



2022 Kent County, Ottawa County and the City of Grand Rapids Regional Hazard Mitigation Plan



REDACTED FOR PUBLIC VIEW

TABLE OF CONTENTS

LIST OF FIGURES	
LIST OF TABLES.....	
LIST OF APPENDICES	
Executive Summary	1
1. Introduction	5
1.1 Acknowledgements.....	5
2. Hazard Mitigation Plan Process.....	14
2.1 Plan Goals and Objectives.....	15
2.1.1 Focus on Equity	15
2.2 Planning Process	16
2.2.1 Existing Plans and Programs.....	16
2.2.2 Implementation	18
2.3 Participation in Plan Development.....	18
2.3.1 Jurisdiction Participation	19
2.3.2 Advisory Committee.....	19
2.3.3 Community Representatives.....	19
2.3.4 Public Outreach	19
2.3.5 Neighboring Communities	19
2.4 Plan Development Activities	20
2.4.1 Surveys and Workshops.....	20
2.4.2 Mitigation Strategies and Actions	24
2.4.3 Public Meetings	26
2.5 Plan Adoption.....	26
2.6 Plan Maintenance	27
3. Regional Profile	29
3.1 Historical Overview	29

3.2	Geography and Climate	29
3.2.1	Climate Change	31
3.3	Land Use Patterns	32
3.4	Transportation Network.....	33
3.5	Population Characteristics	33
3.6	Economic Characteristics	36
3.7	Public Services	38
3.8	Critical Asset Categories.....	39
4.	Community Profiles.....	40
4.1	The City of Grand Rapids	40
4.2	Kent County Jurisdictions	41
4.2.1	Ada Township.....	41
4.2.2	Algoma Township	41
4.2.3	Alpine Township	42
4.2.4	Bowne Township	42
4.2.5	Byron Township.....	42
4.2.6	Caledonia Township	43
4.2.7	Village of Caledonia.....	43
4.2.8	Cannon Township.....	44
4.2.9	Cascade Township	44
4.2.10	Village of Casnovia	45
4.2.11	City of Cedar Springs.....	45
4.2.12	Courtland Township.....	46
4.2.13	City of East Grand Rapids	46
4.2.14	Gaines Township	46
4.2.15	Grand Rapids Township	47
4.2.16	City of Grandville	47
4.2.17	Grattan Township	48

4.2.18	Village of Kent City	48
4.2.19	City of Kentwood.....	49
4.2.20	City of Lowell	49
4.2.21	Lowell Township	50
4.2.22	Nelson Township	50
4.2.23	Oakfield Township	50
4.2.24	Plainfield Township.....	51
4.2.25	City of Rockford	51
4.2.26	Village of Sand Lake.....	52
4.2.27	Solon Township	52
4.2.28	Sparta Township.....	53
4.2.29	Village of Sparta	53
4.2.30	Spencer Township.....	53
4.2.31	Tyrone Township	54
4.2.32	Vergennes Township.....	54
4.2.33	City of Walker	55
4.2.34	City of Wyoming.....	55
4.3	Ottawa County Jurisdictions	56
4.3.1	Allendale Township, GVSU	56
4.3.2	Blendon Township	56
4.3.3	Chester Township.....	57
4.3.4	City of Coopersville.....	57
4.3.5	Crockery Township	57
4.3.6	City of Ferrysburg	58
4.3.7	Georgetown Township.....	58
4.3.8	City of Grand Haven	59
4.3.9	Grand Haven Township	59
4.3.10	City of Holland	60

4.3.11 Holland Township	60
4.3.12 City of Hudsonville	61
4.3.13 Jamestown Township	61
4.3.14 Olive Township	62
4.3.15 Park Township	62
4.3.16 Polkton Township	63
4.3.17 Port Sheldon Township.....	63
4.3.18 Robinson Township	64
4.3.19 Spring Lake Township	64
4.3.20 Village of Spring Lake.....	65
4.3.21 Tallmadge Township.....	65
4.3.22 Wright Township	66
4.3.23 City of Zeeland.....	66
4.3.24 Zeeland Township	67
5. Hazard History	68
5.1 Civil Disturbance	68
5.2 Criminal Acts.....	70
5.2.1 Vandalism.....	70
5.2.2 Arson	72
5.3 Drought.....	73
5.4 Earthquakes.....	77
5.5 Extreme Temperatures	79
5.5.1 Extreme Heat.....	79
5.5.2 Extreme Cold	82
5.6 Fire Hazards	85
5.6.1 Wildfires	85
5.6.2 Scrap Tire Fire	87
5.6.3 Structural Fire	91

5.7 Flooding	92
5.7.1 Dam Failure	92
5.7.2 Riverine Flooding	99
5.7.3 Shoreline Flooding and Erosion	105
5.7.4 Urban Flooding	108
5.8 Hazmat Incidents	111
5.8.1 Hazardous Materials: Fixed Site	111
5.8.2 Transportation Incidents	113
5.8.3 Wellhead and Pipeline Accidents	115
5.9 Infrastructure Failure	119
5.9.1 Electrical System Failure	119
5.9.2 Water System Failure	121
5.9.3 Storm Water System Failure	122
5.9.4 Sewer System Failure	123
5.9.5 Communication Systems Failure and Cyber Attack	124
5.10 Nuclear Power Plants	127
5.11 Public Health Emergencies	128
5.12 Subsidence and Landslides	132
5.13 Thunderstorm Hazards	134
5.13.1 Hail	134
5.13.2 Lightning	137
5.13.3 High Wind	139
5.14 Tornadoes	141
5.15 Winter Hazards	144
5.16 Transportation Accidents	148
5.17 Terrorism and Active Assailant Incidents	151
5.18 Weapons of Mass Destruction	153

6. Hazard Mitigation	155
6.1 Previous Action Plans	155
6.1.1 Incorporation of the 2017 Plan.....	156
6.2 Regional Action Plans.....	158
Goal #1- Education and awareness: Promote life and safety through public education, hazard analysis, and early warning	159
Goal #2- Structure and infrastructure: Reduce loss of life and property damage with disaster-resistant structures, equipment, and communication	164
Goal #3- Natural systems protection: Minimize damage and losses by preserving or restoring the functions of natural systems	168
Goal #4- Local plans and regulations: Incorporate hazard mitigation considerations into land use planning, resource management, and land development processes.	170
6.3 Jurisdictional Action Plans	171
7. Plan Monitoring and Revision	172
7.1 Coordination with Other Plans and Programs.....	172
References	173

LIST OF FIGURES

Figure 1:	Site Location Map (p. 28)
Figure 2:	Civil Disturbance: Vulnerable Locations (p.69)
Figure 3:	Drought and Fire (p.75)
Figure 4:	Scrap Tire Fire: Collection Facilities (p.88)
Figure 5:	Flooding and Dams (p.93)
Figure 6:	National Shelter System Facilities (p.97)
Figure 7:	Critical Dune Areas (p.107)
Figure 8:	Hazmat Incidents: Transportation (p.112)
Figure 9:	Hazmat Incidents: Pipelines (p.116)
Figure 10:	Nuclear Power Plant (p.125)
Figure 11:	Subsidence and Mining (p.131)
Figure 12:	Warning Siren Locations (p.135)
Figure 13:	Transportation Accidents (p.146)

LIST OF TABLES

Table 1:	Hazard Ranking (p.3)
Table 2:	Advisory Committee and Community Representatives Participation (p.6)
Table 3:	Municipal/Community Representatives Providing Feedback on the Draft (p.12)
Table 4:	HMP First Survey Results (p.20)
Table 5:	First Workshop Results (p.21)
Table 6:	Hazard Ranking Summary (p.23)
Table 7:	Plan Approval Process (p.27)
Table 8:	Kent County Temperature and Precipitation Averages (p.30)
Table 9:	Ottawa County Temperature and Precipitation Averages (p.30)
Table 10:	Kent County Population Characteristics (p.34)
Table 11:	Ottawa County Population Characteristics (p.35)
Table 12:	Kent County Economic Characteristics (p.36)
Table 13:	Ottawa County Economic Characteristics (p.37)
Table 14:	Regional School Data (p.39)
Table 15:	Scrap Tires Locations (p.90)
Table 16:	Kent County Dams (p.95)
Table 17:	Ottawa County Dams (p.96)
Table 18:	Participation in the National Flood Insurance Program (p.102)
Table 19:	Kent County Underground Mines (p.131)
Table 20:	National Climatic Data Center Intensity Scale (p.134)

LIST OF APPENDICES

Appendix A.	Public Meeting and Outreach Materials (p.175)
Appendix B.	Survey and Workshop Materials (p.251)
Appendix C.	Example Community Resolution for Plan Adoption (p.521)
Appendix D.	Supplemental Hazard Data (p.525)
Appendix E.	Existing Authorities and Resource (p.624)
Appendix F.	Utility Provider Documents (p.647)
Appendix G.	Public Comment and Input (p.659)
Appendix H.	Jurisdictional Action Plans (p.664)

ATTACHMENT

National Flood Insurance Protection Data
Dam Emergency Action Plans
Flood Zone Maps

Executive Summary

The **Kent County, Ottawa County, and City of Grand Rapids Regional Hazard Mitigation Plan** (the 2022 Regional HMP) is a joint effort dedicated to improving the health and safety of community members and their communities through mitigation efforts for specific hazards. Local governments reviewed and supplied information about area hazards, concerns and priorities, current prevention and mitigation measures, and planned mitigation projects.

Kent County, Ottawa County, and the City of Grand Rapids are subject to natural, technological, and human hazards that can threaten life and health, and adversely impact the quality of life, property, the environment, and infrastructure. Providing strategies that minimize the impact of these significant hazards requires a commitment to a multi-step program, including defining the problem, identifying preventive measures, implementing mitigation strategies, and incorporating hazard mitigation into City and County-wide planning efforts. As a first step, Kent and Ottawa Counties prepared a multi-jurisdictional *Hazard Mitigation Plan* in 2006 to better understand significant Kent and Ottawa County hazards and identify ways to mitigate those hazards. The 2006 Plan was approved by FEMA, and updates were approved by FEMA in 2012 and in 2017. The following fifty-nine (59) jurisdictions are included in this 2022 Regional HMP. Bolded jurisdictions were represented by an active participant(s) during this process.

Kent County

Ada Township

Algoma Township

Alpine Township

Bowne Township

Byron Township

Caledonia Township

Village of Caledonia

Cannon Township

Cascade Township

Village of Casnovia

City of Cedar Springs

Courtland Township

City of East Grand Rapids

Gaines Township

City of Grand Rapids

Grand Rapids Township

City of Grandville

Grattan Township

Village of Kent City

City of Kentwood

City of Lowell

Lowell Township

Nelson Township

Oakfield Township

Plainfield Township

City of Rockford

Village of Sand Lake

Solon Township

Sparta Township

Village of Sparta

Spencer Township

Tyrone Township

Vergennes Township

City of Walker

City of Wyoming

Ottawa County

Allendale Township/GVSU

Blendon Township

Chester Township

City of Coopersville

Crockery Township

City of Ferrysburg

Georgetown Township

City of Grand Haven

Grand Haven Township

City of Holland

Holland Township

City of Hudsonville

Jamestown Township

Olive Township

Park Township

Polkton Township

Port Sheldon Township

Robinson Township

Spring Lake Township

Village of Spring Lake

Tallmadge Township

Wright Township

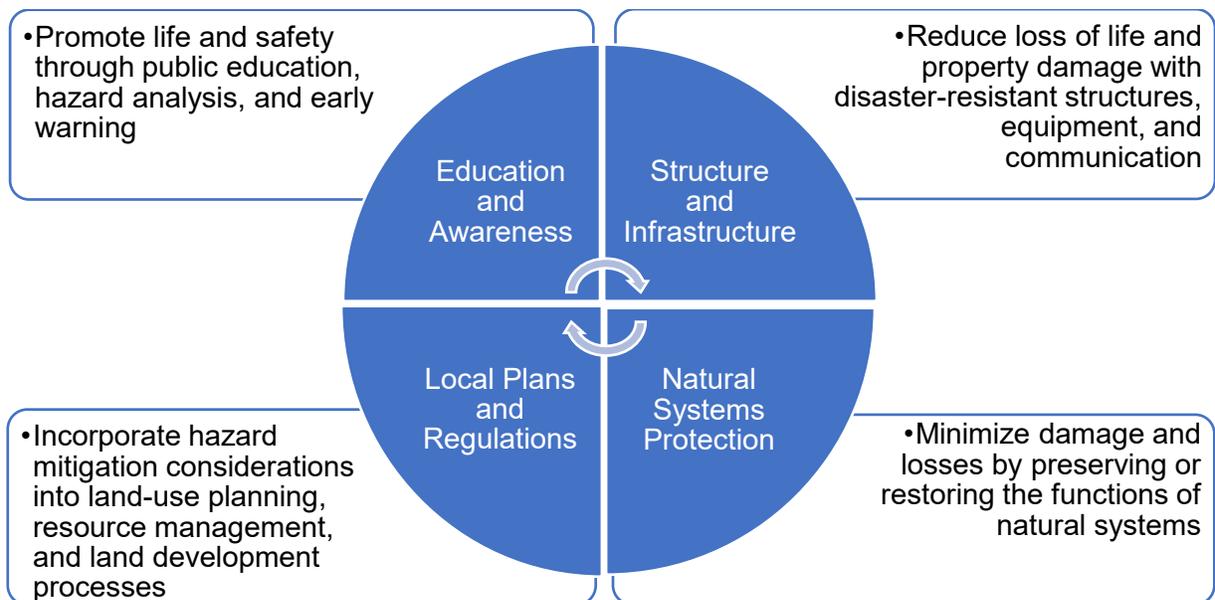
City of Zeeland

Zeeland Township

The Plan Process

The 2022 Regional HMP was completed with the assistance of Kent County, Ottawa County, and the City of Grand Rapids Emergency Managers, representatives and leaders from the represented communities, the Michigan State Police Emergency Management and Homeland Security Division, and other stakeholders. Over 165 individuals participated in the preparation, evaluation, and community outreach components of the 2022 Regional HMP. ASTI Environmental was contracted by the Offices of Emergency Management to facilitate the planning and development process. This plan was prepared in coordination with an Advisory Committee who assisted with evaluation, assessment, community outreach, and the adoption of the 2022 Regional HMP.

