation? (For example: provide training to improve preparedness of citizens and emergency response teams).
   coordinate efforts between municipalities

Hazard Mitigation Plan Update Emergency Management Coordinators Survey

1. Which city, village, or township do you represent?
   Village of Goodrich

2. Have there been any policies/projects put into place? (For example: implemented a Hazard Mitigation Policy, or made drainage improvements).
   ✓ Yes
   ___ No
   If "yes," what were they?
   drained Millpond to be able to work on dam

3. Do you have any specific ideas about policies or projects that your community could implement in the future? (For example: make Hazard Mitigation a priority in the Master Plan, or move structures out of the flood plain).
   working on digging around Millpond dam to see if fixable

4. Are you willing to incorporate Hazard Mitigation planning techniques into future community plans?
   ✓ Yes
   ___ No

5. How can existing community policies/programs be improved to accomplish hazard mitigation? (For example: provide training to improve preparedness of citizens and emergency response teams).
   Fixing dam and working to replace it

Hazard Mitigation Plan Update Emergency Management Coordinators Survey

1. Which city, village, or township do you represent?
   Village of Gaines

2. Have there been any policies/projects put into place? (For example: implemented a Hazard Mitigation Policy, or made drainage improvements).
   ✓ Yes
   ___ No
   If "yes," what were they?
   police department disaster review

3. Do you have any specific ideas about policies or projects that your community could implement in the future? (For example: make Hazard Mitigation a priority in the Master Plan, or move structures out of the flood plain).

4. Are you willing to incorporate Hazard Mitigation planning techniques into future community plans?
   ✓ Yes
   ___ No

5. How can existing community policies/programs be improved to accomplish hazard mitigation? (For example: provide training to improve preparedness of citizens and emergency response teams).

APPENDIX B

Project Applications

Genesee County Hazard Mitigation Plan
Proposed Hazard Mitigation Project Request Form

Applicant Agency: Atlas Township

Contact Person: Shirley Kaufman-Jones

Title: Supervisor

natural gas backup generator for Atlas Township Office/Hall which also serves as a Community Room and sub-station for Genesee Co. Sheriff Dept.

To allow use as a safe haven room winter-spring-summer or fall for residents needing shelter.

Have currently received quote from Consumers Energy - waiting for quotes from 2 private contractors

Location of generator would be:
7386 S. Gale Road - Grand Blanc, MI

Please attach additional pages if necessary.

Estimated Project Cost: $31,000.00

Please attach a location map for this project.

Proposed Timeframe for Implementation:	1 to 5 years	6 to 10 years	11 or more years

Genesee County Hazard Mitigation Plan
Proposed Hazard Mitigation Project Request Form

Applicant Agency: Atlas Townships

Contact Person: Shirley Kaufman-Jones

Title: Supervisor

Dead Ash trees - road safety throughout entire township

along various roads, streets, neighborhoods

Please attach additional pages if necessary.

Estimated Project Cost: $80,000.00

Please attach a location map for this project.

Proposed Timeframe for Implementation:	1 to 5 years	6 to 10 years	11 or more years

Genesee County Hazard Mitigation Plan
Proposed Hazard Mitigation Project Request Form

Applicant Agency: Atlas Township

Contact Person: Shirley Kaufman-Jones

Title: Supervisor

Drainage improvement to reduce risk of flooding to residential structures

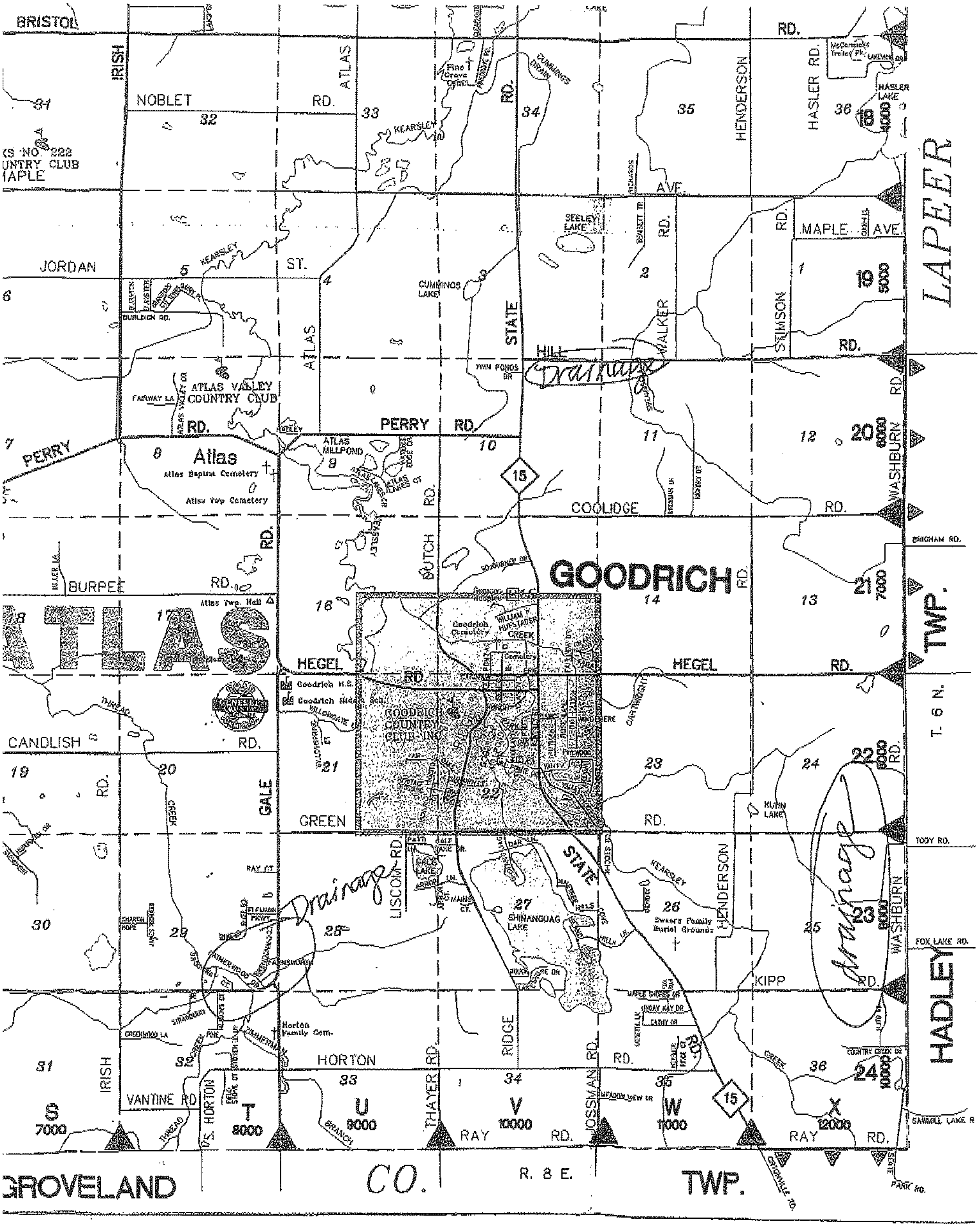
Cathegwood / Farnsworth
Hill Road
Washburn Rd - between County Line (Ray) Rd and Kipp Road

Please attach additional pages if necessary.

Estimated Project Cost: $500,000.00

Please attach a location map for this project.

Proposed Timeframe for Implementation:	1 to 5 years	6 to 10 years	11 or more years


BRISTOL
RD.
IRISH
NOBLET
RD.
ATLAS
HENDERSON
HASLER RD.
HASLER LAKE
Pine Grove Cem.
KEARSLEY
CUMMINGS DRAIN
STATE RD.
AVE.
MAPLE AVE.
SEELEY LAKE
JORDAN
ST.
CUMMINGS LAKE
STIMSON
WALKER
HILL
RD.
Drainage
LAPEER
ATLAS VALLEY COUNTRY CLUB
PERRY RD.
PERRY
Atlas
Atlas Baptist Cemetery
Atlas Twp Cemetery
ATLAS MILLPOND
BUTCH RD.
COOLIDGE RD.
WASHBURN RD.
BRIGHAM RD.
GOODRICH
BURPEE RD.
Atlas Twp. Hall
ATLAS
TWP.
HEGEL RD.
HEGEL
Goodrich Cemetery
Goodrich H.S.
Goodrich Middle Sch.
GOODRICH COUNTRY CLUB INC
CANDLISH RD.
T. 6 N.
CREEK
GALE
GREEN
RD.
KUHN LAKE
TODY RD.
Drainage
Drainage
LISCOM RD.
GALE LAKE
STATE
KEARSLEY
SHINANGUAG LAKE
Swears Family Burial Grounds
HENDERSON
FOX LAKE RD.
KIPP RD.
HADLEY
Horton Family Cem.
IRISH
HORTON RD.
RIDGE
THAYER RD.
JOSSMAN RD.
RD.
CREEK
VANTINE RD
S. HORTON
S
7000
T
8000
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9000
V
10000
W
11000
X
12000
RAY RD.
RAY RD.
SAWMILL LAKE R
PARK RD.
GROVELAND
CO.
R. 8 E.
TWP.