The goal of the 2022 Regional HMP is to reduce the impact of hazards on the life, health, and economic well-being of community members based on a continuing hazard risk and vulnerability analysis through the following four general objectives:



Specific tasks for the preparation of this 2022 Regional HMP included the following:

- Identify hazards and risks
- Develop a hazard history
- Analyze social vulnerability indicators
- Develop a community profile
- Assess vulnerabilities
- Define community goals and objectives
- Identify and prioritize hazard mitigation strategies
- Develop Action Plans for a select list of mitigation strategies
- Prepare a draft hazard mitigation plan for county, municipal, and public review
- Solicit county, municipal, and public feedback
- Prepare a final Hazard Mitigation Plan
- Provide community outreach and communication
- Document the planning process
- Adopt the final Hazard Mitigation Plan

Hazard Assessment

A total of 33 natural, technological, and human hazards were identified and evaluated during the planning process using a combination of surveys, workshops, recent events, the FEMA National Risk Index, and the 2019 Michigan Hazard Mitigation Plan. The top 15 hazard rankings were determined by the participants of the second survey. This survey looked at hazard data discussed during the first workshop to determine the top hazards. The following table is a final ranking of these top 15 hazards:

Table 1: Hazard Ranking

Event	Ranking
Public Health Emergencies (Pan, Epi, Con F&W)	1
Flooding & Erosion (Riverine/Shoreline)	2
Infrastructure Failure (Electric, Gas/Oil, Pipeline, Water)	3
Severe Summer Weather (Hail, Lightning, High Winds)	4
Supply Chain Disruption (Gas/Oil, PPE, etc.)	5
Infrastructure Failure (Communications & Internet)	6
Extreme Temperature (Hot/Cold)	7
Winter Weather (Snow, Ice, Sleet)	8
Tornadoes	9
Major Fires	10
Invasive Species	11
Cyber Security Intrusion	12
Criminal Acts (Mass Shootings/Active Assailant)	13
Landslide	14
Civil Unrest	15

Following additional discussion, this list was reduced to the following four hazards, which are the focus of this 2022 Regional HMP:



These four hazards represent both county-wide and local community concerns. Prioritization of these hazards does not reduce the significance of any of the hazards evaluated but provides a method for the represented communities to focus mitigation activities and resources.

Hazard Mitigation

The Advisory Committee reviewed the mitigation strategies from the 2017 Plan, updated these strategies with a focus on equity and the “whole community”, and identified new strategies for consideration based on input from the mitigation survey and workshop discussions. The Advisory Committee selected the 12 mitigation strategies listed below to develop into final regional Action Plans based on the four prioritized hazards. This list is organized by the four regional objectives. Further detail is found in Section 6.2.

Objective #1 – Education and awareness

Action 1.1: Utilize various mechanisms to communicate credible and actionable information to the public. (All Hazards)

Action 1.2: Educate and train local businesses, community organizations, and the general public in mitigation, preparedness, response, and recovery actions. (All Hazards)

Action 1.3: Develop education and notification strategies for communicating with non-English speakers, and those with disabilities and access and functional needs. (All Hazards)

Action 1.4: Improve coordination and collaboration for public health crises between cities, counties, health departments, service providers, hospitals/clinics/doctors, pharmacies, and the general public. (Public Health Emergencies)

Action 1.5: Evaluate and improve early warning emergency notifications, emphasizing digital methods of outreach. (All Hazards)

Objective #2 – Structure and Infrastructure

Action 2.1: Ensure communication systems are resilient, interoperable, and employ redundancies. (Infrastructure Failure)

Action 2.2: Identify critical infrastructure vulnerabilities and ensure security is adequate. (Infrastructure Failure)

Action 2.3: Maintain power infrastructure, backup systems, and generators for critical infrastructures. (Infrastructure Failure)

Action 2.4: Develop engineering controls to promote floodwater diversion. (Flooding and Erosion)

Objective #3 – Natural systems Protection

Action 3.1: Develop ecological controls to promote floodwater diversion. (Flooding and Erosion)

Action 3.2: Prioritize green spaces in areas that are most vulnerable to heat island effects and severe weather impacts. (Severe Weather)

Objective #4 – Local Plans and Regulations

Action 4.1: Develop policies regarding at-risk properties for flooding and erosion. (Flooding and Erosion)

1. Introduction

Kent County, Ottawa County, and the City of Grand Rapids are subject to natural, technological, and human hazards that can adversely impact the quality of life, property, the environment, and infrastructure. The Federal Disaster Mitigation Act of 2000 requires local governments to develop a Hazard Mitigation Plan (HMP), which identifies strategies to minimize the impact of these hazards, reduce vulnerability, and be eligible for *pre-* or *post-*disaster mitigation funding. In response, Kent County, Ottawa County, and the City of Grand Rapids have prepared this multi-jurisdictional plan to better understand significant hazards and their impacts and to identify ways to mitigate those hazards.

The 2022 Regional HMP was completed with the guidance of the Kent County, Ottawa County, and City of Grand Rapids Emergency Management departments, members of the community, representatives, and leaders from communities in the Counties, the Michigan State Police Emergency Management and Homeland Security Division's Mitigation and Recovery Section, and other stakeholders.

1.1 Acknowledgements

The development of this 2022 Regional HMP required individuals' time, talents, effort, and ideas. Approximately 165 representatives, including a total of 30 Advisory Committee members, were chosen to be involved in the preparation of this 2022 Regional HMP.

Kent County, Ottawa County, and the City of Grand Rapids would like to acknowledge and thank the following people for their cooperation and assistance in developing this report:

Emergency Management

Allison Farole, Emergency Management Administrator – City of Grand Rapids
Lou Hunt, Emergency Management Director – Ottawa County
Matt Groesser, Emergency Management Coordinator – Kent County

Michigan State Police Emergency Management and Homeland Security Division, Mitigation/Recovery Section

Mike Sobocinski, Hazard Mitigation Specialist
Mitch Graham, Hazard Mitigation Specialist

ASTI Environmental

Tom Wackerman, Project Advisor
Kera Sharpe, Project Manager
Megan Salazar, Assistant Project Manager

Advisory Committee Members and Community Representatives

Table 2 presents the names and affiliations of individuals that participated in the Hazard Mitigation Plan workshops and surveys, with Advisory Committee members in bold.

Table 2: Advisory Committee and Community Representatives Participation

Name	Community or Organization	Title/Department	Other	1 st Survey	1 st Workshop	2 nd Survey	2 nd Workshop
Aaron Boos	Ottawa County	Applied Technology Manager		X			
Aaron Schut	Life EMS Ambulance	Deputy Director of Central Operations		X			
Adam Magers	Cascade Township	Fire Chief		X		X	
Al Jano	Kent County Facilities Management Department	Director			X		X
Al Vanderberg	Ottawa County	County Administrator		X			
Alek Mizikar	City of Coopersville	Deputy City Manager		X			
Alison Sutter	City of Grand Rapids	Sustainability and Performance Management Officer		X	X		X
Allison Farole	City of Grand Rapids	Emergency Management Administrator		X	X	X	X
Amanda Cooper	Ottawa County/Lakeshore Advantage	Vice President, Strategic Initiatives		X		X	
Amanda Price	Ottawa County	Treasurer		X			
Amy Irish-Brown	MSU Extension	Senior Extension Educator		X			
Amy Lunn	Third Reformed Church- Holland / City of Grand Rapids	Church Administrator		X			
Andrew Boatright	City of Zeeland	General Manager		X			
Annabelle Wilkinson	City of Grand Rapids	Environmental & Climate Justice Specialist		X	X	X	X
Becky Lehman	City of Holland / Ottawa County	Business Services Director		X			
Ben Cammenga	Kent County	Sheriff's Office	X				
Benjamin Swayze	Cascade Charter Township	Township Manager		X			
Bill Hordyk	City of Grand Rapids	Plans Examiner		X			
Billy O'Donnell	Higher Ed - GVSU	Emergency Manager		X			
Brennan Woell	Nunica- Crockery Township	Pastor		X			
Brian Bennett	City of Wyoming Fire Department	Fire Chief				X	
Brian Sipe	Grand Haven Township Fire & Rescue	Fire Chief		X			

Name	Community or Organization	Title/Department	Other	1 st Survey	1 st Workshop	2 nd Survey	2 nd Workshop
Chris Tinney	City of Holland	Captain of Fire Operations/Emergency Management Coordinator		X	X	X	X
Cort Beard	Ottawa County	Training Officer/SARTECH		X			
Cristy Rankin	Kent & Ottawa Counties	Emergency Preparedness Specialist		X			
Dale Bergman	Sparta Township	Township Supervisor		X			
Dan Carlton	Georgetown Township	Superintendent		X			
Darwin Baas	Kent County Department of Public Works	Director		X	X		
Datro Cartman Jr	Mercy Health Saint Mary's- City of Grand Rapids	Emergency Management Coordinator				X	
Dave Dahl	City of Hudsonville	Emergency Management Director		X		X	
Dave Datema	Tallmadge Township	Supervisor		X			
David Kiddle	Mercy Health St. Mary's- City of Grand Rapids	Director of Security and Emergency Preparedness		X			
David Lamer	Ottawa County	Ham Radio		X			
David Walters	Grand Haven Board of Light & Power	General Manager		X			
David Wierzbicki	Dept. of Environment, Great Lakes, and Energy	Incident Management Specialist		X		X	
Deb Alderink	Kent County LEPC, Fishbeck	CIH, RN. Occupational Safety & Health Manager, LEPC Chair		X		X	X
Doug Start	City of Grand Rapids	Director of IT	X				
Don Groeneveld	City of Ferrysburg	Custodian		X			
Earle Bares	North Ottawa County/Grand Haven	Airport Manager		X			
Ed Wirth	Ottawa County	Volunteer		X			
Efrain Lazaro	Ottawa County	Wolverine Pipeline - Niles Area Supervisor		X			
Eric Delong	City of Grand Rapids	Deputy City Manager	X				
Eric Dokter	Grand Rapids Fire Department	Fire Marshal				X	
Eric Payne	City of Grand Rapids Police Department	Chief of Police			X		X
Erin Moore	MSU Extension	District Director		X			

Name	Community or Organization	Title/Department	Other	1 st Survey	1 st Workshop	2 nd Survey	2 nd Workshop
Fitz Fitzgerald	Ottawa County	Erosion Control Engineer		X			
Frank Johnson	Robinson Township	Supervisor Robinson Township		X			
Franklin Force	Grattan Township	Supervisor		X			
Gary Greal	Park Township	Retired Program Manager		X			
Gail Olbrich	Ottawa County	Volunteer		X			
Gary Meerman	Chester Township	Supervisor		X		X	
Gary Reimer	City of Grand Rapids	Director		X			
Gary Secor	City of Grand Rapids	Court Administrator		X			
Greg Madura	Alpine Township	Supervisor		X	X		X
Heather Miller	University of Michigan Health - West	Safety Officer		X			
Helen Conklin	Chester Township	Clerk		X			
Howard Baumann	Port Sheldon Township	Supervisor		X		X	
Jake Sparks	Ottawa County	Captain		X			
James Junt	City of Grand Rapids	Director of Public Works	X				
Jason Kelley	Kent County Sheriff's Office	Lieutenant		X	X		X
Jason Poll	Ottawa County	Ottawa CERT Training Coordinator		X			
Jason Shamblin	Ottawa County	Director		X			
Jeffrey Hieb	US Coast Guard	Preparedness Specialist		X			
Jennifer Kimball James	Kent County	Deputy County Administrator		X	X		X
Jennifer Sorek	Ottawa County Department of Public Health	Emergency Preparedness Manager				X	X
Jerry J. Powell, PE	Vicinity Energy Grand Rapids, LLC	Operations Manager				X	
Jim Koetje	Southside Emergency of Holland/Park township	Security coordinator		X			
Jim Simmons	Ottawa County	Volunteer		X			
Joe Bush	Ottawa County Water Resources Commissioner's Office	Water Resources Commissioner			X		X
John Lehman	City of Grand Rapids	Fire Chief			X	X	X

Name	Community or Organization	Title/Department	Other	1 st Survey	1 st Workshop	2 nd Survey	2 nd Workshop
John Shay	Ottawa County	Deputy County Administrator		X			
Jon Kuyten	Holland Hospital-City of Holland	Safety/Regulatory Affairs Coordinator		X		X	
Jonathan Seyferth	City of Coopersville	City Manager		X			
Josiah Timmermans	Ottawa County Water Resources Commissioner's Office	Chief Deputy			X		X
Julius Suchy	Ada Township	Township Manager		X		X	
Justin Roebuck	Ottawa County	Ottawa County Clerk		X			
Karla Black	Kent County Health Department	Emergency Preparedness Coordinator		X	X	X	X
Keith Van Beek	City of Holland	City Manager		X			
Ken Krombeen	City of Grandville	City Manager		X			
Ken Yonker	Kent County	Kent County Drain Commissioner		X		X	X
Kevin Peters	Blendon Township	Supervisor		X			
Kim Lobert	Ottawa County	Ottawa County SkyWarn Coordinator		X			
Kim Triplett	Gaines Charter Township	Executive Secretary, Supervisors Office		X			
Kimberly Wojahn	City of Holland	Owner Dune Dogz		X			
Kristen Turkelson	City of Grand Rapids	Planning Director	X				
Kurt Reppart	City of Grand Rapids	1st Ward City Commissioner		X			
Kurtis Brown	County of Ottawa	Admin. Asst. - Finance		X			
Lance Corey	Kent County EMS	MCA Systems Administrator			X		X
Laura Dykstra	Ottawa County	Volunteer		X			
Laurie VanHaitsma	Jamestown Charter Township	Supervisor		X			
Leah DeLano	Ottawa County	Homeland Security Regional Planner		X			
Lee Fisher	Ottawa County	Prosecuting Attorney		X			
Lisa M Carr	Gerald R. Ford International Airport	Public Safety & Operations Director		X			
Lou Hunt	Ottawa County	Director of Emergency Management		X	X	X	X
Lynette Kemme	Spectrum Health Zeeland Community Hospital	Emergency Preparedness Specialist		X			
Lynne Doyle	Ottawa County	Executive Director		X			

Name	Community or Organization	Title/Department	Other	1 st Survey	1 st Workshop	2 nd Survey	2 nd Workshop
Marcie Ver Beek	County of Ottawa	HR Director		X			
Marie Anderson	Ottawa County	Unit Coordinator Ottawa County Medical Reserve Corps		X			
Mark Fleet	City of Grand Rapids	Building Official		X		X	
Mark Rambo	City of Kentwood	Deputy City Administrator			X		X
Matt Groesser	Kent County	Emergency Management Coordinator		X	X	X	X
Matt Woolford	Kent County	Equalization Director		X	X	X	X
Melissa Linderman	City of Holland Our Lady of the Lake Parish	Director of Administration		X			
Michael A. Morrow	Ottawa County	Technical Infrastructure Manager, Cybersecurity Role		X	X	X	X
Michael DeVries	Grand Rapids Township	Supervisor		X		X	
Michael Rohwer	Ottawa ISD schools	Asst. Superintendent, Ottawa Area ISD		X			
Michael Walsh	Ottawa County	Volunteer		X			
Mike Grenier	City of Grand Rapids	Environmental Services Department Manager		X			
Mike Lehnertz	Kent County Road Commission	Assistant District Foreman		X	X	X	X
Milinda Ysasi	City of Grand Rapids	City Commissioner		X			
Nancy Shane	City of Kentwood	Fire Department Executive Administrator				X	
Nick Roush	Holland Township	Maintenance Manager		X			
Oren J. Londo	City of Hudsonville	Staff Member		X			
Pat Staskiewicz	Ottawa County Road Commission	Public Utilities Director		X	X		X
Patricia Draper	Kent County/Kent County Health Department	Emergency Preparedness Specialist		X		X	
Paul Klimas	Ottawa County	IT Director		X			
Paul Sachs	Ottawa County	Director of Planning and Performance Improvement		X	X		X
Peter Elam	Plainfield Charter Township	Flood Plain Manager/Senior Planner		X		X	
Philip Van Huis	Ottawa County Emergency Communications	Emergency Coordinator (OCEC)		X			
Rebecca Hopp	City of Ferrysburg, Ottawa County	Mayor		X			

Name	Community or Organization	Title/Department	Other	1 st Survey	1 st Workshop	2 nd Survey	2 nd Workshop
Rich Szczepanek	Ottawa Medical Control Board Authority	EMS Systems Administrator		X			
Robert Roon	Ottawa County	Ottawa County emergency Management Volunteer		X			
Robert Tease	Ottawa Area Intermediate School District	Director of Safety and Security				X	
Robyn Afrik	Ottawa County	DEI Director		X			
Roger Bergman	Ottawa County	county commissioner		X			
Ronald Doll	Ottawa County	Volunteer		X			
Samuel Peterson	Oakfield Township Fire Department	Fire Chief		X	X		
Sandra Oudemolen	Ottawa County	Canteen Task Force Leader		X			
Sara Johnson	Ottawa County	Resource Manager		X			
Sarah Juist	Jenison-Georgetown Charter Township	Pastor		X			
Scott Gamby	Park Township	Fire Chief		X			
Scott Karcher	CSX Transportation	Manager of Hazardous Materials/CSX Police		X			
Scott Rifenberg	Grand Rapids Police Department	Deputy Chief				X	
Scott Siler	Charter Township of Caledonia	Fire Chief		X			
Sean Burns	Kent ISD / City of Grand Rapids	Kent ISD Safety/Security Coordinator		X		X	
Sebastian Swae	Ottawa County; MI Region 6	Volunteer		X			
Sheri Boon	Ottawa County	Nurse		X			
Sherri Vainavicz	Call 2-1-1, Heart of West Michigan United Way	Director of Programs & Services		X			
St. Paul's United Church of Christ	City of Grand Haven	Church Office		X			
Stacy Madden	Kent County	Emergency Preparedness Program Specialist		X			
Stacy Stout	City of Grand Rapids	Director of Equity and Engagement		X			
Stephanie Welch	Ottawa County	PA-C		X			
Steve Bulthuis	Holland Charter Township	Manager		X			
Steve Devlaemicnk	City of Grand Rapids	Assistant Building Official		X			

Name	Community or Organization	Title/Department	Other	1 st Survey	1 st Workshop	2 nd Survey	2 nd Workshop
Steve Grose	Jubilee Ministries, City of Holland	Executive Director		X			
Steve Prins	City of Grand Rapids	Facilities Maintenance Superintendent				X	
Susan Trainer	Oakfield Township	Township Clerk		X			
Tammy Smith	Ottawa County Central Dispatch Authority	Deputy Director of OCCDA		X			
Tedd Van Solkema	Life EMS Ambulance	Director of Operations		X			
Thomas Byle	Kent County Road Commission	Assistant Director of Engineering		X	X		X
Thomas Haveman	Ottawa County	Volunteer		X			
Thomas Oonk	Zeeland Charter Township	Supervisor				X	
Tim Burkman	City of Grand Rapids	Grand Rapids Engineer					X
Tim Jungel	City of Zeeland	Chief of Police		X			
Tim Klunder	City of Zeeland	City Manager		X			
Tom Oonk	Zeeland Charter Township	Supervisor		X			
Tom Ricksgers	OCcSAR OC CERT	OC volunteer		X			
Tom VandenBerg	City of Zeeland	Executive Pastor		X			
Tyler Wagenmaker	City of Hudsonville	Reverend		X			
Valerie Guttowsky	Ottawa County	Volunteer		X			
Wayne Jernberg	City of Grand Rapids	Water System Manager		X	X		X
William O'Donnell	Grand Valley State University	Sergeant - Emergency Management				X	
Windy Warren	Heart of West Michigan United Way	CERT Coordinator		X			
Yasemin Tulu	Ottawa County	Volunteer		X			

Table 3 presents the names and affiliations of individuals who provided feedback on the draft 2022 Regional HMP and additional information specific to FEMA-requested content.

Table 3: Municipal/Community Representatives Providing Feedback on the Draft HMP

Name	Community or Organization
Pam Potter	GVSU
Brett Little	Allendale
Nancy Shane	City of Kentwood Fire Department Executive Administrator
Christine Wistrom	Disability Network Lakeshore

Justin Stadt	City of Grandville
Sam Przy	City of Grand Rapids
Tori Graves	Great Lakes Shoreline
Mike Devries	Grand Rapids Charter Township
Karla Black	Kent County
Jennifer DeHaan	Plainfield Charter Township
Erin Moore	Michigan State University
Jennifer Sorek	Ottawa County Department of Public Health
Annabelle Wilkinson	City of Grand Rapids
Mike Womack	City Manager- Cedar Springs
Jeff Gritter	Supervisor, Byron Township

2. Hazard Mitigation Plan Process

The 2022 Regional HMP is designed to comply with the requirements of the [Disaster Mitigation Act of 2000](#), which states that local governments must have an approved Hazard Mitigation Plan in place to be eligible for pre-disaster mitigation funds after November 1, 2003, and post-disaster mitigation funds after November 1, 2004.¹ The 2022 Regional HMP is also designed to comply with guidance documents developed by the Federal Emergency Management Agency (FEMA), the Michigan State Police Emergency Management and Homeland Security Division (EMHSD), and other applicable federal and state laws. The hazard mitigation plan development process was accomplished by evaluating the impacts of known natural, technological, and human hazards, identifying significant hazards, identifying, and prioritizing mitigation options.

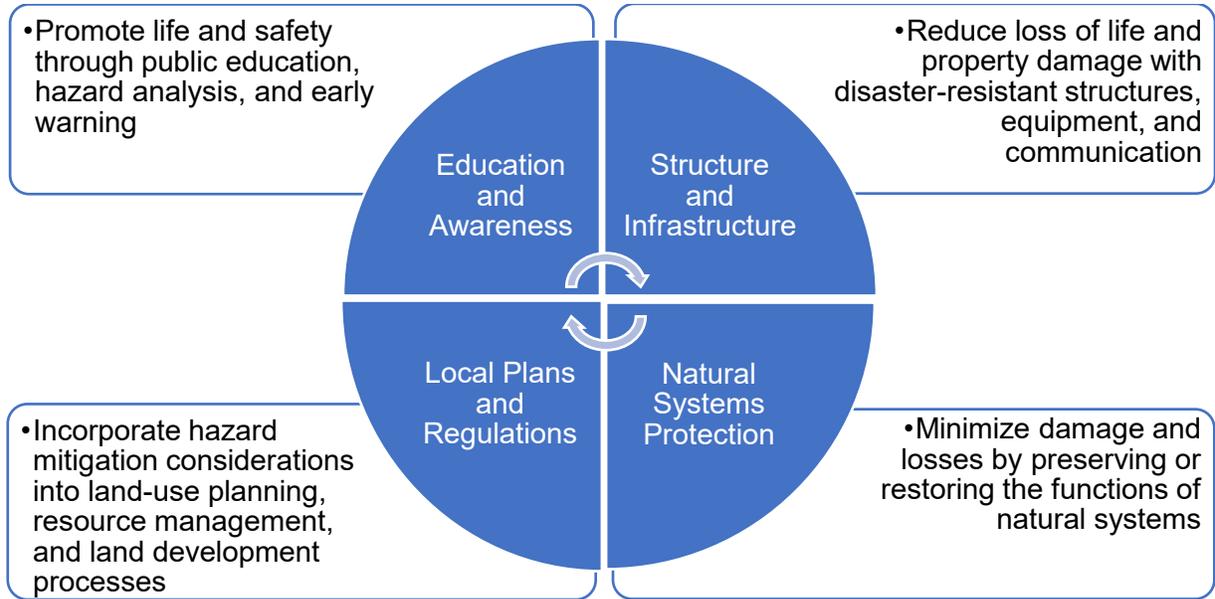
A total of 33 hazards were evaluated during the planning process, listed below. Hazard definitions are included in Section 5.

 Natural	 Technological	 Human
Drought	Fires – Scrap Tire, Structural,	Civil Disturbance
Earthquakes	Flooding – Dam Failure, Urban	Criminal Acts- Vandalism, Arson
Extreme Temperatures- Heat, Cold	Hazmat Incidents – Fixed Site, Transportation, Wellhead/ Pipeline	Public Health Emergencies
Fires- Wildfire	Infrastructure Failure –	Transportation Accidents
Flooding- Riverine, Shoreline	Electrical Systems, Water System, Stormwater system, Sewer System, Communications	Terrorism and Active Assailants
Subsidence and Landslides	Nuclear Power Plant	Weapons of Mass Destruction
Thunderstorms- Hail, Lightning, High Wind		
Tornadoes		
Winter Hazards		

¹ Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165), 44 CFR (Code of Federal Regulations) Part 201

2.1 Plan Goals and Objectives

The goal of the 2022 Regional HMP is to reduce the impact of hazards on life, health, and economic well-being based on a continuing hazard risk and vulnerability analysis through the following four general objectives.



2.1.1 Focus on Equity

According to FEMA, equity is the consistent and systematic fair, just and impartial treatment of all individuals. Underserved populations/communities have limited or no access to resources or are otherwise disenfranchised. These groups may include people who are socioeconomically disadvantaged, people with limited English proficiency, geographically isolated or educationally disadvantaged people, people of color as well as those of ethnic and national origin minorities, women and children, individuals with disabilities and others with access and functional needs, and seniors.² With these factors in mind, the framework for addressing equity through the 2022 hazard mitigation planning process had the following three components.

Planning and Outreach	Hazard Analysis	Mitigation Actions
<ul style="list-style-type: none"> • Include community-based leaders in plan development and review • Promote diverse community participation through public meetings, multiple communications channels, and interpretation services 	<ul style="list-style-type: none"> • Analyze social vulnerability indicators • Identify high concentration areas of underserved populations and community members • Measure cost of risks and hazards beyond property value, which undervalues the impact of asset loss 	<ul style="list-style-type: none"> • Identify actions that mitigate disparities (e.g. language and evacuation barriers) • Identify actions that address the whole community

² Glossary Section: NDRF - National Disaster Recovery Framework

2.2 Planning Process

To meet federal, state, and local requirements for hazard mitigation and FEMA grant funding, the 2022 Regional HMP provides a basis for identifying and managing the impact of natural, technological, and human hazards. Plan preparation involved the completion of the following tasks:

- Identify hazards and risks
- Develop a hazard history
- Develop a community profile
- Assess vulnerabilities
- Define community goals and objectives
- Identify and prioritize hazard strategies
- Develop Action Plans for a select list of mitigation strategies
- Prepare a draft Hazard Mitigation Plan for county, municipal, and public review
- Solicit county, municipal, and public feedback
- Prepare a final Hazard Mitigation Plan
- Provide community outreach and communication
- Document the planning process
- Adopt the final Hazard Mitigation Plan

Kent County, Ottawa County, and the City of Grand Rapids contracted ASTI Environmental, Inc. (ASTI) of Grand Rapids, Michigan to facilitate the hazard mitigation planning process and prepare this updated Regional Hazard Mitigation Plan.

Planning Approach

The Advisory Committee participated in two workshops and three surveys to identify hazards and applicable mitigation strategies. Details on these surveys and workshops can found in Section 2.4.1.

The first survey focused on identifying hazards and ranking the identified set of hazards in regard to impact. A follow-up survey determined the level of concern and perceived likelihood of each hazard as it relates to the following ranking criteria. A third survey was provided to the Advisory Committee to review and update the mitigation strategies outlined in the 2017 HMP and also provided an opportunity to suggest new mitigation strategies.

The workshops included individual and group-wide discussions and evaluations on the historical, current, and future impacts of these hazards. Through a combination of ranking exercises, polls, and discussions, workshop participants identified goals, objectives, identified top hazards and developed mitigation actions.

2.2.1 Existing Plans and Programs

A Hazard Mitigation Plan is only one part of the emergency management process. The 2022 Regional HMP does not replace existing plans or programs but serves as a reference for hazard mitigation in planning and program development. It is important to coordinate plan preparation with existing local emergency plans, programs, procedures, and organizations established by the represented communities and jurisdictions, as well as federal plans and programs. Examples include comprehensive plans, capital improvement plans, transportation plans, emergency

operations plan, zoning ordinances, and building codes. A list of existing local authorities and resources can be found in Appendix E.

In developing the 2022 Regional HMP, hazard mitigation goals and objectives within the 2017 HMP were reviewed and updated. The following Federal and State documents and databases were used to develop the 2022 Regional HMP:

- Michigan Department of State Police Emergency Management Division, Michigan Hazard Analysis, April 2019
- U.S. Census Bureau, Profile of General Demographic Characteristics: 2020 Kent and Ottawa Counties, Michigan
- FEMA National Flood Insurance Program Community Status Book, updated January 5, 2022
- FEMA National Risk Index: Kent and Ottawa County 2021
- NOAA Storm Events Database 2021

Hazard mitigation assistance programs provide funding for eligible mitigation measures that reduce disaster losses. A review of these programs helped direct mitigation focus. Existing federal resources include the following.

Hazard Mitigation Grant Program

This program provides funding to state, local, tribal, and territorial governments so they can develop hazard mitigation plans and rebuild in a way that reduces, or mitigates, future disaster losses in their communities. When requested by an authorized representative, this grant funding is available after a presidentially declared disaster. All state, local, tribal, and territorial governments must develop and adopt hazard mitigation plans to receive funding for their hazard mitigation projects.

Pre-Disaster Mitigation Grant Program

This program makes federal funds available to state, local, tribal, and territorial governments to plan for and implement sustainable cost-effective measures designed to reduce the risk to individuals and property from future natural hazards, while also reducing reliance on federal funding from future disasters. The program is authorized by Section 203 of the Stafford Act.

Building Resilient Infrastructure and Communities Program

This program aims to categorically shift the federal focus away from reactive disaster spending and toward research-supported, proactive investment in community resilience. Examples of BRIC projects are ones that demonstrate innovative approaches to partnerships, such as shared funding mechanisms, and/or project design. Through BRIC, FEMA continues to invest in a variety of mitigation activities with an added focus on infrastructure projects and Community Lifelines.