Genesee County Hazard Mitigation Plan
Proposed Hazard Mitigation Project Request Form

Applicant Agency: Atlas Township

Contact Person: Shirley Kaufman-Jones

Title: Supervisor

High pressure 10inch water wells (electric to be used by Fire Department to fight fires in various Township locations

See map marked (W)

each well cost depending on location

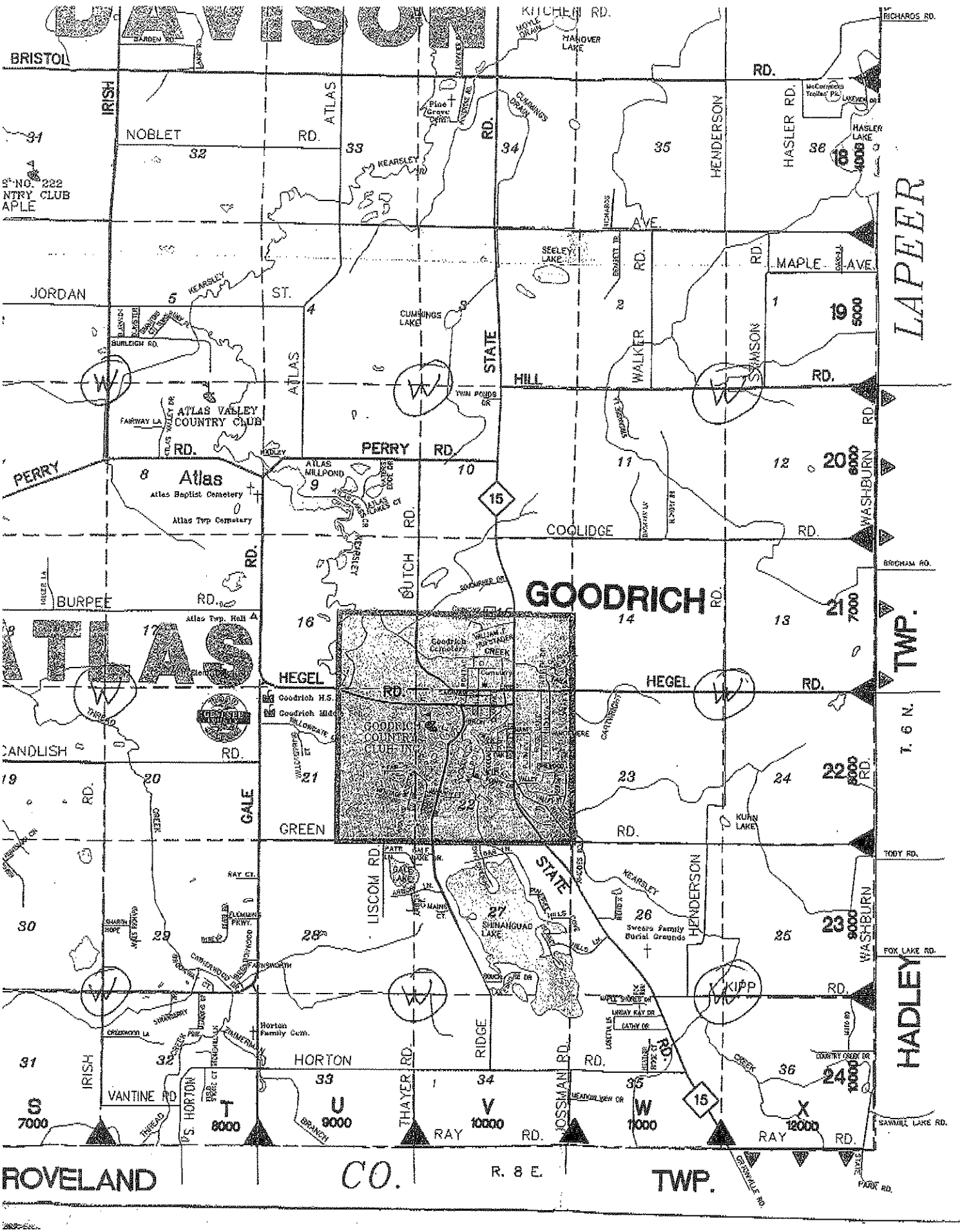
$28,000.00 eight wells

Please attach additional pages if necessary.

Estimated Project Cost:

Please attach a location map for this project.

Proposed Timeframe for Implementation:	1 to 5 years	6 to 10 years	11 or more years


DAVISON
LAPEER
ATLAS
GOODRICH
HADLEY
ROVELAND
CO.
TWP.
R. 8 E.
T. 6 N.
BRISTOL
NOBLET RD.
KITCHEN RD.
HANOVER LAKE
RICHARDS RD.
HENDERSON RD.
HASLER RD.
HASLER LAKE
IRISH RD.
ATLAS RD.
DUTCH RD.
STATE HILL RD.
WALKER RD.
JAMISON RD.
MAPLE AVE.
SEELEY LAKE
CUMMINGS LAKE
JORDAN ST.
KEARSLEY
ATLAS VALLEY COUNTRY CLUB
PERRY RD.
ATLAS MILLPOND
Atlas
Atlas Baptist Cemetery
Atlas Twp Cemetery
COOLIDGE RD.
WASHBURN RD.
BRIGHAM RD.
BURPEE RD.
Atlas Twp. Hall
HEGEL RD.
Goodrich H.S.
Goodrich Mid.
GOODRICH COUNTRY CLUB INC.
CANDLISH RD.
GALE RD.
GREEN RD.
LISCOM RD.
KUHN LAKE
TOBY RD.
SWANAQUAD LAKE
Sweers Family Burial Grounds
FOX LAKE RD.
KIPP RD.
SAWMILL LAKE RD.
PARK RD.
GRENVILLE RD.
VANTINE RD.
HORTON RD.
Horton Family Cem.
RIDGE RD.
THAYER RD.
JOSSMAN RD.
RAY RD.
S 7000
T 8000
U 9000
V 10000
W 11000
X 12000
15
19 5000
20 6000
21 7000
22 8000
23 9000
24 10000

Genesee County Hazard Mitigation Plan
Proposed Hazard Mitigation Project Request Form

Applicant Agency: Atlas Township

Contact Person: Shirley Kautman Jones

Title: Supervisor

boat for water or ice rescues for Fire Department use. Help with evacuation in the event of floods or dam failure within Village of Goodrich

Please attach additional pages if necessary.

Estimated Project Cost: $5,000.00

Please attach a location map for this project.

Proposed Timeframe for Implementation:	1 to 5 years	6 to 10 years	11 or more years

Genesee County Hazard Mitigation Plan
Proposed Hazard Mitigation Project Request Form

Applicant Agency: Atlas Township

Contact Person: Shirley Kaufman-Jones

Title: Supervisor

Emergency Warning Sirens placed in varieds locations within Atlas Twp to be audible by all residents in all sections

Map to follow showing placement locations after Westshore provides to me. Meet with Westshore 8/15-13

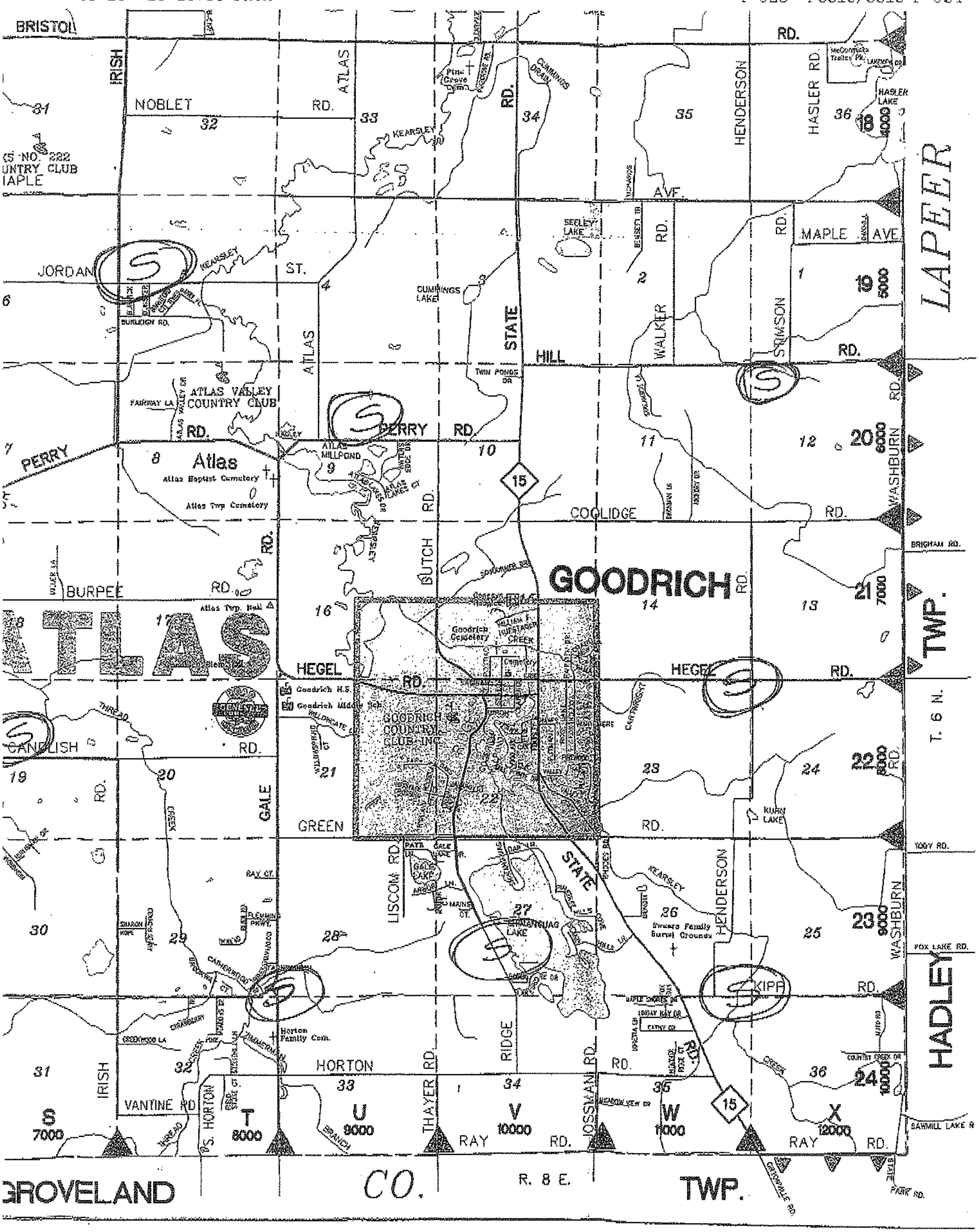
$25,000. per siren - estimate 8 sirens

Please attach additional pages if necessary.

Estimated Project Cost: $25,000. per siren

Please attach a location map for this project.

Proposed Timeframe for Implementation:	1 to 5 years	6 to 10 years	11 or more years


BRISTOL
RD.
IRISH
NOBLET
RD.
ATLAS
32
33
34
35
36
HENDERSON
HASLER RD.
KEARSLEY
AVE.
MAPLE AVE.
LAPEER
JORDAN
ST.
SEELEY LAKE
CUMMINGS LAKE
STATE
HILL
RD.
WALKER
STIMSON
ATLAS VALLEY COUNTRY CLUB
PERRY
RD.
Atlas
Atlas Baptist Cemetery
Atlas Twp Cemetery
ATLAS MILLPOND
15
COOLIDGE
RD.
WASHBURN
BRIGHAM RD.
GOODRICH
BURPEE
RD.
Atlas Twp. Hall
DUTCH RD.
ATLAS
HEGEL
RD.
TWP.
Goodrich H.S.
Goodrich Middle Sch.
GOODRICH COUNTRY CLUB INC.
Goodrich Cemetery
CANDLISH
RD.
GALE
GREEN
RD.
KURN LAKE
YOGY RD.
LISCOM RD.
STATE
KEARSLEY
Swears Family Burial Grounds
T. 6 N.
FOX LAKE RD.
KIPP
RD.
HADLEY
Horton Family Cem.
HORTON
THAYER RD.
RIDGE
HOSSMAN RD.
RD.
VANTINE RD
S. HORTON
S 7000
T 8000
U 9000
V 10000
W 11000
X 12000
RAY
RD.
RAY
RD.
SAWMILL LAKE R
PARK RD.
GROVELAND
CO.
R. 8 E.
TWP.

Genesee County Hazard Mitigation Plan
Proposed Hazard Mitigation Project Request Form

Contact Information for Proposed Project

Applicant Agency: City of Linden, 132 E. Broad St. Linden, Mi. 48451, 810-735-5457

Contact Person: Scott D. Sutter

Title: Chief of Police

Project Description

Please see attached narrative.

Please attach additional pages if necessary.

Estimated Project Cost: $30,000.00

Please attach a location map for this project.

Proposed Timeframe for Implementation:	1 to 5 years	6 to 10 years	11 or more years

The City of Linden's proposed project request is for a stand-alone generator for City Hall.

The City of Linden is located in southern Genesee County. The City of Linden serves a population of 3,957. In addition to this there are two elementary schools located in the City of Linden that serve approximately 1,000 student plus faculty. Caretel Inns, a senior assisted living facility, is located in the City of Linden, this facility has approximately 160 beds. Furthermore, Shiawassee Mobile Home Park is located in the City of Linden. This mobile home park has approximately 300 units.

The City of Linden's Police, Fire and Department of Public Works are housed at the City Hall. Currently, if the power goes out City Hall loses all power. This greatly impacts the community in that emergency sirens would not work to notify the residence of severe weather. In addition to this Fire and Police Personnel response to a disaster would be severely impacted in that if a disaster or emergency were to occur in the night time hours, personnel would be operating literally in the dark. Emergency response times would be delayed, potentially risking life and property

The City of Linden's emergency operating plans entails that City Hall, in case of emergency or disasters, would operate as an Incident Command Post. Currently, if the City of Linden were to lose power the City would not be able to utilize City Hall as a command post.

In 2007 a devastating fire completely destroyed a portion of the City of Linden's downtown. This landmark building, Broadstreet Restaurant, was a fixture for the community. During the fire, City Hall operated as the Command Post. Even though there were no injuries or loss of life, the impact this fire had on the residence of Linden was greatly felt. Residence flocked to City Hall for questions and direction. By having a Command Post at City Hall the City was able to mitigate and bring healing to the community by being there for its residence. In addition to this public safety, City Management and other governmental entities were able to be housed in one building to deal with the affects and response to the fire.

This grant would enable the City of Linden to install a stand-alone generator which would greatly enhance the City's goal of preventing loss of life, enhancing our early warning system, increase public awareness, improve response and recovery for man-mad/ natural disaster and protect public health, welfare and safety.

Genesee County Hazard Mitigation Plan
Proposed Hazard Mitigation Project Request Form

Contact Information for Proposed Project

Applicant Agency: DAVISON TOWNSHIP

Contact Person: KURT SOPER

Title: TWP. SUPERVISOR

Project Description

PURCHASE AND INSTALLATION OF THREE (3) ADVANCE WARNING SIRENS WITHIN DAVISON TOWNSHIP. PLEASE SEE ATTACHED MAP FOR SIREN LOCATIONS.

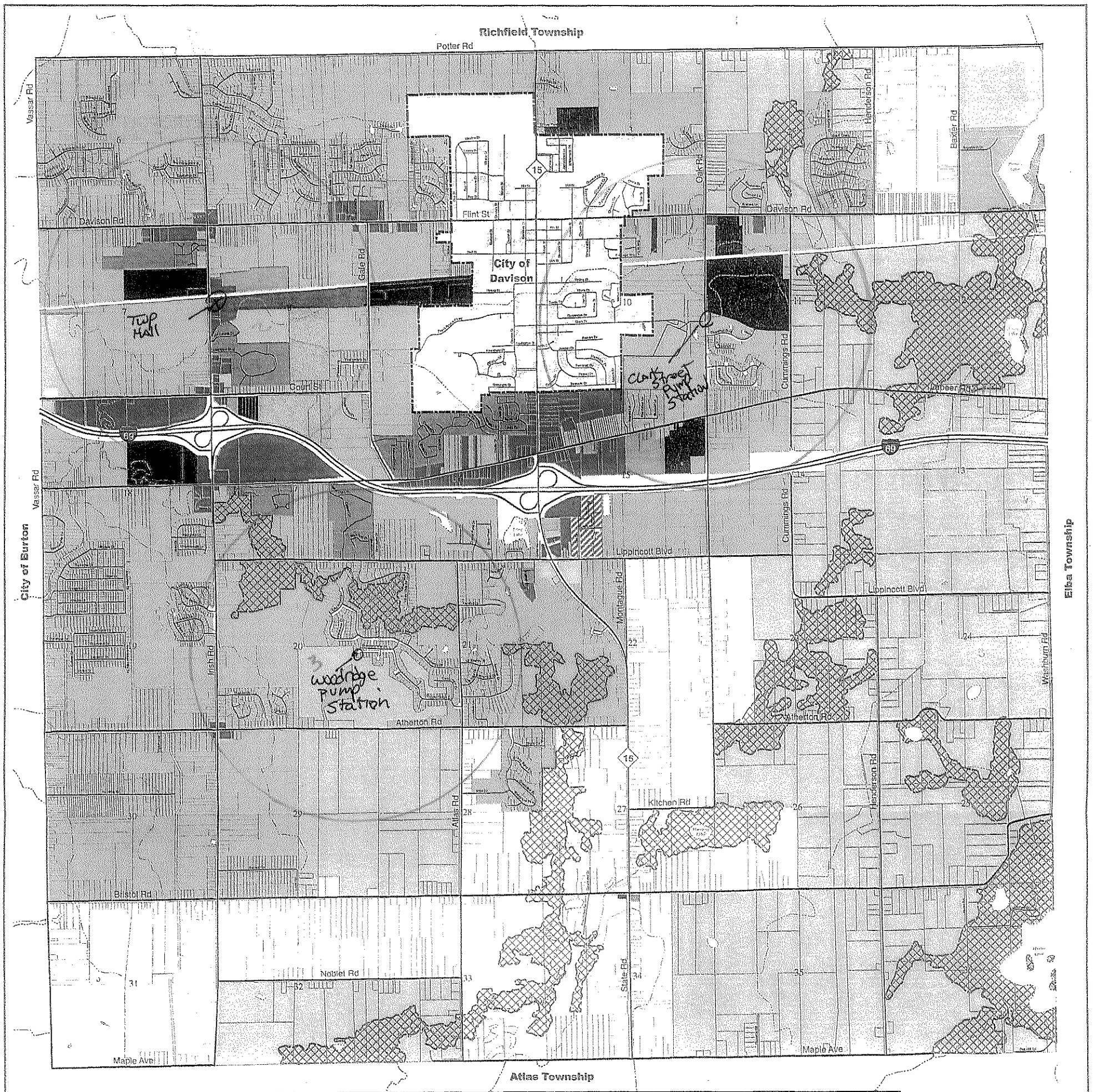
Please attach additional pages if necessary.

Estimated Project Cost: $60,000

Please attach a location map for this project.

Proposed Timeframe for Implementation:	1 to 5 years	6 to 10 years	11 or more years

circles indicate 1 mile radius



SCHEDULE OF REGULATIONS* Zoning Districts	Min. Size Per Zoning Lot (a) Area	Min. Size Per Zoning Lot (a) Width in Ft.	Max. Bldg. Height in Ft.	Max. Bldg. Lot Coverage (%)	Min. Yard Setback Requirements Per Zoning Lot in Ft. (b) (c) (d) (e) Front (g) (h)	Each Side	Rear	Min. Liveable Floor Area in Sq. Ft. (f)	Max. Gross Density in Units Per Acre
RC, Recreation Conservation	10 ac	330	50	10	60	30	50	1600	0.1
RA, Residential Agricultural	10 ac	330	50	10	60	50	50	1400	0.1
RSE, Residential Suburban Estate	1.5 ac	150	50	20	50	25	50	1800	0.7
RU-1, Residential Urban	(j)	(j)	50	30	25 (k)	10	35	1200	1-3.2
RM-1, Residential Multiple Family (Low Density) (L)	5 ac	200 (u)	50	25	(m) (n) (o)	(m) (n) (o)	(m) (n) (o)	(p)	4-8 (q)
RM-2, Residential Multiple Family (Medium Density) (L)	(r)	200 (u)	50	35	(m) (n) (s)	(m) (o) (s)	(M) (o) (s)	(p)	(t)
RMH, Residential Mobile Home Park	(v)	(v)	50	(v)	(v)	(v)	(v)	---	---
MX, Mixed Use	10 ac	---	50	---	---	---	---	---	---
CO, Community Office	---	---	50	(w)	100 (x)	15	20 (y)	---	---
LC, Local Commercial	---	---	50	(w)	100 (x)	20 (z)	35 (y)	---	---
GC, General Commercial	---	---	50	(w)	100 (x)	20 (z) (aa) (cc)	35 (y) (aa)	---	---
P-L, Public Lands	---	---	40	50	---	---	---	---	---
M-1, Limited Manufacturing	1 ac	150	45	(w)	100 (bb)	20 (aa) (cc)	35 (y) (aa) (dd)	---	---
M-2, General Manufacturing	2 ac	150	60	(w)	100 (bb)	20 (aa) (cc)	50 (y) (aa) (dd)	---	---

*Refer to Township Zoning Ordinance for complete listing of development regulations.