Rehabilitation of High Hazard Potential Dams Grant

This award provides technical, planning, design, and construction assistance in the form of grants for rehabilitation of eligible high hazard potential dams. A state or territory with an enacted dam safety program, the State Administrative Agency, or an equivalent state agency, is eligible for the grant.

2.2.2 Implementation

Successful implementation of the 2022 Regional HMP requires the plan to fit within, and be consistent with, other goals, objectives, and programs of Kent County, Ottawa County, and the City of Grand Rapids’ governments. Identified goals, objectives, mission statements, and other guiding principles of relevant agencies were reviewed as part of the planning process. The hazard mitigation planning processes are not intended to replace any other City or County planning effort but should be considered in future City/County-wide planning.

The three Emergency Management offices served as the leads for developing and implementing the Hazard Mitigation Plan. The 2022 Regional HMP is consistent with the proposed plan update goals of the City of Grand Rapids and Kent and Ottawa Counties’ Emergency Management departments.

2.3 Participation in Plan Development

The 2022 Regional HMP planning process was structured around discussions and feedback from Kent County, Ottawa County, and the City of Grand Rapids officials. The following fifty-nine (59) jurisdictions are included in this 2022 Regional HMP. Each jurisdiction was asked to provide feedback, however 26 of the 59 jurisdictions failed to actively participate. Bolded jurisdictions were represented by an active participant(s) during this process.

<u>Kent County</u>	City of Lowell	Crockery Township
Ada Township	Lowell Township	City of Ferrysburg
Algoma Township	Nelson Township	Georgetown Township
Alpine Township	Oakfield Township	City of Grand Haven
Bowne Township	Plainfield Township	Grand Haven Township
Byron Township	City of Rockford	City of Holland
Caledonia Township	Village of Sand Lake	Holland Township
Village of Caledonia	Solon Township	City of Hudsonville
Cannon Township	Sparta Township	Jamestown Township
Cascade Township	Village of Sparta	Olive Township
Village of Casnovia	Spencer Township	Park Township
City of Cedar Springs	Tyrone Township	Polkton Township
Courtland Township	Vergennes Township	Port Sheldon Township
City of East Grand Rapids	City of Walker	Robinson Township
Gaines Township	City of Wyoming	Spring Lake Township
City of Grand Rapids		Village of Spring Lake
Grand Rapids Township	<u>Ottawa County</u>	Tallmadge Township
City of Grandville	Allendale Township/GVSU	Wright Township
Grattan Township	Blendon Township	City of Zeeland
Village of Kent City	Chester Township	Zeeland Township
City of Kentwood	City of Coopersville	

Neighboring community municipal officials, affected stakeholders, including local and regional agencies involved in hazard mitigation activities and land use/regional planning, and the general public were also invited to participate in the planning process. The mechanisms for outreach and input are listed below.

- A project website was developed to provide a summary of the planning process, development schedule, and relevant background materials.
- A flier was designed to provide a visual depicting the planning process to the Advisory Committee, municipal officials, and the general public.
- Online surveys were provided to the Advisory Committee and appropriate stakeholders.
- Two workshops were conducted to identify and prioritize hazards, develop hazard mitigation strategies, and develop Action Plans.
- Each jurisdiction (Kent County, Ottawa County, and the City of Grand Rapids) hosted a virtual public meeting.
- Copies of the draft plan were distributed to all Advisory Committee members and community representatives and were available for public review on the project web site and local libraries.

Copies of public outreach materials describing the planning process and soliciting participation in the development of the 2022 Regional HMP are provided in Appendix A.

2.3.1 Jurisdiction Participation

The three Emergency Management offices provided contract administration, coordinated the participation on the Advisory Committee, dedicated staff time, and coordinated Geographic Information Systems (GIS) data. All jurisdictions within Kent and Ottawa Counties are continuing participants.

2.3.2 Advisory Committee

Kent County, Ottawa County, and the City of Grand Rapids were each asked to identify 10 people to participate in the Advisory Committee. The Advisory Committee consisted of individuals with relevant expertise and community-based leaders who served as the primary group to provide input throughout the planning process. The Advisory Committee participated in hazard identification, risk assessment, evaluation of mitigation strategies, and the development of Action Plans. The list of Advisory Committee representatives is found in Table 2.

2.3.3 Community Representatives

Additional, appropriate stakeholders were asked to contribute to the process by participating in the first survey, which focused on hazards, vulnerabilities, and potential mitigation options. Community representatives were kept informed of plan development progress through the project website, Advisory Committee meeting minutes, surveys, and the public meetings. The list of stakeholder representatives is found in Table 2.

2.3.4 Public Outreach

Three virtual public meetings were held in February 2022 to provide an opportunity for the public to be informed of what the 2022 Regional HMP is, provide feedback, and to understand the importance of the plan. Public feedback was recorded and discussed by the three Emergency Management offices. All concerns and comments relevant to the 2022 Regional HMP were incorporated into the Plan. Section 2.4.3 provides further details of these public meetings.

2.3.5 Neighboring Communities

Neighboring communities were invited to attend all public meetings. Adjoining county representatives, including, Muskegon, Allegan, Barry, Ionia, Montcalm, and Newaygo were asked to review the draft 2022 Regional HMP. A copy of this email can be found in Appendix A.

2.4 Plan Development Activities

2.4.1 Surveys and Workshops

Three digital surveys and two virtual workshops provided an opportunity for the Advisory Committee members and community representatives to provide input on a variety of questions. A copy of all survey and workshop documents is located in Appendix B.

First Survey

The first survey's objective was to identify the most significant hazards out of 33 Hazards categorized as either natural, technological, or human-caused hazards. The survey was open from March 17 to April 6, 2021, with the participation of 139 community representatives and Advisory Committee members, who represent at least 13 community departments or organizations, and 35 municipalities.

The criteria used to prioritize these hazards ranged from Not Important to Very Important. Importance was determined through an evaluation of the impacts the hazard has on the community, economy, and the environment. The following 12 hazards were selected for further review and analysis:

Table 4: First Survey Results

2021 Survey Rank	% VI or Important
Public Health Emergencies (Pan, Epi, Con F&W)	90.1
Infrastructure Failure (Electric, Gas/Oil, Pipeline)	90.0
Infrastructure Failure (Water)	89.9
Infrastructure Failure (Communications)	89.8
Flooding [& Erosion] (Riverine/Shoreline)	87.6
Winter Weather (Snow, Ice, Sleet)	87.5
Cyber Security Intrusion	87.5
Severe Thunderstorms (Hail, Lightning, High Winds)	85.0
Infrastructure Failure (Bridges, Roads, Structures)	84.0
Supply Chain Disruption (Gas/Oil, PPE, etc.)	82.9
Criminal Acts (Mass Shootings/Active Assailant)	81.4
Infrastructure Failure (Sanitary/Storm Sewers)	79.8

First Workshop – Hazard and Risk Analysis

The objective of the first workshop was to identify and analyze the most critical hazards and vulnerabilities within Kent County, Ottawa County, and the City of Grand Rapids. The first workshop was conducted on April 19, 2021, with the participation of 32 Advisory Committee members, who represent 23 community departments or organizations, and seven (7) municipalities. This meeting oriented and familiarized the Advisory Committee members with the purpose and planning process for updating the Regional Hazard Mitigation Plan. To determine high risk hazards' impacts on critical infrastructure and vulnerable areas, a risk and vulnerability assessment was conducted. The Advisory Committee then prioritized the identified hazards.

The first task of the meeting involved reviewing the function of the mitigation process. During discussions, workshop participants recommended several existing plans for sustainability, climate change efforts, and goals to ensure hazard mitigation strategies address concerns surrounding equity. Results from the first survey were presented during the workshop where Advisory Committee members discussed the importance of each hazard and the impacts these hazards have on their respective communities. The Advisory Committee indicated the following categories as top assets in the region:



The Advisory Committee was asked to select and weigh criteria to further analyze the top 12 hazards. The following questions were utilized in the workshop:

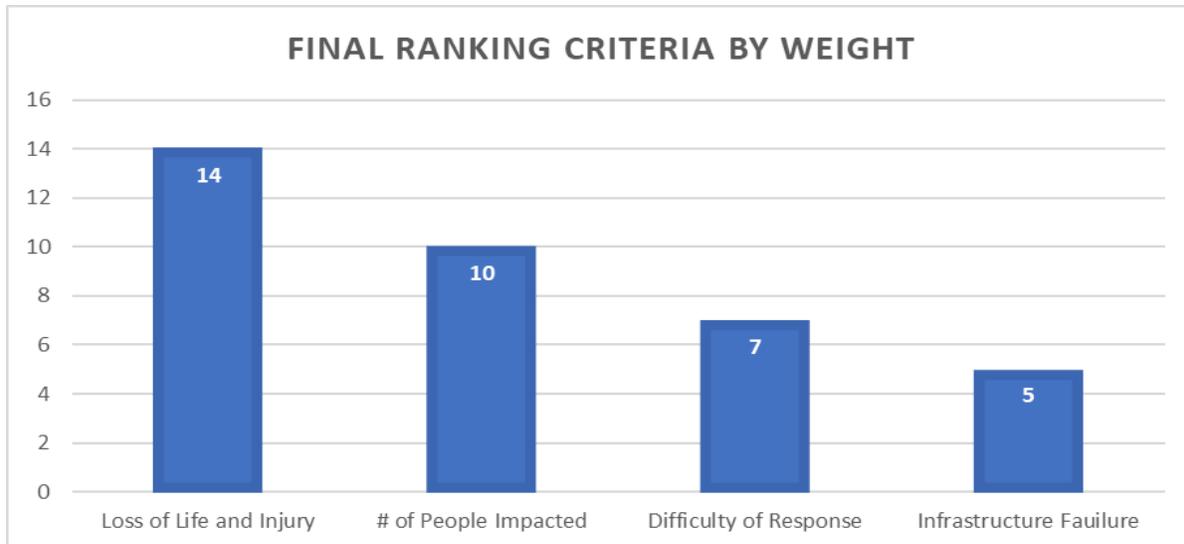
- What are the top priorities for the community when considering hazard mitigation?
- What do community leaders represent as important?
- What are the top priorities for emergency response agencies when considering hazard impacts?
- What are the top challenges facing the County when a hazard occurs?

Using a paired comparison methodology, the Advisory Committee agreed to use the following criteria to evaluate the 12 hazards:

Table 5: First Workshop Results

	Response & Recovery Difficulty	Infrastructure Failure	Loss of Life and Injury	# of People Impacted	Sum
Response & Recovery Difficulty		4	1	2	7
Infrastructure Failure	2		1	2	5
Loss of Life and Injury	5	5		4	14
# of People Impacted	4	4	2		10

With respect to the criterion, the importance of one item to the other is:
 5 = much greater 4 = greater than 3 = the same as 2 = lower than 1 = much lower



Second (follow-up) Survey

The first Advisory Committee workshop required a follow-up survey to review and prioritize the hazards discussed. The respondents were asked to rank their level of concern/perceived likelihood of each hazard as it relates to the four criteria. The respondents were also asked to select hazard events that can disproportionately affect those of low-income, people of color, and those with access and functional needs. The following events were considered to have the most disproportionate effects (ranked from highest to lowest):

1. Extreme Temperatures
2. Public Health Emergencies
3. Civil Unrest
4. Infrastructure Failure
5. Winter Weather

A total of 33 natural, technological, and human hazards were identified and evaluated during the planning process using a combination of surveys, workshops, recent events, the FEMA National Risk Index, and the 2019 Michigan Hazard Mitigation Plan. Below in Table 6, the top 15 hazards for the region are ranked.

Table 6: Hazard Ranking Summary

Event	Survey Rank	Workshop Rank	State Hazard Rank	National Risk Rank	Overall
Public Health Emergencies (Pan, Epi, Con F&W)	1	1	2	10	14
Flooding & Erosion (Riverine/Shoreline)	4	8	1	6	19
Infrastructure Failure (Electric, Gas/Oil, Pipeline, Water,	2	2	8	10	22
Severe Summer Weather (Hail, Lightning, High Winds)	7	8	6	3	24
Supply Chain Disruption (Gas/Oil, PPE, etc.)	8	4	3	10	25
Infrastructure Failure (Communications & Internet)	3	6	8	10	27
Extreme Temperature (Hot/Cold)	10	8	9	1	28
Winter Weather (Snow, Ice, Sleet)	5	8	14	2	29
Tornadoes	10	8	7	4	29
Major Fires	10	9	4	9	32
Invasive Species	10	8	5	10	33
Cyber Security Intrusion	6	7	10	10	33
Criminal Acts (Mass Shootings/Active Assailant)	9	3	14	10	36
Landslide	10	8	14	5	37
Civil Unrest	10	5	14	10	39

1= Ranked as the most important hazard in the category Overall= Final ranking score with the lowest score ranked as most important

Third Survey

A third survey was developed for the Advisory Committee to focus on the Action Plans detailed in the 2017 HMP. The 2017 HMP noted 12 regional Action Plans, 11 Kent County Actions Plans, 10 Ottawa County Action Plans, six City of Grand Rapids Action Plans, and multiple Action Plans for each jurisdiction. The survey was open from July 28 to September 20, 2021, with the participation of 34 Advisory Committee members.

Members were asked to evaluate possible hazard mitigation strategies. Additional space was provided for each hazard so that participants could suggest mitigation strategies. Mitigation strategies presented in the survey were developed from the first Advisory Committee meeting, the 2017 Plan, as well as from lists of potential mitigation strategies developed by other communities undertaking hazard mitigation planning in Michigan and elsewhere. The survey listed eight or more mitigation strategies for each hazard, for a total of 215 strategies. 36 individuals completed the survey prior to the second workshop.

The Advisory Committee was also asked to indicate the top assets that are the most vulnerable in their community and community participation in the National Flood Insurance Program (NFIP). Those who were not participants were asked to provide their reasons for not participating. The feedback is provided in Appendix B.