Legend

- Freeway
- Primary Roads
- Local Roads
- Water Features
- Water Bodies
- City of Davison
- Parcel Lines

Parcel Source: Genesee County Equalization Department, 2006, and Wade Trim.

This Ordinance was adopted by the Township Board of Davison Township by authority of Act 184, of the Public Acts of Michigan, 1943, at a Regular Meeting thereof duly called and held on the 11th day of July, 1994, A.D.

KAREN MILLER
Clerk, Davison Township

REVISIONS: March 26, 2002
July 15, 2002
January 17, 2003
March 19, 2007

0 1,000 2,000 4,000 Feet

ZONING DISTRICTS MAP

Davison Township Genesee County, MI

WADE TRIM
25251 Northline Road
Taylor, MI 48180
www.WadeTrim.com

Genesee County Hazard Mitigation Plan
Proposed Hazard Mitigation Project Request Form

Contact Information for Proposed Project

Applicant Agency: Charter Township of Flushing

Contact Person: Ron Birchmeier

Title: Supervisor

Project Description

Our Charter Township does not have tornado sirens in place, but our surrounding communities do. I know they test their sirens regularly, and I'm sure for a few moments the residence are annoyed by the sound, but if it saves lives, then it's worth a few moments of noise.

It's been years since our roads have flooded due to the creeks not being able to handle large amounts of rainfall, but it has happened. Brent Creek and Cole Creek are located inside the township and cross one primary and one local road. It's been years since they last have been dredged.

Please attach additional pages if necessary.

Estimated Project Cost: $10 - $30,000

Please attach a location map for this project.

Proposed Timeframe for Implementation:	1 to 5 years	6 to 10 years	11 or more years

Genesee County Hazard Mitigation Plan
Proposed Hazard Mitigation Project Request Form

Project Alternatives

Project Alternative 1:

Estimated Project Cost:

Please attach a location map for this project.

Project Alternative 2:

Estimated Project Cost:

Please attach a location map for this project.

Proposed Timeframe for Implementation:	1 to 5 years	6 to 10 years	11 or more years

Genesee County Hazard Mitigation Plan
Proposed Hazard Mitigation Project Form

Contact Information for Proposed Project

Applicant Agency: GENESEE COUNTY ASSOCIATION OF FIRE CHIEFS

Contact Person: WILLIAM "SKIP" DAVIS

Title: ASSISTANT FIRE CHIEF - DAVISON/RICHFIELD FIRE DEPT.

Project Description

- CREATE A GIS DATA LAYER OF FIRE HYDRANT LOCATION WITHIN GENESEE COUNTY.

- THIS PROJECT IS INTENDED TO ASSIST IN THE MITIGATION OF STRUCTURE FIRES THROUGHOUT GENESEE COUNTY BY CREATING ACCURATE MAPPING OF HYDRANT LOCATIONS THAT CAN BE UTILIZED BY THE 911 CENTER TO AID RESPONDING FIRE DEPARTMENTS IN LOCATING DEPENDABLE WATER SOURCES FOR USE IN CONTROLLING THE SPREAD AND EXTINGUISHMENT OF STRUCTURE FIRES. THERE ARE CURRENTLY OVER 14,000 HYDRANTS IN THE COUNTY. ACCURATE DATA LOCATION HAS ONLY BEEN COLLECTED FOR APPROXIMATELY 8,000 HYDRANTS.

- THE SCOPE OF THE PROJECT IS TO COLLECT A HYDRANT LOCATION DATA LAYER WITHIN AN AVERAGE ACCURACY OF +/- 10 FEET.

- THIS DATA WOULD BE INCLUDED IN 911 CENTER PREMISE INFORMATION AND BE IMMEDIATELY AVAILABLE TO INITIAL ARRIVING FIRE UNITS AND TO MUTUAL AID UNITS CALLED TO ASSIST IN CONTROLLING A LARGE FIRE.

- BASED ON INITIAL TEST AREAS IT IS EXPECTED THIS WORK CAN BE COMPLETED FOR APPROXIMATELY $ 66,000.

Please attach additional pages if necessary.

Estimated Project Cost: $ 65,000.00

Please attach a location map for this project.

Proposed Timeframe for Implementation	1 to 5 years	6 to 10 years	11 or more years

$ LESS THAN

Montrose Charter Township
139 S. Saginaw Street, P.O. Box 3128 Montrose, MI 48457
Phone (810) 639-2021 Fax (810) 639-3207

August 13, 2013

GLS Region V
1101 Beach St. Room 223
Flint, MI 48502
Planning and Development Commission
Claire Wilke, Associate Planner

Dear Ms. Wilke:

The Charter Township of Montrose, at this time has no Hazard Mitigation project request. However, we realize the importance of this organization and wish to remain a partner with FEMA and our local agencies, so that we can work together should one of our communities face a disaster in the future.

Sincerely,

Mark A. Emmendorfer
Supervisor
Charter Township of Montrose

ATTN: [illegible]
8/27/2013

Genesee County Hazard Mitigation Plan
Proposed Hazard Mitigation Project Request Form

Applicant Agency: University of Michigan-Flint

Contact Person: Mike Lane

Title: Manager 810-766-6763

Project Description

Provide the funding to develop a Flood Mitigation Plan. This plan will address ongoing mitigation needs such as installing USGS river gauges, constructing berms / physical barriers that can resist the elevation associated with the overflow of the Flint River.

RECEIVED
GENESEE COUNTY
AUG 27 2013
METROPOLITAN
PLANNING COMMISSION

Please attach additional pages if necessary.

Estimated Project Cost:	$50,000	Please attach a location map for this project.	
Proposed Timeframe for Implementation:	(1 to 5 years) (circled)	6 to 10 years	11 or more years

Genesee County Hazard Mitigation Plan
Proposed Hazard Mitigation Project Request Form

Project Alternatives

Project Alternative 1: Enhance First Street Residence Hall Evacuation and Sheltering.
To include developing plans and specifications for construction of a storm shelter to house over 300 residents. Also develop a strategy that can be used to integrate plans for a shelter into any expansion of the residence hall. In addition install two outdoor warning sirens to alert students/residents of severe weather. Following development of drawings for a shelter, construct a shelter to house residents.

Estimated Project Cost: $550,000

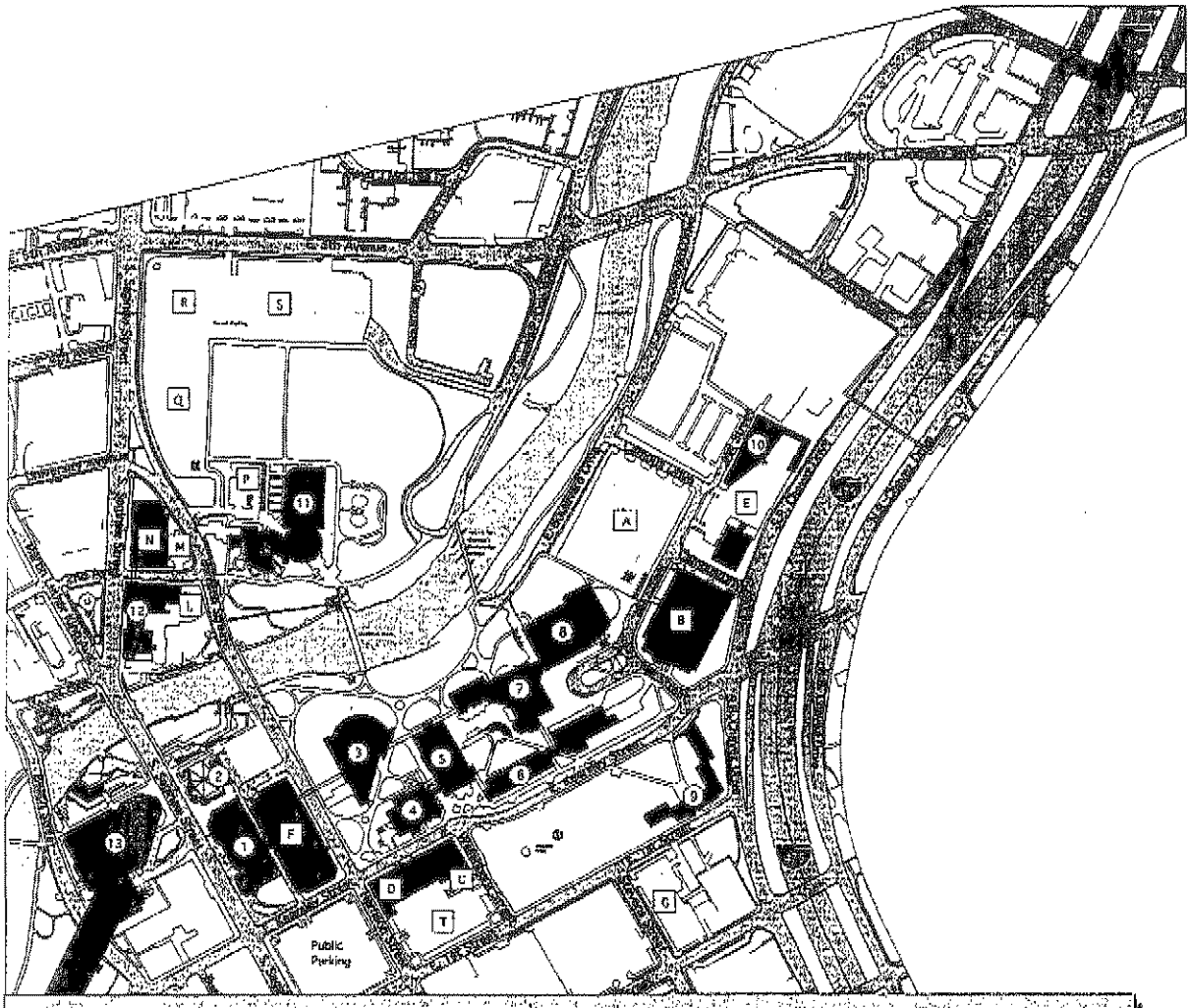
Please attach a location map for this project.

Project Alternative 2: Upgrading and providing improvements to the UM Flint EOC and Department of Public Safety operations.
This includes moving the Dispatch center and adding additional equipment to the center and the EOC.

Estimated Project Cost: $500,000

Please attach a location map for this project.

Proposed Timeframe for Implementation:	(1 to 5 years) — circled	6 to 10 years	11 or more years

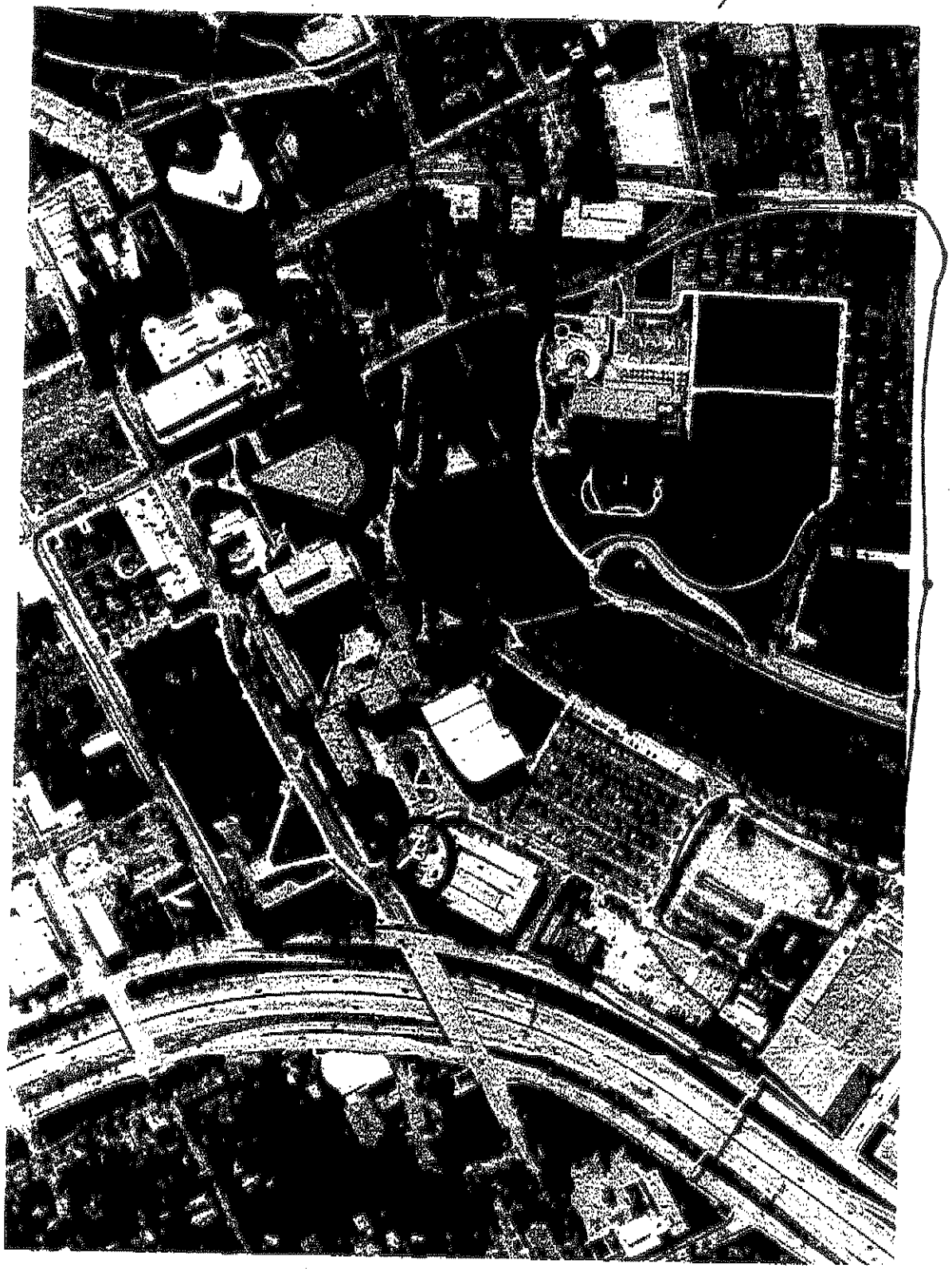


Parking Lots & Decks

- A. Student Permit Parking
- B. Mill St. Deck, Visitor & Student Permit Parking
- C. Handicap Parking Only
- D. Harrison Deck, Staff/Faculty Permit Parking
- E. Faculty/Staff Permit Parking
- F. Waterstreet Deck, Student Permit Parking
- G. Student Permit Parking
- L. Northbank Tenant Permit Parking
- M. Handicap & Student Permit Parking
- N. Northbank Deck, Tenant & Visitor Parking
- P. Visitor Meters & Handicap Parking
- T. Student Permit Parking
- Q. Faculty/Staff/Student Permit Parking
- R. Faculty/Staff/Student Permit Parking
- S. Faculty/Staff/Student Permit Parking

Buildings

1. University Pavilion
2. Pavilion Annex
3. Frances Willson Thompson Library
4. French Hall Theatre
5. David M. French Hall
6. William R. Murchie Science Building
7. Harding Mott University Center
8. Recreation Center
9. First Street Residence Hall
10. Hubbard Services Building
11. William S. White Building
12. Northbank Center
13. Riverfront Center



APPENDIX C

Signed Forms

Genesee County Hazard Mitigation Plan Update
Local Unit Participation Form

I, Mayor Paula Zelenko, recognized the importance of Hazard Mitigation Planning for City of Burton (Community Name). Our community has had opportunity to provide input into the Plan Update.

In the past five years, my community has done the following to prevent or mitigate hazards: *(for example: built a tornado shelter, drainage improvements, implemented Hazard Mitigation Policy)*

New fire engines now have foam proportioners, updating Fire Fighter Right to Know documentation, drainage improvements, on going training of employees with programs such as: NIMS, ICS,Threaten Risk Assessment, increased efforts on erosion control and soil stabilization, initiating BS&A modules to assist tracking of new businesses Identified private entities and people for emergency assistance and shelters

To prevent or mitigate future hazards, our community would like to: *(for example: move structures out of the flood plain, stabilize sod)*

Seek grant funding to assist us with 1.) accelerating our ditching program to better expedite on going drainage improvements.
2.) replacement of water and sewer infrastructure that has exceed service life
3.) accelerating demolitions of blighted structures and clean up of vacant lots
4.) implementing the Citizen Emergency Response Training (CERT) and emergency personal preparedness plans

My community's hazard priorities are: *(for example: inclement weather, dam failure, snow and ice storms)*

Inclement weather to keep our trunk route clear as we have a significant amount of hazardous transport through the I-69.
Specialized training for emergency response such as our 10 story senior citizen residential high rise.

My community's prioritized hazard mitigation strategies are: *(for example: map floodplains, retrofit existing structures in the floodplain)*

Continuing with our pro-active evaluations and training to meet any new criteria, standards, and methodologies.

Additional comments:

Our city has great continuity. We have used our past experiences and experiences of other communities to review and improve our processes and how we will respond to future similar incidents. It does not matter what department, what section of the community, what individual; we take those situations and use them as learning experiences to determine 1.) How could this event have been avoided? 2.) How could we have improved response? 3.) What tools do we need to make the improvement? 4.) Where will the resources come from? 5.) When will we make it happen?

Name: Mayor Paula Zelenko

Title: Mayor

Community: City of Burton

Date: November 8, 2013

Genesee County Hazard Mitigation Plan Update
Local Unit Participation Form

I, MICHAEL HART, recognized the importance of Hazard Mitigation Planning for CITY OF DAVISON (Community Name). Our community has had opportunity to provide input into the Plan Update.

In the past five years, my community has done the following to prevent or mitigate hazards: *(for example: built a tornado shelter, drainage improvements, implemented Hazard Mitigation Policy)*

To prevent or mitigate future hazards, our community would like to: *(for example: move structures out of the flood plain, stabilize sod)*

BUILD EMERGENCY SHELTER
- TORNADO
- SNOW
- FLOODING
- RAIL ACCIDENTS

My community's hazard priorities are: *(for example: inclement weather, dam failure, snow and ice storms)*

SNOW + ICE STORMS

RAIL LINE - CN

My community's prioritized hazard mitigation strategies are: *(for example: map floodplains, retrofit existing structures in the floodplain)*

Additional comments:

ADDITIONAL FUNDING NEEDED FOR ALL OF THE ABOVE

Name: MICHAEL HART
Title: CITY MANAGER
Community: CITY OF DAVISON
Date: 10-28-13

Genesee County Hazard Mitigation Plan Update
Local Unit Participation Form

I, Robert Cairnduff, recognized the importance of Hazard Mitigation Planning for City of Fenton (Community Name). Our community has had opportunity to provide input into the Plan Update.