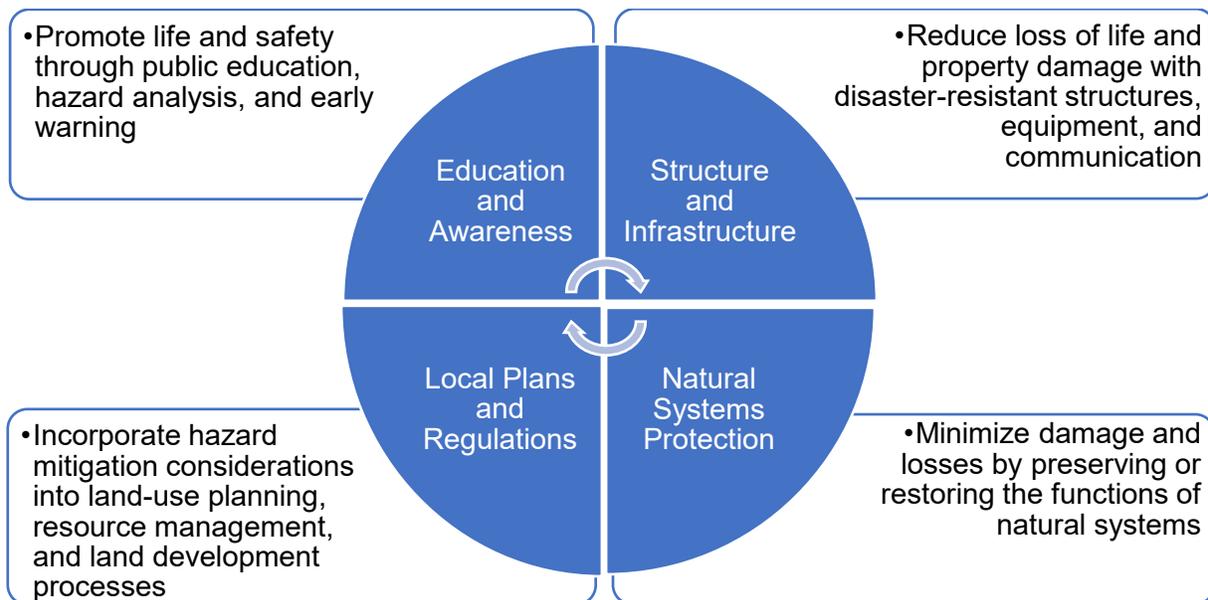
Second Workshop – Mitigation Strategies

The second workshop's objective focused on (1) identifying, evaluating, and prioritizing hazard mitigation alternatives for the key hazards and critical assets, (2) developing mitigation goals and objectives, (3) developing evaluation criteria to select mitigation strategies, and (4) identifying mitigation strategies to develop additional Action Plans for the 2022 Regional HMP. The workshop was on September 23, 2021, with the participation of 28 Advisory Committee members. The following four hazards were determined to be the focus of the 2022 Regional HMP:



These four hazards represent both county-wide and local community concerns. Prioritization of these hazards does not reduce the significance of any of the hazards evaluated, but it provides a method for the represented communities to focus mitigation activities and resources.

The Advisory Committee agreed to use the goal from the 2017 Plan. The four objectives below were determined based on the four types of FEMA suggested mitigation actions.



2.4.2 Mitigation Strategies and Actions

A mitigation action is a specific action, project, activity, or process taken to reduce or eliminate long-term risk from hazards and their impacts on people and property. Implementing mitigation actions helps achieve the plan’s mission and goals. The actions aim to reduce vulnerability to threats and hazards from the plan’s core and are a key outcome of the planning process. The actions presented in this 2022 Regional HMP were selected from a list of options during the second workshop (Appendix B) and prioritized by the Advisory Committee according to the following criteria:

- The project addresses more than one hazard.
- The project is cost-effective based on physical damages prevented.
- The project completely or substantially reduces the risk of future damage, hardship, loss, or suffering.
- The project is technically feasible and demonstrates sound hazard mitigation techniques.

- The project promotes nature-based solutions and will not create adverse environmental effects.
- The project takes a Whole Community approach to hazard mitigation, which involves and supports historically underserved populations in the planning and decision-making processes.

The twelve mitigation strategies below were selected to develop into final regional Action Plans and further detailed in Section 6.2.

Objective #1 – Education and awareness

Action 1.1: Utilize various mechanisms to communicate credible and actionable information to the public. (All Hazards)

Action 1.2: Educate and train local businesses, community organizations, and the general public in mitigation, preparedness, response, and recovery actions. (All Hazards)

Action 1.3: Develop education and notification strategies for communicating with non-English speakers, and those with disabilities and access and functional needs. (All Hazards)

Action 1.4: Improve coordination and collaboration for public health crises between cities, counties, health departments, service providers, hospitals/clinics/doctors, pharmacies, and the general public. (Public Health Emergencies)

Action 1.5: Evaluate and improve early warning emergency notifications, emphasizing digital methods of outreach. (All Hazards)

Objective #2 – Structure and Infrastructure

Action 2.1: Ensure communication systems are resilient, interoperable, and employ redundancies. (Infrastructure Failure)

Action 2.2: Identify critical infrastructure vulnerabilities and ensure security is adequate. (Infrastructure Failure)

Action 2.3: Maintain power infrastructure, backup systems, and generators for critical infrastructures. (Infrastructure Failure)

Action 2.4: Develop engineering controls to promote floodwater diversion. (Flooding and Erosion)

Objective #3 – Natural systems Protection

Action 3.1: Develop ecological controls to promote floodwater diversion. (Flooding and Erosion)

Action 3.2: Prioritize green spaces in areas that are most vulnerable to heat island effects and severe weather impacts. (Severe Weather)

Objective #4 – Local Plans and Regulations

Action 4.1: Develop policies regarding at-risk properties for flooding and erosion. (Flooding and Erosion)

The Action Plan lays the groundwork for implementation by describing how the mitigation plan will be incorporated into existing planning mechanisms and how each jurisdiction will prioritize, implement, and administer the mitigation actions. In a multi-jurisdictional plan, each jurisdiction must have an Action Plan specific to that jurisdiction and its vulnerabilities. The Jurisdictional Action Plans are further detailed in Section 6.3 and included in Appendix H.

2.4.3 Public Meetings

A virtual public meeting was held separately for Kent County, Ottawa County, and the City of Grand Rapids. Due to the impacts of the COVID-19 pandemic, the virtual meeting format provided a safe environment for the public to learn about the updated Regional Hazard Mitigation Plan and to provide feedback. In coordination with the Communication Departments of the three jurisdictions, public meetings were promoted through the project website, press releases, social media posts, and through the advocacy of the Advisory Committee. Translation services were provided during the City of Grand Rapids public meeting. Each meeting began at 6:30pm and lasted approximately one hour.



Following the public meeting, the community was asked to provide feedback on the HMP via email, social media, and or the HMP website. Copies of public meeting materials and feedback can be found in Appendix A and Appendix G. All comments were considered and the plan was updated accordingly. Some feedback addressed equity and under-served populations. In response, the plan was given a larger focus on vulnerable populations and equitable hazard mitigation.

2.5 Plan Adoption

Before a jurisdiction can formally adopt and use the Hazard Mitigation Plan, FEMA shall approve the plan. The Office of Emergency Management for each Kent County, Ottawa County and the City of Grand Rapids were provided a draft of the 2022 Regional HMP in January 2022. After the initial review, ASTI updated the plan in preparation for the public meetings. To ensure attendees of each public meeting were able to access the full plan, a redacted copy of the plan was available on the project website. ASTI then incorporated all feedback to develop the final 2022 Regional Hazard Mitigation Plan before submitting to the State Hazard Mitigation Officers (SHMO).

A summary of the plan approval process is outlined in Table 7. The jurisdictional adoption dates for the plan can be found in Appendix C along with a copy of each resolution formalizing these adoptions.

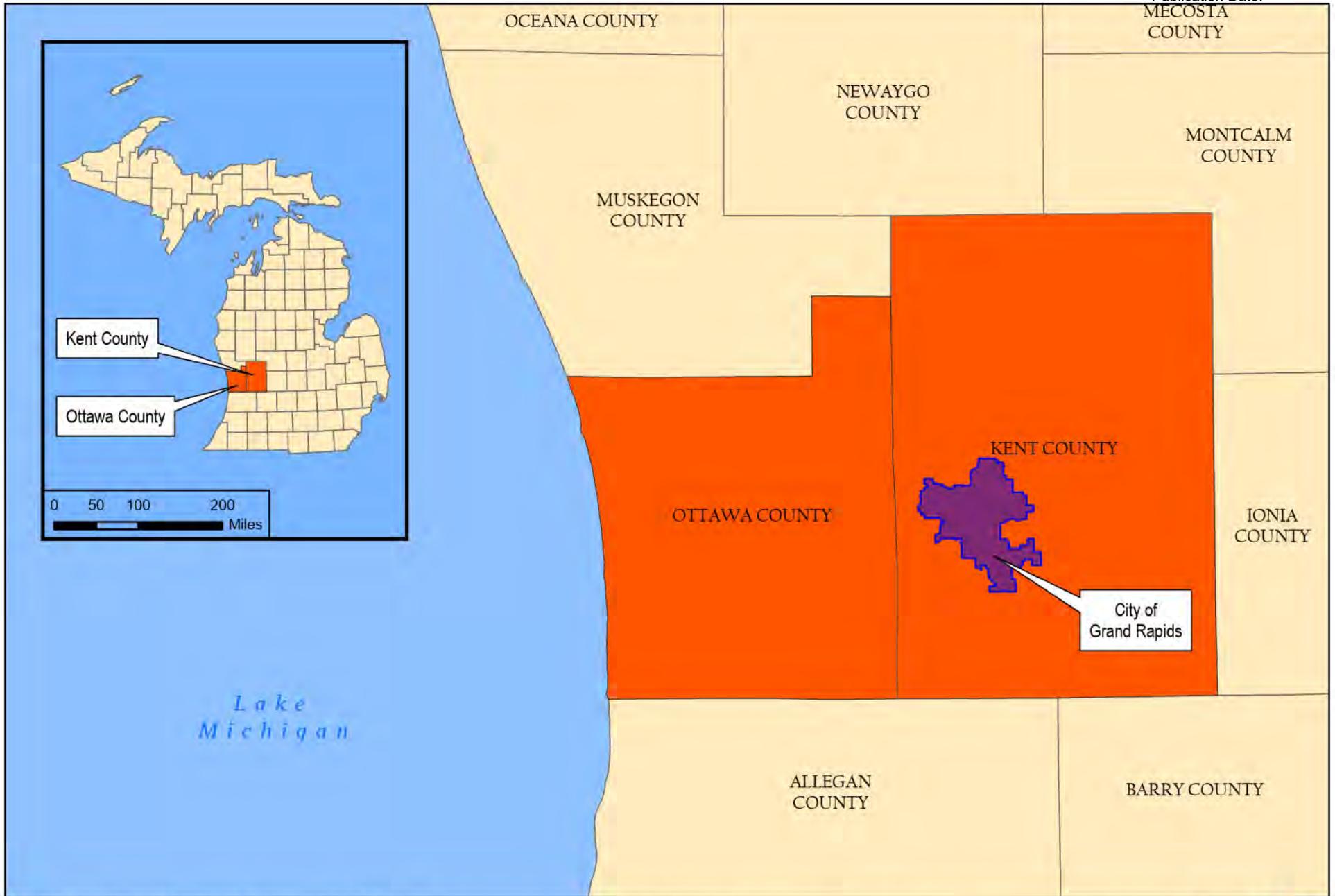
Table 7: Plan Approval Process

Step	Date
Submit plan to SHMO for state review	February 7, 2022
Receive feedback	June 15, 2022
State submits plan to FEMA for review	October 6, 2022
Receive feedback	November 16, 2022
Resubmit to FEMA for review	December 9, 2022
FEMA issues "approvable pending adoption"	
Local jurisdictions adopt plan and submit resolutions	
FEMA issues approval letter and final plan review tool	

FEMA and the Michigan Emergency Management and Homeland Security Division require all multi-jurisdictional plans be adopted either in whole or in part, by individual municipalities within the planning area. Municipal officials were informed of this requirement, and a sample resolution of adoption was provided to each community with the announcement of the 2022 Regional HMP. Information regarding local hazard priorities and mitigation strategies is included in separate subsections so that each community may readily reference and adopt sections specific to their municipality. In accordance with these approvals, the 2022 Regional HMP was presented to the appropriate elected bodies.

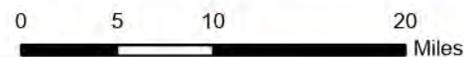
2.6 Plan Maintenance

In a coordinated manner, the Office of Emergency Management for each Kent County, Ottawa County, and the City of Grand Rapids will manage the updates to the 2022 Regional HMP on an annual basis. The 2022 Regional HMP will be reviewed, updated, and revised every five years to maintain compliance with the Hazard Mitigation Plan requirements from FEMA and the Michigan EMHSD. Both Kent and Ottawa County provide news, updates, and contact information for the 2022 Regional HMP on their County websites. Social media may also be used to connect with the public. Plan maintenance is further detailed in Section 7.



Kent County, Ottawa County, & City of Grand Rapids 2022 Regional Hazard Mitigation Plan

Kent County & Ottawa County, MI



3. Regional Profile

3.1 Historical Overview

The Grand River runs through Kent County, Ottawa County, and the City of Grand Rapids and empties into Lake Michigan at Grand Haven. On the west bank are Hopewell Indian Burial Mounds containing the remains of Indigenous people, including religious leaders, who often were buried with special objects of great spiritual significance. The river valley was an important center for the fur trade in the early 19th century. After the War of 1812, Rix Robinson and Louis Campau were the earliest traders in the area.

In 1826, Louis Campau established a trading post in what is today the City of Grand Rapids. In 1831, he bought land and platted the town. Campau is considered the town's "father." One year later, government surveyor Lucius Lyon purchased land north of Campau's property. Campau surveyed and platted the village following Native American trails. Lyon platted his property in an English grid format, which meant two adjoining villages had different platting formats. Campau later merged the villages under the name of Grand Rapids.

Kent County was established in 1836 and named after the New York jurist and legal scholar James Kent, who represented the Michigan Territory in its dispute with Ohio over the Toledo Strip. Kent County is the manufacturing center of West Michigan, with the Steelcase Corporation based in the county. It is also the home of the Frederik Meijer Gardens, a significant cultural landmark of the Midwest. The Gerald R. Ford International Airport is located on the southeast side of the City of Grand Rapids.

Ottawa County was established in 1837 and named after the Native American Ottawa people whom the area has historically been home to. Today the county has a large number of seasonal residents in the summer with many lakefront homes and cottages that serve as summer vacation properties for residents of the City of Grand Rapids, Detroit, and Chicago.

The City of Grand Rapids was incorporated as Kent County's first village in 1838 and was established as the City of Grand Rapids in May of 1850. The city's early industries included gypsum mining and logging. Today, the City of Grand Rapids is the economic and cultural hub of West Michigan and is one of the fastest-growing cities in the Midwest.

3.2 Geography and Climate

Kent County, Ottawa County, and the City of are located in West Michigan, north of Allegan and Barry Counties, east of Ionia and Montcalm Counties, and south of Muskegon and Newaygo Counties (Figure 1).

According to the U.S. Census Bureau, Kent County has a total area of 872 square miles, including the 45 square miles that make up the City of Grand Rapids. Ottawa County has a land area of 563 square miles, with a total area of 1,631 square miles including areas of Lake Michigan.

The region has a predominantly humid continental climate, with hot and humid summers, cold and snowy winters, and quick but mild fall and spring seasons. Summers are moderately warm, and heat waves are not uncommon. With Lake Michigan to the west, the lake effect on the area is strong, contributing to increasing cloudiness and snowfall, and moderate temperatures.