In the past five years, my community has done the following to prevent or mitigate hazards: *(for example: built a tornado shelter, drainage improvements, implemented Hazard Mitigation Policy)*

We have improved our public safety commuications by installing BDA's at the high school and middle school.
We made major upgrades to 3 of our 5 severe weather sirens and re-banded all 5 to meet FCC requirments.
Conducted table-top and real life training exercises with neighboring municipalites and school districts.
Replaced/updated our police departments respirators with CBRNE rated cartridges.
Installed natural gas powered generators at all six of our sanitary sewer lift stations.
Update our city-wide Emergency Operations Support Plan annualy.

To prevent or mitigate future hazards, our community would like to: *(for example: move structures out of the flood plain, stabilize sod)*

Dam improvments/repairs
Infrastructure imporvments/replacements. (Water and sewer mains)

My community's hazard priorities are: *(for example: inclement weather, dam failure, snow and ice storms)*

Tornados
inclement weather
Snow and ice storms
Fires
Infrastructure failure (water mains, Dam)
Hazardous materials incident (transportation)

My community's prioritized hazard mitigation strategies are: *(for example: map floodplains, retrofit existing structures in the floodplain)*

Continue to maintain and improve our severe weather notification system
Continous improvements to our Emergency Operations Support Plan
Training for our Police and Fire departments in Hazardous Materials
Maintian/replace/upgrade our infrastructure

Additional comments:

Name: Robert Cairnduff
Title: Fire Chief- Designated Emergecny Rep.
Community: City of Fenton
Date: 11/1/2013

Genesee County Hazard Mitigation Plan Update
Local Unit Participation Form

I, Steven P. Solomon, recognized the importance of Hazard Mitigation Planning for City of Grand Blanc (Community Name). Our community has had opportunity to provide input into the Plan Update.

In the past five years, my community has done the following to prevent or mitigate hazards: *(for example: built a tornado shelter, drainage improvements, implemented Hazard Mitigation Policy)*

2008 - White drain construction in Kirkridge subdivision

2010 - Perry drain improvements in Kirkridge subdivision

2011 - Storm sewer construction Footing drain disconnects in Grand Oak subdivision

2012 - Viaduct drain clean out on Saginaw Street

2013 - Applegate drain clean out

See attached statement regarding structure fires, Haz Mat, and terrorism

To prevent or mitigate future hazards, our community would like to: *(for example: move structures out of the flood plain, stabilize sod)*

Continue to improve storm water drainage in the city and maintain city services at a level that allows for proper mitigation service delivery.

My community's hazard priorities are: *(for example: inclement weather, dam failure, snow and ice storms)*

Weather related events; especially rain, which has caused many flooding related issues, and snow and ice storms

My community's prioritized hazard mitigation strategies are: *(for example: map floodplains, retrofit existing structures in the floodplain)*

Drainage improvements

Additional comments:

There has been quite an extensive continuing discussion taking place at the city council on the need to improve our storm water drainage issues. The improvement process is being carried out and has improved our storm water run off; however, it needs to continue to improve.

Name: Steven P. Solomon

Title: Chief of Police

Community: City of Grand Blanc

Date: October 31, 2013

The Grand Blanc Fire Department has continued to mitigate the problem of structure fire through the passage of a millage and hiring full-time firefighters. Currently, Station #1 is staffed with 4 personnel around the clock 365 days a year.

We have also begun a very elaborate Fire Education Bureau that includes inspections of all commercial and industrial properties, the education of many students in our schools and doing plan reviews of all new construction. This will, hopefully, lower the number of fires and fire losses for the City and Township of Grand Blanc.

Because of the railroad passing through the City and the expressways throughout our Fire District, we have continued to work with the County Haz Mat team to insure that our community has a means of mitigating any and all haz mat incidents. The Fire Department just took control of managing the County Haz Mat Team and has begun to recruit new and old members. We have kept up with all hazardous materials that are in our community through our inspection program.

We keep track of the different materials that are sent through our community on the rails and the highway. We have kept up our training in haz mat and are prepared if the accident was to occur.

Because we have the Regional Urban Search and Rescue equipment here, we are very much prepared for any and all major transportation accidents that are to occur in Grand Blanc's Fire District. We have received many pieces of equipment that can assist in the rescue and mitigation of the transportation accidents that could occur. We have worked with and alongside both of our Police Agencies and feel very confident that we can handle most of the transportation accidents that occur here by ourselves.

As for terrorism, many of us have taken courses on the mitigation of any terrorist act that were to occur here. All of the Fire Department has taken the NIMS 100, 200, 700 and 800 courses through FEMA. All of the officers of the department have taken NIMS 300 and a few of us have taken NIMS 400. One of the officers is an instructor of these courses and has taught numerous classes in Chicago. By taking these classes, the mitigation of any terrorist event will be easier by understanding the different positions in the Incident Command System.

Also, we have been very active in the All Hazards- National Incident Management System including taking some of the given position's courses. Some of the courses taken are Incident Commander, Public Information Officer, Operations Chief and Logistics Chief to name a few. We are continuing to take as many of these courses as we can. We are waiting to see what the Region is hosting over the next year.

Genesee County Hazard Mitigation Plan Update
Local Unit Participation Form

I, Amy Planck, recognized the importance of Hazard Mitigation Planning for City of Montrose (Community Name). Our community has had opportunity to provide input into the Plan Update.

In the past five years, my community has done the following to prevent or mitigate hazards: *(for example: built a tornado shelter, drainage improvements, implemented Hazard Mitigation Policy)*

The City has contracted with the Charter Township of Montrose for police & fire protection. That agency routinely trains for disaster situations. The City has also installed a new warning siren (2012).

To prevent or mitigate future hazards, our community would like to: *(for example: move structures out of the flood plain, stabilize sod)*

Have all county drains cleaned to prevent flooding. Have all railroad ties removed from ditches or either side of the railroad tracks to prevent flooding. The City is currently working with the Huron & Eastern Railroad to mitigate drainage issues along the tracks & cleanup of debris which has allowed standing water in certain areas.

My community's hazard priorities are: *(for example: inclement weather, dam failure, snow and ice storms)*

Snow storms, ice storms, high wind damage, train derailment

My community's prioritized hazard mitigation strategies are: *(for example: map floodplains, retrofit existing structures in the floodplain)*

Additional comments:

Perhaps a mock disaster drill with other members of Genesee County simulating a train derailment would help to be better prepared in the event of a derailment.

Name: Amy Planck

Title: Interim City Manager

Community: City of Montrose

Date: November 8, 2013

Genesee County Hazard Mitigation Plan Update
Local Unit Participation Form

I, Thomas Darnell, recognized the importance of Hazard Mitigation Planning for The City of Mt. Morris (Community Name). Our community has had opportunity to provide input into the Plan Update.

In the past five years, my community has done the following to prevent or mitigate hazards: *(for example: built a tornado shelter, drainage improvements, implemented Hazard Mitigation Policy)*

N/A.

To prevent or mitigate future hazards, our community would like to: *(for example: move structures out of the flood plain, stabilize sod)*

None.

My community's hazard priorities are: *(for example: inclement weather, dam failure, snow and ice storms)*

Inclement weather, including tornadoes, wind storms, and snow and ice storms. Railroad related emergencies including HAZMAT incidents.

My community's prioritized hazard mitigation strategies are: *(for example: map floodplains, retrofit existing structures in the floodplain)*

Write a plan to address our hazard priorities.

Additional comments:

Name: Thomas Darnell

Title: City Manager

Community: The City of Mt. Morris

Date: 11/12/13

Genesee County Hazard Mitigation Plan Update
Local Unit Participation Form

I, Tom Svrcek, recognized the importance of Hazard Mitigation Planning for City of Swartz Creek (Community Name). Our community has had opportunity to provide input into the Plan Update.

In the past five years, my community has done the following to prevent or mitigate hazards: *(for example: built a tornado shelter, drainage improvements, implemented Hazard Mitigation Policy)*

Drainage improvement to City main discharge ditch

To prevent or mitigate future hazards, our community would like to: *(for example: move structures out of the flood plain, stabilize sod)*

Stabilize areas in flood areas

My community's hazard priorities are: *(for example: inclement weather, dam failure, snow and ice storms)*

Snow and Ice Storms

My community's prioritized hazard mitigation strategies are: *(for example: map floodplains, retrofit existing structures in the floodplain)*

N/A

Mapping is already done by the federal government

Additional comments:

Flood Plain map needs to be redone with new elevations set

Name: Tom Svrcek

Title: Director of Public Services

Community: City of Swartz Creek

Date: November 11, 2013

Genesee County Hazard Mitigation Plan Update
Local Unit Participation Form

I, CHRIS GEHRINGER recognized the importance of Hazard Mitigation Planning for CLAYTON TWP (Community Name). Our community has had opportunity to provide input into the Plan Update.

In the past five years, my community has done the following to prevent or mitigate hazards: *(for example: built a tornado shelter, drainage improvements, implemented Hazard Mitigation Policy)*

DITCHING, DRAINAGE THROUGH NEW CULVERTS. SCHOOL PLANS FOR TERRORIST ATTACKS.