Tables 8 and 9 provide average monthly weather conditions for Kent and Ottawa Counties in 2020.

Table 8: Kent County Temperature and Precipitation Averages

Month	Average Daily Temperature (F°)	Average Precipitation (inches)
January	29.9	3.46
February	26.6	0.94
March	37.9	3.19
April	43.3	3.88
May	55.6	4.77
June	68.1	3.02
July	74.4	3.29
August	70.5	2.89
September	60.1	2.78
October	46.7	3.18
November	43.5	2.23
December	31.3	2.61
Annual Total	-	36.24

Table 9: Ottawa County Temperature and Precipitation Averages

Month	Average Daily Temperature (F°)	Average Precipitation (inches)
January	32.2	3.06
February	44.5	0.88
March	47.9	3.12
April	60.9	3.81
May	70.8	4.95
June	74.7	3.48
July	68.6	2.85
August	55.9	2.39
September	43.6	2.75
October	38.2	3.57
November	27.9	2.05
December	31	2.54
Annual Total	-	35.45

Source: www.ncdc.NOAA.gov and NWA, 2020.

Ottawa County has 24 miles of Lake Michigan shoreline which influences the climate significantly. In comparison to areas across the lake or further inland, temperatures above 90°F in the summer and below zero in the winter occur infrequently, rarely more than three or four times per season. The average annual snowfall measures 65 inches and increases to nearly 80 inches in the snow belt extending along the lake shore.³

3.2.1 Climate Change⁴

Climate change is a long-term change in the average weather patterns that have come to define Earth's local, regional, and global climates.⁵ The Great Lakes region can expect more variable and volatile weather from year to year and from season to season in the future. This trend could lead to more extreme weather events, such as storms that produce more than one inch of rain in 24 hours, increased frequency of consecutive days above 90°F and 90% humidity, and more freeze-thaw cycles in winter and spring.

Temperatures

The current annual average temperature for the Grand Rapids area is 47.3°F. This average temperature has decreased by 0.2°F from 1951 to 2017. Average temperatures in the Grand Rapids area are projected to increase by almost 4.0°F by 2050. This increase in annual average temperature is assuming there is a continuation of the current climate change impacts.

Extreme Heat

The Grand Rapids area averages highs of 81°F in the summer. Temperatures above 90 degrees are common with an average of nine days a year. Grand Rapids is projected to see an increase of 12 to 30 days per year of over 90°F days by 2050 and an increase of 29 to 64 days per year over 90°F days by the end of the century. Additionally, models suggest an increase of 3 - 12 days of over 95°F days by 2050.⁶

In the future, higher temperatures could lead to additional heat waves, especially since air stagnation events are projected to increase. There is greater certainty that summer nighttime low temperatures will continue to increase, making it more difficult to cool off at night during extended heat events. In addition, any periods of future drought will also contribute to extreme heat.

Extreme Cold

The Grand Rapids region experiences, on average, 152 days per year of below freezing (32°F) temperatures. Historical records show the average number of days below freezing has continuously decreased over time. It is common for the Grand Rapids region to experience temperatures at or below 10°F during the winter.

Average Precipitation

Between 1951 and 2017, the annual precipitation in the Grand Rapids area has increased by 16% (5.3"). This was observed in all four seasons, with the highest increase of 35.8% (3.1") observed

³ <https://www.miottawa.org/Parks/pdf/plan/section2.pdf>

⁴ Grand Rapids Climate Resiliency Report
[grand-rapids-climate-resiliency-report-master-web.pdf](#) (wmeac.org)

⁵ Overview: Weather, Global Warming and Climate Change

Global Warming vs. Climate Change | Resources – Climate Change: Vital Signs of the Planet (nasa.gov)

⁶ Grand Rapids, MI Historical and Future Climate Information
[WMSBF_FactSheet_GLISA.pdf](#) (umich.edu)

during the spring. The average annual precipitation in the Grand Rapids area is projected to increase by an additional three inches by 2050 and by seven inches by 2100.

Heavy Precipitation

According to the Great Lakes Integrated Sciences Assessments Program (GLISA), the frequency and intensity of severe storms have increased not only in the Grand Rapids area, but across the nation and world. Between 1958 and 2016, the amount of precipitation falling in the heaviest 1% of storms increased by 42% in the Midwest. In the extreme western extent of the Great Lakes region, as much as 50% of annual total precipitation falls during only 10 days of the year. Accumulated precipitation during these 10 days has increased dramatically over that same region of the country, with increases of 20 to 30% observed from 1971 to 2000 in many locations. Climate models project the Great Lakes region to experience a greater increase in total precipitation than most other regions of North America. The amount of precipitation falling in the most intense 1% of precipitation events is projected to increase by another 40% or more by late century (2070-2099), relative to 1986-2015 amounts. In the Great Lakes region, projected changes in seasonal precipitation can cause flooding, increasing the risk of sewage overflows, water contamination, and algal blooms. The risk of flooding, particularly along the Grand River, will be amplified by more storm activity, increasing the risk of infrastructure damage and health hazards.

According to GLISA, annual snowfall in the Grand Rapids area has increased over the last 40 years. Increased temperatures in the future may cause winter precipitation to transition from snow to rain over time. The projected change in annual snowfall is variable and is projected to decrease between 20 to 27 inches by 2050 and 24 to 44 inches by 2100. This increase in annual precipitation will most likely be experienced through shorter, yet extreme events.⁷

Rain Free Periods⁸

The term rain-free is defined by periods of three weeks with less than 0.45 inches of rainfall. Rain free periods are highly variable year-to-year, with an overall decreasing trend. Occurrences of these dry periods decreased after peaking in the 1980s. The summer of 2011 saw the most recent peak in 3-week rain-free events. In the future, even though more annual precipitation is projected in the Grand Rapids area overall, more is anticipated to fall in shorter, extreme events leaving longer periods of time that experience no rainfall, which may increase the potential for droughts.

3.3 Land Use Patterns

In Kent County and Ottawa County, land use and zoning controls are performed at the municipal level. The amenities of living near the Grand River and Lake Michigan have enticed residential development over the years. Although a strip of low-density, single-family housing hugs the riverbank along numerous segments of the Grand River, significant portions of the river still flow past open, undeveloped, or agricultural lands. Compared to the Grand River, the Lake Michigan shoreline has experienced intense residential development. Additionally, the region has also experienced a rapid increase in residential land use.

⁷ GLISA, Climate Change in the Great Lakes Region and Grand Rapids.

⁸ WMSBF_FactSheet_GLISA.pdf (umich.edu)

3.4 Transportation Network

Kent County has a network of roadways that spans nearly 2,000 centerline miles of both rural and urban roadways and includes over 170 bridges. Ottawa County maintains 1,707 miles of county roads, 521 centerline miles of the state highway system, and 136 bridges.

Kent County and the City of Grand Rapids are serviced by the Interurban Transit Partnership, which operates a public transit system called The Rapid⁹. The Rapid operates 23 fixed bus routes with special services for Grand Valley State University and Grand Rapids Community College. Aside from the City of Grand Rapids, the system also serves the following municipalities: East Grand Rapids, Grandville, Kentwood, Walker, Wyoming and parts of Alpine Township, Byron Township, and Gaines Township.

Ottawa County is serviced by Harbor Transit¹⁰ and the Macatawa Area Express¹¹ systems. The Harbor Transit serves a 55-square-mile area with a fleet of 29 buses and serves the City of Ferrysburg, City of Grand Haven, Grand Haven Township, Village of Spring Lake, and Spring Lake Township. The Macatawa Area Express is the primary mass transportation provider in Ottawa County's Holland-Zeeland metropolitan area. The system is made up of eight fixed routes and a dial-a-ride service.

The three main airports located in Kent County are the Gerald R. Ford International Airport, the Lowell City Airport, and the Sparta Miller Airport. The three main airports located in Ottawa County are the Riverview Airport, the Grand Haven Municipal Airpark, and the Ottawa Executive Airport.

Five major rail-based transportation systems service the region including Mid-Michigan Railroad, CSX Transportation, Grand Elk Railroad, Grand Rapids Eastern Railroad, and the Coopersville and Marne Railway.

3.5 Population Characteristics

An analysis of Census 2020 data, coupled with historical census data indicates that Kent County, Ottawa County and all municipalities therein have experienced a significant rate of population increase over the past few decades. Similar residential development trends are likely to continue as the development in the larger cities of Grand Rapids and Holland increases. Local leaders are working to increase residential development throughout both counties. These leaders should be encouraged to consider mitigation, e.g. strengthened building materials, landscaping, etc., as this development occurs.

Kent County is the 4th most populated county in Michigan. According to the 2020 United States census data, Kent County's population is 657,974, with a growth rate of 0.55% in the past year.

The City of Grand Rapids, within Kent County, is the second largest city in Michigan. According to the 2020 United States census data, the City of Grand Rapids' population is 198,917, with a growth rate of 0.33% in the past year.

Ottawa County is the 7th most populated and fastest-growing county in Michigan. According to the 2020 United States census data, Ottawa County's population is 296,801, with a growth rate of 0.69% in the past year.

⁹ (The Rapid, 2021)

¹⁰ (About Harbor Transit, 2021)

¹¹ (Macatawa Area Express, 2021)

Many of the cities and townships in Kent and Ottawa County swell in population during the growing season due to a significant influx of migrant and agricultural workers. Tourists during the summer months also increase population numbers in these two Counties, especially in urban areas and along the lake shore.

Tables 10 and 11 contain demographic information as provided by the U.S. Census Bureau.

Table 10: Kent County Population Characteristics

Year	Population Count	
	Kent County	Grand Rapids
1990	500,631	189,126
2010	602,975	188,036
2020	660,560	198,917
Race	Population (Percentage)	
	Kent	Grand Rapids
White	515,653 (79.6%)	117,361 (59.0%)
Black or African American	62,188 (9.6%)	36,026 (18.6%)
Two or More Races	26,415 (4.1%)	11,139 (5.6%)
Asian	19,427 (3.0%)	4,774 (2.4%)
American Indian and Alaska Native	2,334 (.36%)	80 (0.4%)
Native Hawaiian and Other Pacific Islander	187 (.03%)	0
Age	Population (Percentage)	
	Kent	Grand Rapids
Under 5 years	43,911 (6.8%)	13,717 (6.8%)
5 to 9 years	44,048 (6.8%)	11,250 (5.6%)
10 to 14 years	43,670 (6.7%)	11,140 (5.5%)
15 to 19 years	43,358 (6.7%)	14,115 (7.0%)
20 to 24 years	45,197 (7.0%)	19,703 (9.8%)
25 to 29 years	53,749 (8.3%)	24,313 (12.1%)
30 to 34 years	47,689 (7.4%)	18,583 (9.2%)
35 to 39 years	43,059 (6.6%)	13,263 (6.6%)
40 to 44 years	37,609 (5.8%)	8,851 (4.4%)
45 to 49 years	39,145 (6.0%)	9,452 (4.7%)
50 to 54 years	40,741 (6.3%)	10,277 (5.1%)
55 to 59 years	41,650 (6.4%)	9,758 (4.9%)
60 to 64 years	38,391 (5.9%)	10,709 (5.3%)
65 to 69 years	29,021 (4.5%)	7,858 (3.9%)
70 to 74 years	20,843 (3.2%)	7,577 (3.8%)
75 to 79 years	13,991 (2.2%)	3,490 (1.7%)
80 to 84 years	10,564 (1.6%)	2,568 (1.3%)
85 years and over	11,485 (1.8%)	4,380 (2.2%)

Source: U.S. Census Bureau

Table 11: Ottawa County Population Characteristics

Year	Population
1990	187,768
2010	264,130
2020	293,852
Race	Population (Percentage)
White	256,755 (89.6%)
Two or More Races	7,987 (2.8%)
Asian	7,747 (2.7%)
Black or African American	4,425 (1.5%)
American Indian and Alaska Native	907 (.32%)
Native Hawaiian and Other Pacific Islander	67 (.02%)
Age	Population (Percentage)
Under 5 years	17,863 (6.2%)
5 to 9 years	19,120 (6.7%)
10 to 14 years	20,167 (7.0%)
15 to 19 years	24,541 (8.6%)
20 to 24 years	26,524 (9.3%)
25 to 29 years	17,289 (6.0%)
30 to 34 years	16,942 (5.9%)
35 to 39 years	16,722 (5.8%)
40 to 44 years	16,907 (5.9%)
45 to 49 years	16,676 (5.8%)
50 to 54 years	17,700 (6.2%)
55 to 59 years	17,966 (6.3%)
60 to 64 years	16,248 (5.7%)
65 to 69 years	14,147 (4.9%)
70 to 74 years	9,860 (3.4%)
75 to 79 years	7,110 (2.5%)
80 to 84 years	4,773 (1.7%)
85 years and over	6,003 (2.1%)

Source: U.S. Census Bureau

3.6 Economic Characteristics

According to the U.S. Census Bureau, 83.5% of the population of Kent and Ottawa Counties is in the workforce. The primary economic sectors in the region include education services, health care, and manufacturing. Detailed economic characteristic information is displayed in Table 12 and Table 13.

Table 12: Kent County Economic Characteristics

Subject (ages 16 and over)	Population (Percentage)	
	Kent County	Grand Rapids
Employed	345,415 (66.8%)	104,498 (64.6%)
Unemployed	13,823 (2.7%)	5,891 (3.6%)
Not in Labor Force	157,251 (30.4%)	50,939 (31.5%)
Below Poverty Level (all ages)	72,882 (11.3%)	43,432 (22.4%)
Employment Sector	Population	Percentage
Agriculture, forestry, fishing and hunting, and mining	3,762	1.1%
Construction	20,222	5.9%
Manufacturing	68,229	19.8%
Wholesale trade	13,982	4.0%
Retail trade	34,510	10.0%
Transportation and warehousing, and utilities	14,334	4.1%
Information	3,169	0.9%
Finance and insurance, and real estate and rental and leasing	20,005	5.8%
Professional, scientific, and management, and administrative and waste management services	34,456	10.0%
Educational services, and health care and social assistance	78,336	22.7%
Arts, entertainment, and recreation, and accommodation and food services	32,244	9.3%
Other services, except public administration	16,511	4.8%
Public administration	5,655	1.6%

Source: U.S. Census Bureau, 2019 Estimates

Table 13: Ottawa County Economic Characteristics

Subject (ages 16 and over))	Population (Percentage)	
Employed	154,414 (67.1%)	
Unemployed	4,380 (1.9%)	
Not in Labor Force	71,291 (31.0%)	
Below Poverty Level	23,516 (8.3%)	
Employment Sector	Population	Percentage
Agriculture, forestry, fishing and hunting, and mining	2,015	1.3%
Construction	8,997	5.8%
Manufacturing	37,567	24.3%
Wholesale trade	4,605	3.0%
Retail trade	15,578	10.1%
Transportation and warehousing, and utilities	6,070	3.9%
Information	1,342	0.9%
Finance and insurance, and real estate and rental and leasing	6,011	3.9%
Professional, scientific, and management, and administrative and waste management services	12,388	8.0%
Educational services, and health care and social assistance	37,187	24.1%
Arts, entertainment, and recreation, and accommodation and food services	13,666	8.9%
Other services, except public administration	6,971	4.5%
Public administration	2,017	1.3%

Source: U.S. Census Bureau, 2019 Estimates

3.7 Public Services

Public services refer to commodities and/or services available in the region and the companies and organizations that provide them. These services include public utilities, schools, libraries, and parks.