To prevent or mitigate future hazards, our community would like to: *(for example: move structures out of the flood plain, stabilize soil)*

WORK WITH COUNTY ON (2) MAIN DRAINS THAT RUN THROUGH TOWNSHIP - MISTEGAY AND COLE CREEK DRAINS REDUCE FLOODING

My community's hazard priorities are: *(for example: inclement weather, dam failure, snow and ice storms)*

FLOODING TOXIC HAZARDS DUE TO SPILLS ON MAIN HIGHWAYS, M-21, M-13, I-69

My community's prioritized hazard mitigation strategies are: *(for example: map floodplains, retrofit existing structures in the floodplain)*

INCLEMENT WEATHER - FLOODING REDUCE BUILDINGS IN FLOOD PLANE - REDO EXISTING FLOOD MAPS

Additional comments:

SINCE THE BIG FLOOD OF 2 YEARS AGO WE HAVE DONE CONSIDERABLE DRAINAGE IMPROVEMENTS, BUT MORE HAS TO BE DONE

WORKING WITH POLICE AND FIRE TOWARD PLAN FOR BIO-HAZARD ACCIDENT

Name: CHRIS GEHRINGER
Title: SUPERVISOR
Community: CLAYTON TWP
Date: 11/12/13

Genesee County Hazard Mitigation Plan Update
Local Unit Participation Form

I, Thomas Broecker, recognized the importance of Hazard Mitigation Planning for Fenton Township (Community Name). Our community has had opportunity to provide input into the Plan Update.

In the past five years, my community has done the following to prevent or mitigate hazards: *(for example: built a tornado shelter, drainage improvements, implemented Hazard Mitigation Policy)*

- Extensive rehabilitation of sanitary sewer system to reduce the risk of spills and overflows
- Road ditch and drain maintenance

To prevent or mitigate future hazards, our community would like to: *(for example: move structures out of the flood plain, stabilize sod)*

- Install a generator at the Township Hall so it can serve as an emergency shelter
- Renovate Fire Station #1 so it can serve as an emergency shelter

My community's hazard priorities are: *(for example: inclement weather, dam failure, snow and ice storms)*

- Inclement weather
- Tornadoes
- Snow/ice storms
- Hazardous material incidents
- Infrastructure failure (sanitary sewer)

My community's prioritized hazard mitigation strategies are: *(for example: map floodplains, retrofit existing structures in the floodplain)*

Emergency siren upgrades
Road ditching program
Culvert replacements

Additional comments:

Name: Thomas Broecker
Title: Operations Manager
Community: Fenton Township
Date: 11-11-13

Genesee County Hazard Mitigation Plan Update
Local Unit Participation Form

I, Mary Ann Price, recognized the importance of Hazard Mitigation Planning for Forest Township (Community Name). Our community has had opportunity to provide input into the Plan Update.

In the past five years, my community has done the following to prevent or mitigate hazards: *(for example: built a tornado shelter, drainage improvements, implemented Hazard Mitigation Policy)*

Continue to purchase new fire department equiptment to keep dept. updated.
Continue to train fire department personnel in Haz. Mat Awareness & Operations

To prevent or mitigate future hazards, our community would like to: *(for example: move structures out of the flood plain, stabilize soil)*

Establish shelter sites within Forest Township.
Update emergency action plan w/ Otisville Village.
Establish plans/relationships with neighboring communities
Investigate placing more sirens within the Township

My community's hazard priorities are: *(for example: inclement weather, dam failure, snow and ice storms)*

Inclement weather
Structure fires
Environmental hazards
Terrorism

My community's prioritized hazard mitigation strategies are: *(for example: map floodplains, retrofit existing structures in the floodplain)*

Obtain generators for shelter sites and siren site.
Update action plan.

Additional comments:

Name: Mary Ann Price
Title: Township Supervisor
Community: Forest Township
Date: 11-4-13

Genesee County Hazard Mitigation Plan Update
Local Unit Participation Form

I, Chuck Melki, recognized the importance of Hazard Mitigation Planning for Gaines Township (Community Name) our community has had opportunity to provide input into the Plan Update.

In the past five years, my community has done the following to prevent or mitigate hazards: *(for example: built a tornado shelter, drainage improvements, implemented Hazard Mitigation Policy)*

1) Installed 2 warning sirens
2) Have ~~Red Cross~~ Community Shelters established along w/ Township Hall

To prevent or mitigate future hazards, our community would like to: *(for example: move structures out of the flood plain, stabilize sod)*

Get Better drainage

My community's hazard priorities are: *(for example: inclement weather, dam failure, snow and ice storms)*

Inclement Weather

My community's prioritized hazard mitigation strategies are: *(for example: map floodplains, retrofit existing structures in the floodplain)*

map floodplains

Additional comments:

Name: Chuck Melki
Title: Supervisor
Community: Gaines Township
Date: 11/12/2013

Genesee County Hazard Mitigation Plan Update
Local Unit Participation Form

I, Randal R. Waites, recognized the importance of Hazard Mitigation Planning for Genesee Twp (Community Name). Our community has had opportunity to provide input into the Plan Update.

In the past five years, my community has done the following to prevent or mitigate hazards: *(for example: built a tornado shelter, drainage improvements, implemented Hazard Mitigation Policy)*

Drainage Improvements

To prevent or mitigate future hazards, our community would like to: *(for example: move structures out of the flood plain, stabilize sod)*

Move structures out of flood plain

Mitigate property acquisition and structure Demolition

My community's hazard priorities are: *(for example: inclement weather, dam failure, snow and ice storms)*

Management cost

Inclement weather/snow and ice storms

Dam failure

Structure elevation in flood plains

Minor localized flood reduction projects

5% initiative projects

My community's prioritized hazard mitigation strategies are: *(for example: map floodplains, retrofit existing structures in the floodplain)*

Map Flood Plains

Mitigate Elevating or removal of structures to eliminate

Additional comments:

Put overhead electric under ground for pump stations # 1 & # 4, also add stand alone

Generators to cut cost of labor and pumper trucks.

Name: Randal R. Waites

Title: DPW Supervisor

Community: Genesee Twp

Date: 11.06.2013

Genesee County Hazard Mitigation Plan Update
Local Unit Participation Form

I, David E. Stamm, recognized the importance of Hazard Mitigation Planning for Grand Blanc Township (Community Name). Our community has had opportunity to provide input into the Plan Update.

In the past five years, my community has done the following to prevent or mitigate hazards: *(for example: built a tornado shelter, drainage improvements, implemented Hazard Mitigation Policy)*

1. Upgraded six (6) weather sirens including the notification system
2. Added generators at four (4) sewage pumping stations
3. Implemented sewer flow metering program to analyze wet weather flow impacts
4. Implemented sewer cleaning, televising, and repair programs to prevent flooding from sewer backups
5. Implemented pilot program to remove residential sump pump connections from the sanitary sewer thereby reducing the threat of sewer overflows during wet weather events.

To prevent or mitigate future hazards, our community would like to: *(for example: move structures out of the flood plain, stabilize sod)*

Currently applying for a MDEQ SAW grant, in conjunction with the Genesee County Drain Commission to do a Water Shed Management Plan for the Thread Creek which has experienced flooding in the last few springs.

My community's hazard priorities are: *(for example: inclement weather, dam failure, snow and ice storms)*

Our community's hazard priorities are inclement weather, flooding and storms.

My community's prioritized hazard mitigation strategies are: *(for example: map floodplains, retrofit existing structures in the floodplain)*

Our community's prioritized hazard mitigation strategies are adding at least one (1) weather siren and construction of a safe room at the Township Government Center.

Additional comments:

Name: David E. Stamm

Title: Chief of Police

Community: Grand Blanc Township

Date: November 7, 2013

The Grand Blanc Fire Department has continued to mitigate the problem of structure fire through the passage of a millage and hiring full-time firefighters. Currently, Station #1 is staffed with 4 personnel around the clock 365 days a year.

We have also begun a very elaborate Fire Education Bureau that includes inspections of all commercial and industrial properties, the education of many students in our schools and doing plan reviews of all new construction. This will, hopefully, lower the number of fires and fire losses for the City and Township of Grand Blanc.

Because of the railroad passing through the City and the expressways throughout our Fire District, we have continued to work with the County Haz Mat team to insure that our community has a means of mitigating any and all haz mat incidents. The Fire Department just took control of managing the County Haz Mat Team and has begun to recruit new and old members. We have kept up with all hazardous materials that are in our community through our inspection program.

We keep track of the different materials that are sent through our community on the rails and the highway. We have kept up our training in haz mat and are prepared if the accident was to occur.

Because we have the Regional Urban Search and Rescue equipment here, we are very much prepared for any and all major transportation accidents that are to occur in Grand Blanc's Fire District. We have received many pieces of equipment that can assist in the rescue and mitigation of the transportation accidents that could occur. We have worked with and alongside both of our Police Agencies and feel very confident that we can handle most of the transportation accidents that occur here by ourselves.

As for terrorism, many of us have taken courses on the mitigation of any terrorist act that were to occur here. All of the Fire Department has taken the NIMS 100, 200, 700 and 800 courses through FEMA. All of the officers of the department have taken NIMS 300 and a few of us have taken NIMS 400. One of the officers is an instructor of these courses and has taught numerous classes in Chicago. By taking these classes, the mitigation of any terrorist event will be easier by understanding the different positions in the Incident Command System.

Also, we have been very active in the All Hazards- National Incident Management System including taking some of the given position's courses. Some of the courses taken are Incident Commander, Public Information Officer, Operations Chief and Logistics Chief to name a few. We are continuing to take as many of these courses as we can. We are waiting to see what the Region is hosting over the next year.

Genesee County Hazard Mitigation Plan Update
Local Unit Participation Form

I, Larry Green, recognized the importance of Hazard Mitigation Planning for Mt. Morris Township (Community Name). Our community has had opportunity to provide input into the Plan Update.

In the past five years, my community has done the following to prevent or mitigate hazards: *(for example: built a tornado shelter, drainage improvements, implemented Hazard Mitigation Policy)*

Worked with all three fire departments on response time in ways to improve our procedures.

To prevent or mitigate future hazards, our community would like to: *(for example: move structures out of the flood plain, stabilize sod)*

Work to remove all the dead ash trees in our community in Sections 23, 24, 14, and 13.

My community's hazard priorities are: *(for example: inclement weather, dam failure, snow and ice storms)*

Inclement weather and our response time to getting help to all of the residents.

My community's prioritized hazard mitigation strategies are: *(for example: map floodplains, retrofit existing structures in the floodplain)*

Getting rid of all the dangerous ash trees and response to the call.

Additional comments:

Name: Larry Green

Title: Supervisor

Community: Mt. Morris Township

Date: November 11, 2013

Genesee County Hazard Mitigation Plan Update
Local Unit Participation Form

I, David Guigear, recognized the importance of Hazard Mitigation Planning for Charter Township of Mundy (Community Name). Our community has had opportunity to provide input into the Plan Update.

In the past five years, my community has done the following to prevent or mitigate hazards: *(for example: built a tornado shelter, drainage improvements, implemented Hazard Mitigation Policy)*

In regards to our inclement weather alert system Mundy Township has recently invested in two additional warning siren locations. Those locations are strategically placed to best address alerting our residents of potential weather and emergency hazards that exist in our communnity. Prior to the two recent additions of sirens the Township purchased computer software which monitors each location to ensure the equipment is functioning properly. We also have a maintenance program, on an annual basis, that makes sure it is functioning properly. The Township works well with the Genesee County Drain Commission to ensure drains are maintained in proper fashion. Recently, we adopted two Resolutions to exceed the typical allotment for drains to extend maintenance to mitigate potential flooding.

To prevent or mitigate future hazards, our community would like to: *(for example: move structures out of the flood plain, stabilize sod)*

To prevent or mitigate future hazards we would request the Township Board create an amendment to the Zoning Ordinance requiring an added layer of approval by the Planning Commission for any work performed in the flood plain or prohibit any construction in the flood plain.

My community's hazard priorities are: *(for example: inclement weather, dam failure, snow and ice storms)*

Mundy Township is committed to adding additional emergency siren locations recommended by our vendor in the future to ensure that every resident will be alerted should a weather or emergency situation occurs in the area. This commitment will continue until our goal is realized.

My community's prioritized hazard mitigation strategies are: *(for example: map floodplains, retrofit existing structures in the floodplain)*

Mundy Township monitors activity in the flood plain with digital mapping of flood plains. Mundy Township also adheres to the requirements of the Michigan Building Code for construction in flood plains as well as the requirements of Michigan Department of Environmental Quality.

Additional comments:

Name: David Guigear

Title: Supervisor

Community: Charter Township of Mundy

Date: November 12, 2013

Genesee County Hazard Mitigation Plan Update
Local Unit Participation Form

I, Luanne Kondel, recognized the importance of Hazard Mitigation Planning for Village of Gaines (Community Name). Our community has had opportunity to provide input into the Plan Update.

In the past five years, my community has done the following to prevent or mitigate hazards: *(for example: built a tornado shelter, drainage improvements, implemented Hazard Mitigation Policy)*

7yrs ago implemented a hazard mitigation plan along with Gaines Township

To prevent or mitigate future hazards, our community would like to: *(for example: move structures out of the flood plain, stabilize soil)*

We have no issues of flooding or being in the flood plain or have a dam.

My community's hazard priorities are: *(for example: inclement weather, dam failure, snow and ice storms)*

inclement Weather
train derailment
terrorism
fire

My community's prioritized hazard mitigation strategies are: *(for example: map floodplains, retrofit existing structures in the floodplain)*

there isn't a lot we can prioritize on. Our hazards are basically acts of nature and can deal with them if they happen. The only planning we can do is to have a hazard plan into place.

Additional comments:

We have a warning siren to alert us and a plan in place with the Gaines Township fire department and responders along with our Police department.

Name: Luanne Kondel
Title: Clerk
Community: Village of Gaines
Date: 10-24-13

Genesee County Hazard Mitigation Plan Update
Local Unit Participation Form

I, William Sprague, recognized the importance of Hazard Mitigation Planning for Lennon (Community Name). Our community has had opportunity to provide input into the Plan Update.

In the past five years, my community has done the following to prevent or mitigate hazards: *(for example: built a tornado shelter, drainage improvements, implemented Hazard Mitigation Policy)*

We have repaired five catch basins and replaced two collapsed storm drains.

We have purchased blighted property and restored the existing building and converted it to be used for DPW storage.

To prevent or mitigate future hazards, our community would like to: *(for example: move structures out of the flood plain, stabilize sod)*

Upgrade snow removal equipment.

My community's hazard priorities are: *(for example: inclement weather, dam failure, snow and ice storms)*

Our priorities are weather related.

My community's prioritized hazard mitigation strategies are: *(for example: map floodplains, retrofit existing structures in the floodplain)*

Map existing storm drains and develop an asset management plan.

Additional comments:

Name: William Sprague

Title: Village Clerk

Community: Lennon

Date: 11/4/13

Genesee County Hazard Mitigation Plan Update
Local Unit Participation Form

I, Daniel Campbell, recognized the importance of Hazard Mitigation Planning for Otisville (Community Name). Our community has had opportunity to provide input into the Plan Update.

In the past five years, my community has done the following to prevent or mitigate hazards: *(for example: built a tornado shelter, drainage improvements, implemented Hazard Mitigation Policy)*

Maintained drainage system.

To prevent or mitigate future hazards, our community would like to: *(for example: move structures out of the flood plain, stabilize sod)*

My community's hazard priorities are: *(for example: inclement weather, dam failure, snow and ice storms)*

Tornadoes, Snow and Ice Storms, Inclement Weather, Structure Fires, Dam Failure, Civil Disturbance, and Terrorism

My community's prioritized hazard mitigation strategies are: *(for example: map floodplains, retrofit existing structures in the floodplain)*

Retro Existing Structures to have Stand-by power

Additional comments:

We are working with Forest Township on updating our Basic Disaster Plan

We are located near a hazardous materials transport Route.

Name: Daniel Campbell
Title: Assistant DPW Superintendent
Community: Village of Otisville
Date: 10-31-13

GENESEE COUNTY HAZARD MITIGATION PLAN UPDATE
Local Unit Participation Form

I, Julia A. Morford, recognized the importance of Hazard Mitigation Planning for the Charter Township of Flushing. Our community has had opportunity to provide input into the Plan Update.

1. *In the past five years, my community has done the following to prevent or mitigate hazards:* Designated the Flushing Senior High School as a point of distribution center.

2. *To prevent or mitigate future hazards, our community would like to*: install emergency/tornado sirens (see attached picture); review the situation of putting guard rails, etc on the sides of the trussel bridge located between Mt. Morris Road and Frances Road because there could be a derailment at the particular area; have the Genesee County Emergency Manager periodically do educational seminars/townhall meetings on the evacuation procedure if there should be a "flood", "busted gas line", or other disaster situation.

3. *My community's hazard priorities are*: inclement weather, hazardous material spill from train derailment; broken/busted pipe lines.

4. *My community's prioritized hazard mitigation strategies are*: install emergency/tornado sirens; install guard rails or other recommended side controls on the trussel bridge, located between Mt. Morris Road and Frances Road to prevent a derailment (see attached picture); obtain educational information on the Buckeye Pipeline in case of a pipeline disaster.

5. *Additional comments:*
   Due to the fact that Flushing Township is considered a "bedroom" community, there are only two (2) routes that people can get to the west side of the Flint River, coming from the East, when they come to Flushing Township - Mt. Morris Road and Pierson Road. If there should be a disaster such as a flood, which in 1986 the bridge on Mt. Morris Road was washed out, there would only be one (1) way to get to the west side of the Flint River.

   Name: Julia A. Morford, Clerk and
   Brian Fairchild, Chief of Flushing Township Police Department

   Community: Charter Township of Flushing

   Date: November 26, 2013

   (This was a joint venture for the Clerk and the Police Chief)

File:Picswiss BL-56-08.jpg

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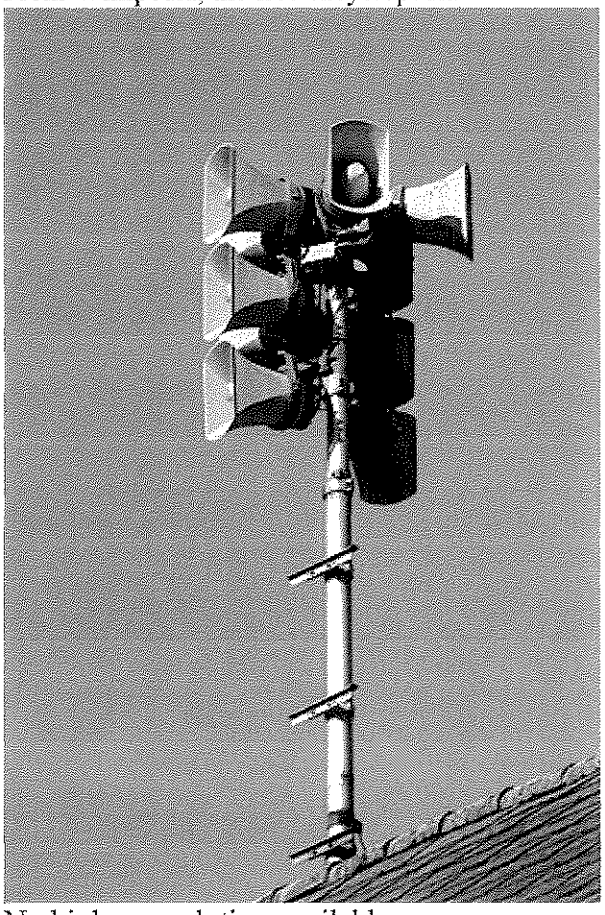

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Description	**Deutsch:** Sirene in Bretzwil **Français :** Sirène dans le village de Bretzwil **English:** Siren horns in the village of Bretzwil, Switzerland
Date	26 October 2005
Source	[1] (http://images.google.com/images?&hl=en&btnG=Search+Images&q=Picswiss_BL-56-08.jpg). If this link does not work (URLs are subject to changes), you can find the picture starting from the canton of the subject: http://www.picswiss.ch/geo.html then the location.
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