Natural gas services are provided to customers in the region primarily by DTE, along with Consumers Energy, SEMCo Energy Gas Company, AmeriGas Eagle Propane, and Michigan Gas Utilities. Electric services are provided primarily by Consumers Energy, along with Great Lakes Energy, Grand Haven B.L.&P, Holland B.P.W., Zeeland BPW, and Lowell L.&P.PI. Telephone and wireless services are provided by several different companies but are primarily provided by AT&T, Verizon, and Xfinity.

Kent County receives sewer services from the Grand Rapids Water Resource Recovery Facility, the City of Wyoming's Clean Water Plant, North Kent Sewer and Infrastructure Alternatives, and PARCC Side Clean Water Plant. Ottawa County receives sewer services from the Lake Michigan Filtration Plant, the Wyoming City Water Plant, Holland BPW WTP, Crockery Township Clean Water Plant, Lowell Wastewater Treatment Plant, Northwest Ottawa Water Treatment Plant, Caledonia Wastewater Treatment, Grand Haven Water Treatment, Sparta Wastewater Treatment Plant, Grandville Wastewater Plant, Allendale Wastewater Plant, and Zeeland Clean Water Plant.

The Clean Water Act of 1972 set up the National Pollutant Discharge Elimination System (NPDES). The NPDES program requires urban communities around the country to begin formulating solutions to the issue of stormwater pollution. In recent years, several communities in the region have developed an illicit discharge elimination program (IDEP). The IDEP includes an investigation of the water in the region to identify and eventually eliminate illicit discharges and impacts to the storm water system.

Urban areas are served primarily by municipal pipeline systems that pump water from Lake Michigan. The City of Grand Rapids is a regional provider of water to municipalities in Kent and Ottawa counties. The water system services a population of approximately 280,000 across a service area of 137 square miles. Municipal water services are also provided by Allendale Township, the City of Grandville, the City of Kentwood, the City of Wyoming, the City of Lowell, the Village of Sparta, Crockery Township, the City of Zeeland, and Holland Township. Rural areas are served primarily by private wells that pump groundwater from the glacial or bedrock aquifers.

Ottawa County has 16 public school districts with a total of 99 public schools. Kent County has 20 public school districts with a total of 265 public schools. Also within the counties are several private schools, public school academies, community colleges, private colleges, and private and public universities. Additional learning resources are provided through both counties' public library services.¹²

¹² US Census Bureau

Table 14: Regional School Data

School Level	Kent County Enrollment (Without Grand Rapids)	City of Grand Rapids Enrollment	Ottawa County Enrollment
Nursery & Preschool	7,392	2,664	5,535
Kindergarten	7,837	2,936	4,752
Elementary School (Grades 1-4)	24,582	8,618	15,339
Elementary School (Grades 5-8)	24,210	8,876	15,053
High School (Grades 9-12)	26,468	10,190	16,778
College, Undergraduate	16,156	12,915	23,621
Graduate, Professional School	4,104	3,446	2,503

(U.S. Census Bureau 2019: ACS 1-year Estimates)

The Kent County Parks Department manages 38 parks and open spaces ranging from two acres in size to 1,500 acres. Ottawa County Parks manages nearly 40 parks and open space lands totaling over 6,000 acres. The Grand Rapids Parks and Recreation Department controls and manages approximately 1,975 acres of land which include 87 developed parks, undeveloped lands, natural areas, cemeteries, trails, and a golf course. The majority of the City’s park acreage is held in nine large regional parks totaling 1,208 acres.¹³

3.8 Critical Asset Categories

The following facilities and infrastructures were identified in the first workshop as critical infrastructure due to providing essential products and services to the public and their role in response and recovery:



¹³ City of Grand Rapids Parks & Recreation Department 2022 Strategic Master Plan Update

4. Community Profiles

The overall goal of a community with respect to hazard mitigation is to protect the local population from natural, technological, and human-made hazards. The following sections summarize each community regarding potential hazards and the critical assets that could be affected. The communities' land use and population descriptions are taken from local Master Plans and the U.S. Census Bureau.

Special Flood Hazard Areas (SFHAs) are delineated on the community's Flood Insurance Rate Maps (FIRMs) located in the attachments and on FEMA's website.

4.1 The City of Grand Rapids

Hazard Priorities

Public Health Emergencies, Flooding, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of the City of Grand Rapids.

Hazard Vulnerability Summary

The largest land use is residential (70%), and the city is home to approximately 198,917 people. According to the 2019 American Community Survey 1-Year Estimates, 12.9% of the population is 65 years of age or older and 6.8% is under five years. The population below poverty level in the last 12 months is 22.4% (highest in Kent County).

Risk locations include hazardous materials transportation through I-196 and I-131 and multiple railways, three high accident intersections, two dams, seven historical mines, 51 Extremely Hazardous Substance (EHS) sites, and five scrap tire collection facilities.

According to the FEMA National Risk Index, the area of Grand Rapids between 3 Mile Road, Plainfield Ave, I-96, and the Grand River (census tract 26081000200) has the highest Social Vulnerability in the region, followed by an area between Wealthy Street, Jefferson Avenue, Hall Street, and I-131 (census tract 26081003600). These components include wealth, race and social status, elderly residents, Hispanic ethnicity, residents without health insurance, special needs individuals, service industry employment, Native American populations, and gender.

The City of Grand Rapids participates in the National Flood Insurance Program. The Grand River extends approximately 1,000 to 6,000 feet into the City of Grand Rapids at the 100-year flood stage. Historic river flooding occurs downstream of Fulton Street. There are 4,972 properties in the City of Grand Rapids that have greater than a 26% chance of being severely affected by flooding over the next 30 years. This represents 8% of all properties in the city. There are 13 repetitive loss properties in the city including nine single-family residential, two businesses, and three non-residential properties, and four are NFIP insured. SFHAs are delineated on the community's FIRM.

4.2 Kent County Jurisdictions

4.2.1 Ada Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Ada Township.

Hazard Vulnerability Summary

The largest land use is agricultural/ rural residential (40%), and the township is home to 13,142 people. According to the 2019 American Community Survey 1-Year Estimates, 7.1% of the population is 65 years of age or older and 6.2% is under five years. The population below poverty level in the last 12 months is 3.4%.

Risk locations include one railway, a catalog distribution center, two dams, and three EHS sites.

Ada Township participates in the National Flood Insurance Program. The Knapp Street bridge and the State Highway 21 bridges cause flow constriction for the Grand River. Three bridges at the Ada Dam cause constriction to the Thornapple River. There are six repetitive-loss properties in the township, including two severe repetitive-loss properties, all are single-family residential and three are NFIP insured. SFHAs are delineated on the community's FIRM.

4.2.2 Algoma Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Algoma Township.

Hazard Vulnerability Summary

The largest land use is agricultural/ rural residential (40%), and the township is home to 12,055 people. According to the 2019 American Community Survey 1-Year Estimates, 13.3% of the population is 65 years of age or older and 7% is under five years. The population below poverty level in the last 12 months is 5.0%.

Risk locations include hazardous materials transportation through I-131 and one railway.

There are no national shelter system facilities in the township. Per- and polyfluoroalkyl substances (PFAS) groundwater contamination from the former Wolverine Tannery is a concern to the township.

Algoma Township participates in the National Flood Insurance Program. There are three repetitive-loss properties in the township, all are single-family residential, and one is NFIP insured. SFHAs are delineated on the community's FIRM.

4.2.3 Alpine Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Alpine Township.

Hazard Vulnerability Summary

The largest land use is agricultural/ rural residential (75%), and the township is home to 14,079 people. According to the 2019 American Community Survey 1-Year Estimates, 12.8% of the population is 65 years of age or older and 7.6% is under five years. The population below poverty level in the last 12 months is 12.8%.

Risk locations include hazardous materials transportation through one railway, one gas transmission pipeline, and 10 EHS sites.

Alpine Township participates in the National Flood Insurance Program as an Emergency Program Community. FEMA has not completed a study to determine flood hazard for the township; therefore, a flood map has not been published at this time.

4.2.4 Bowne Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Bowne Township.

Hazard Vulnerability Summary

The largest land use is agricultural/ rural residential (75%), and the township is home to 3,289 people. According to the 2019 American Community Survey 1-Year Estimates, 14.6% of the population is 65 years of age or older and 6.1% is under five years. The population below poverty level in the last 12 months is 3.0%.

Risk locations include one gas transmission pipeline and two EHS sites.

Bowne Township does not participate in the National Flood Insurance Program. FEMA has not completed a study to determine flood hazard for the township; therefore, a flood map has not been published at this time.

4.2.5 Byron Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Byron Township

Hazard Vulnerability Summary

The largest land use is residential (30%), and the township is home to 26,927 people. According to the 2019 American Community Survey 1-Year Estimates, 15.5% of the population is 65 years of age or older and 6.4% is under five years. The population below poverty level in the last 12 months is 6.2%.

Risk locations include hazardous materials transportation through I-131 and two railways, seven EHS sites, and a scrap tire collection facility.

Byron Township does not participate in the National Flood Insurance Program. FEMA has not completed a study to determine flood hazard for the township; therefore, a flood map has not been published at this time.

4.2.6 Caledonia Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Caledonia Township.

Hazard Vulnerability Summary

The largest land use is agricultural/ rural residential (50%), and the township is home to 15,811 people. According to the 2019 American Community Survey 1-Year Estimates, 12.3% of the population is 65 years of age or older and 6.4% is under five years. The population below poverty level in the last 12 months is 3.9%.

Risk locations include hazardous materials transportation through M-6 and M-37 and one railway, one gas transmission pipeline, multiple sand and gravel mines, a cement manufacturer, a dam, Davenport University, and four EHS sites.

Subsidence/sinkholes, particularly on 92nd street where a residence has a buried county drainpipe going through their land, have had impacts on Caledonia Township.

Caledonia Township participates in the National Flood Insurance Program and administers Chapter 10 of their Zoning Ordinances to minimize losses due to flood conditions in flood hazard areas. Historic flooding has happened upstream of 84th street at LaBarge Dam. There are two repetitive-loss properties in the township, both are single-family residential, and one is NFIP insured. SFHAs are delineated on the community's FIRM.

4.2.7 Village of Caledonia

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of the Village of Caledonia.

Hazard Vulnerability Summary

The largest land use is residential (50%), and the village is home to 1,032 people. According to the 2019 American Community Survey 1-Year Estimates, 8.5% of the population is 65 years of age or older and 7.8% is under five years. The population below poverty level in the last 12 months is 4.1%.

Risk locations include hazardous materials transportation through M-37 and one railway. Subsidence/sinkholes, particularly on Emmons Street, have had impacts on the Village.

The Village of Caledonia participates in the National Flood Insurance Program. There are 62 properties in Caledonia that have greater than a 26% chance of being severely affected by flooding over the next 30 years. This represents 10% of all properties in the village. FEMA has not completed a study to determine flood hazard for the Village of Caledonia; therefore, a flood map has not been published at this time.

4.2.8 Cannon Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Cannon Township.

Hazard Vulnerability Summary

The largest land use is single family residential (47%), and the township is home to 14,739 people. According to the 2019 American Community Survey 1-Year Estimates, 13.3% of the population is 65 years of age or older and 5.6% is under five years. The population below poverty level in the last 12 months is 4.6%.

There are no warning siren locations in the township.

Cannon Township participates in the National Flood Insurance Program. SFHAs are delineated on the community's FIRM.

4.2.9 Cascade Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Cascade Township.

Hazard Vulnerability Summary

The largest land use is agricultural/ rural residential (60%), and the township is home to 19,667 people. According to the 2019 American Community Survey 1-Year Estimates, 17.5% of the population is 65 years of age or older and 5.8% is under five years. The population below poverty level in the last 12 months is 11.7%.

Risk locations include hazardous materials transportation through I-196 and M-6, one railway, and one major airport, one dam, and 15 EHS sites.

Cascade Township participates in the National Flood Insurance Program. SFHAs are delineated on the community's FIRM.

4.2.10 Village of Casnovia

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of the Village of Casnovia.

Hazard Vulnerability Summary

The Village of Casnovia is home to 323 people. According to the 2019 American Community Survey 1-Year Estimates, 9.0% of the population is 65 years of age or older and 10.2% is under five years. The population below poverty level in the last 12 months is 11.3%.

Risk locations include hazardous materials transportation through one railway, and multiple sand and gravel mines.

The Village of Casnovia does not participate in the National Flood Insurance Program. FEMA has not completed a study to determine flood hazard for the village; therefore, a flood map has not been published at this time.

4.2.11 City of Cedar Springs

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of the City of Cedar Springs.

Hazard Vulnerability Summary

The largest land use is residential (30%), and the city is home to 3,627 people. According to the 2019 American Community Survey 1-Year Estimates, 10.2% of the population is 65 years of age or older and 7.3% is under five years. The population below poverty level in the last 12 months is 21.3%.

Risk locations include hazardous materials transportation through I-131 and one railway, and two EHS sites.

The City of Cedar Springs does not participate in the National Flood Insurance Program. Cedar Creek and its tributaries flood historically, including Fifth Street and Cherry, behind Cedar Springs Public Library, at North Park, Park and Elm Street, and the bridge across Main Street. There are 101 properties in Cedar Springs that have greater than a 26% chance of being severely affected by flooding over the next 30 years. This represents 9% of all properties in the city. FEMA has not completed a study to determine flood hazard for the City of Cedar Springs; therefore, a flood map has not been published at this time.

4.2.12 Courtland Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Courtland Township.

Hazard Vulnerability Summary

The largest land use is agricultural (50%), and the township is home to 9,005 people. According to the 2019 American Community Survey 1-Year Estimates, 11.4% of the population is 65 years of age or older and 5.5% is under five years. The population below poverty level in the last 12 months is 3.7%.

Risk locations include hazardous materials transportation at one airport. There are no national shelter system facilities in the township.

Courtland Township does not participate in the National Flood Insurance Program. FEMA has not completed a study to determine flood hazard for the township; therefore, a flood map has not been published at this time.

4.2.13 City of East Grand Rapids

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of the City of East Grand Rapids.

Hazard Vulnerability Summary

The largest land use is residential (70%), and the city is home to 11,371 people. According to the 2019 American Community Survey 1-Year Estimates, 12.1% of the population is 65 years of age or older and 7.6% is under five years. The population below poverty level in the last 12 months is 2.0%.

The City of East Grand Rapids participates in the National Flood Insurance Program. There is one repetitive loss property in the city, it is a single-family residential and NFIP insured. SFHAs are delineated on the community's FIRM.

4.2.14 Gaines Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Gaines Township.

Hazard Vulnerability Summary

The largest land use is agricultural/ rural residential (40%), and the township is home to 26,906 people. According to the 2019 American Community Survey 1-Year Estimates, 11.7% of the population is 65 years of age or older and 7.3% is under five years. The population below poverty level in the last 12 months is 7.8%.

Risk locations include hazardous materials transportation through M-6 and one railway, and one EHS facility.

Gaines Township participates in the National Flood Insurance Program. FEMA has not completed a study to determine flood hazard for the township; therefore, a flood map has not been published at this time.

4.2.15 Grand Rapids Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Caledonia Township.

Hazard Vulnerability Summary

The largest land use is residential (70%), and the township is home to 18,905 people. According to the 2019 American Community Survey 1-Year Estimates, 18.8% of the population is 65 years of age or older and 4.8% is under five years. The population below poverty level in the last 12 months is 4.3%.

Risk locations include hazardous materials transportation through I-196 and one railway, and one EHS facility.

Grand Rapids Township participates in the National Flood Insurance Program. Storm drainage and urban flooding at 1950 East Beltline NE have had impacts on Grand Rapids Township. FEMA has not completed a study to determine flood hazard for the township; therefore, a flood map has not been published at this time.

4.2.16 City of Grandville

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of City of Grandville.

Hazard Vulnerability Summary

The largest land use is residential (35%), and the city is home to 16,083 people. According to the 2019 American Community Survey 1-Year Estimates, 18.7% of the population is 65 years of age or older and 7.3% is under five years. The population below poverty level in the last 12 months is 6.7%.

Risk locations include hazardous materials transportation through I-196 and one railway, one historical underground mine, Rivertown Crossings, and seven EHS sites.

The City of Grandville participates in the National Flood Insurance Program. Flooding problems along Bliss Creek Intercounty Drain are known to exist at the intersection of Kenowa Avenue and 44th Street, as well as at an older home located approximately a quarter mile north of this intersection on the west side of Kenowa Avenue. There are 825 properties in Grandville that have greater than a 26% chance of being severely affected by flooding over the next 30 years. This represents 15% of all properties in the city. There are seven repetitive loss properties in the city, including four single-family residential, two businesses, and two non-residential, and three are NFIP insured. SFHAs are delineated on the community's FIRMs.

4.2.17 Grattan Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Caledonia Township.

Hazard Vulnerability Summary

Grattan Township is home to 3,809 people. According to the 2019 American Community Survey 1-Year Estimates, 18.3% of the population is 65 years of age or older and 6.6% is under five years. The population below poverty level in the last 12 months is 3.3%.

Risk locations include hazardous materials transportation through one railway and seven EHS sites. There are no warning siren locations in the township.

Grattan Township does not participate in the National Flood Insurance Program. FEMA has not completed a study to determine flood hazard for the township; therefore, a flood map has not been published at this time.

4.2.18 Village of Kent City

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of the Village of Kent City.

Hazard Vulnerability Summary

The largest land uses are agricultural and residential (35% & 35%), and the village is home to 1,057 people. According to the 2019 American Community Survey 1-Year Estimates, 8.7% of the population is 65 years of age or older and 9.5% is under five years (highest in Kent County). The population below poverty level in the last 12 months is 20.2%.

Risk locations include three EHS sites.

The Village of Kent City does not participate in the National Flood Insurance Program. There are 19 properties in Kent City that have greater than a 26% chance of being severely affected by

flooding over the next 30 years. This represents 5% of all properties in the city. FEMA has not completed a study to determine flood hazard for the township; therefore, a flood map has not been published at this time.

4.2.19 City of Kentwood

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of the City of Kentwood.

Hazard Vulnerability Summary

The largest land use is residential (41%), and the city is home to 54,304 people. According to the 2019 American Community Survey 1-Year Estimates, 13.4% of the population is 65 years of age or older and 8.1% is under five years. The population below poverty level in the last 12 months is 10.9%.

Risk locations include hazardous materials transportation through I-196 and two railways, one dam, one historical underground mine, 31 EHS sites, and one scrap tire collection facility.

The City of Kentwood participates in the National Flood Insurance Program. Flooding near plaster creek occurs as a result of backwater from the Grand River. There are 944 properties in Kentwood that have greater than a 26% chance of being severely affected by flooding over the next 30 years. This represents 6% of all properties in the city. Construction in the floodplain is controlled by the city. Some portions of Little Plaster Creek have been channelized to improve hydraulic efficiency. SFHAs are delineated on the community's FIRM.

4.2.20 City of Lowell

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of the City of Lowell.

Hazard Vulnerability Summary

The largest land use is vacant (21%), and the city is home to 4,142 people. According to the 2019 American Community Survey 1-Year Estimates, 14.9% of the population is 65 years of age or older and 6.7% is under five years. The population below poverty level in the last 12 months is 11.7%.

Risk locations include hazardous materials transportation through two railways and one airport, one gas transmission pipeline, and eight EHS sites.

The City of Lowell participates in the National Flood Insurance Program. There are 418 properties in Lowell that have greater than a 26% chance of being severely affected by flooding over the next 30 years. This represents 27% of all properties in the city. There are four repetitive loss properties in the city, all are single-family residential and two are NFIP insured. SFHAs are delineated on the community's FIRM.

4.2.21 Lowell Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Lowell Township.

Hazard Vulnerability Summary

The largest land use is agricultural (33%), and the township is home to 6,276 people. According to the 2019 American Community Survey 1-Year Estimates, 15.0% of the population is 65 years of age or older and 3.5% is under five years. The population below poverty level in the last 12 months is 7.0%.

Risk locations include hazardous materials transportation through I-196 and two railways.

Lowell Township does not participate in the National Flood Insurance Program. FEMA has not completed a study to determine flood hazard for the township; therefore, a flood map has not been published at this time.

4.2.22 Nelson Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Caledonia Township.

Hazard Vulnerability Summary

The largest land use is agricultural (60%), and the township is home to 4,895 people. According to the 2019 American Community Survey 1-Year Estimates, 10.0% of the population is 65 years of age or older and 3.4% is under five years. The population below poverty level in the last 12 months is 3.8%.

Risk locations include hazardous materials transportation through I-131 and one railway.

Nelson Township does not participate in the National Flood Insurance Program. FEMA has not completed a study to determine flood hazard for the township; therefore, a flood map has not been published at this time.

4.2.23 Oakfield Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Oakfield Township.

Hazard Vulnerability Summary

The largest land use is rural residential/agricultural (+95%) and the township is home to 6,277 people. According to the 2019 American Community Survey 1-Year Estimates, 15.2% of the population is 65 years of age or older and 5.1% is under five years. The population below poverty level in the last 12 months is 10.1%.

Oakfield Township participates in the National Flood Insurance Program. FEMA has not completed a study to determine flood hazard for the township; therefore, a flood map has not been published at this time.

4.2.24 Plainfield Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Plainfield Township.

Hazard Vulnerability Summary

The largest land use is rural preserve (~%40), and the township is home to 3,350 people. According to the 2019 American Community Survey 1-Year Estimates, 36.7% of the population is 65 years of age or older (highest in Kent County) and 3.0% is under five years. The population below poverty level in the last 12 months is 7.0%.

Risk locations include hazardous materials transportation through I-131 and one railway, four EHS sites, LMCU Ballpark, and a scrap tire collection facility.

Plainfield Township participates in the National Flood Insurance Program. The Grand River is the major flooding source for the Township of Plainfield. There are 30 repetitive loss properties in the township, all are single-family residential and 12 are NFIP insured. Construction in the floodplain is controlled jointly by the Township and EGLE. SFHAs are delineated on the community's FIRMs.

4.2.25 City of Rockford

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of the City of Rockford.

Hazard Vulnerability Summary

The largest land use is residential (36%), and the city is home to 6,142 people. According to the 2019 American Community Survey 1-Year Estimates, 12.1% of the population is 65 years of age or older and 5.4% is under five years. The population below poverty level in the last 12 months is 11.9%.

Risk locations include hazardous materials transportation through I-131 and one railway, one dam, and four EHS sites.

The City of Rockford does not participate in the National Flood Insurance Program. There are 129 properties in Rockford that have a greater than 26% chance of being severely affected by flooding over the next 30 years. This represents 5% of all properties in the city. FEMA has not completed a study to determine flood hazard for the city; therefore, a flood map has not been published at this time.

4.2.26 Village of Sand Lake

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Village of Sand Lake.

Hazard Vulnerability Summary

The largest land use is residential (70%), and the village is home to 500 people. According to the 2019 American Community Survey 1-Year Estimates, 16.0% of the population is 65 years of age or older and 4.8% is under five years. The population below poverty level in the last 12 months is 7.7%.

Risk locations include hazardous materials transportation through I-131 and one railway, and one EHS facility.

The Village of Sand Lake does not participate in the National Flood Insurance Program. Urban flooding has had major impacts on the village. FEMA has not completed a study to determine flood hazard for the village; therefore, a flood map has not been published at this time.

4.2.27 Solon Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Solon Township.

Hazard Vulnerability Summary

The largest land use is agricultural residential (~80%) and the township is home to 6,496 people. According to the 2019 American Community Survey 1-Year Estimates, 13.1% of the population is 65 years of age or older and 9.3% is under five years. The population below poverty level in the last 12 months is 3.7%.

Risk locations include hazardous materials transportation through one railway and one gas transmission pipeline. There are no national shelter system facilities in the township.

Solon Township participates in the National Flood Insurance Program. FEMA has not completed a study to determine flood hazard for the village; therefore, a flood map has not been published at this time.

4.2.28 Sparta Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Sparta Township.

Hazard Vulnerability Summary

The largest land use is agricultural (75%), and the township is home to 9,395 people. According to the 2019 American Community Survey 1-Year Estimates, 13.2% of the population is 65 years of age or older and 8.4% is under five years. The population below poverty level in the last 12 months is 10.8%

Risk locations include hazardous materials transportation through one railway, two gas transmission pipelines, and nine EHS sites.

Sparta Township participates in the National Flood Insurance Program. SFHAs are delineated on the community's FIRMs.

4.2.29 Village of Sparta

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of the Village of Sparta.

Hazard Vulnerability Summary

The largest land use is open space/vacant (40%), and the village is home to 4,140 people. According to the 2019 American Community Survey 1-Year Estimates, 13.1% of the population is 65 years of age or older and 8.6% is under five years. The population below poverty level in the last 12 months is 11.7%

Risk locations include hazardous materials transportation through one railway.

The Village of Sparta participates in the National Flood Insurance Program. Urban flooding has had major impacts on the village. There are 164 properties in Sparta that have greater than a 26% chance of being severely affected by flooding over the next 30 years. This represents 10% of all properties in the city. There is one repetitive loss property in the village, a single-family residential that is not NFIP insured. SFHAs are delineated on the community's FIRMs.

4.2.30 Spencer Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Spencer Township.

Hazard Vulnerability Summary

The largest land use is rural residential (50%), and the township is home to 4,163 people. According to the 2019 American Community Survey 1-Year Estimates, 16.0% of the population is 65 years of age or older and 3.4% is under five years. The population below poverty level in the last 12 months is 14.1%.

Risk locations include one gas transmission pipeline. There are no national shelter system facilities in the township.

Spencer Township does not participate in the National Flood Insurance Program. FEMA has not completed a study to determine flood hazard for the village; therefore, a flood map has not been published at this time.

4.2.31 Tyrone Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Tyrone Township.

Hazard Vulnerability Summary

The largest land use is agricultural and rural agricultural (75%), and the township is home to 5,021 people. According to the 2019 American Community Survey 1-Year Estimates, 12.5% of the population is 65 years of age or older and 9.0% is under five years. The population below poverty level in the last 12 months is 12.9%.

Risk locations include hazardous materials transportation through one railway. There are no national shelter system facilities in the township.

Tyrone Township does not participate in the National Flood Insurance Program. FEMA has not completed a study to determine flood hazard for the village; therefore, a flood map has not been published at this time.

4.2.32 Vergennes Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Vergennes Township.

Hazard Vulnerability Summary

The largest land use is open/vacant land (30%), and the township is home to 4,741 people. According to the 2019 American Community Survey 1-Year Estimates, 14.0% of the population is 65 years of age or older and 3.8% is under five years. The population below poverty level in the last 12 months is 4.5%.

Risk locations include hazardous materials transportation through one railway and two dams. There are no fire stations in Vergennes Township. There are no warning siren locations in the township.

Vergennes Township does not participate in the National Flood Insurance Program. FEMA has not completed a study to determine flood hazard for the village; therefore, a flood map has not been published at this time.

4.2.33 City of Walker

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of the City of Walker.

Hazard Vulnerability Summary

The largest land use is low density residential (~20%) and the city is home to 25,132 people. According to the 2019 American Community Survey 1-Year Estimates, 15.0% of the population is 65 years of age or older and 6.4% is under five years. The population below poverty level in the last 12 months is 7.9%.

Risk locations include hazardous materials transportation through I-196 and two railways, one gas transmission pipeline, and 17 EHS sites.

The City of Walker participates in the National Flood Insurance Program. Construction in the floodplain is controlled by the city. FEMA has not completed a study to determine flood hazard for the city; therefore, a flood map has not been published at this time.

4.2.34 City of Wyoming

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of the City of Wyoming.

Hazard Vulnerability Summary

The largest land use is residential (46%), and the city is home to 76,501 people. According to the 2019 American Community Survey 1-Year Estimates, 11.5% of the population is 65 years of age or older and 6.9% is under five years. The population below poverty level in the last 12 months is 8.5%.

Risk locations include hazardous materials transportation through I-131 and two railways, two high crash intersections, 46 EHS sites, and two scrap tire collection facilities.

The City of Wyoming participates in the National Flood Insurance Program. There are 1,238 properties in Wyoming that have greater than a 26% chance of being severely affected by flooding over the next 30 years. This represents 5% of all properties in the city. There are eight repetitive

loss properties in the city, all are single-family residential and four are NFIP insured. SFHAs are delineated on the community's FIRMs.

4.3 Ottawa County Jurisdictions

4.3.1 Allendale Township, GVSU

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Allendale Township.

Hazard Vulnerability Summary

The largest land use is low density residential (83%), and the township is home to 20,708 people. According to the 2019 American Community Survey 1-Year Estimates, 5.6% of the population is 65 years of age or older and 5.2% is under five years. The population below poverty level in the last 12 months is 28.8% (highest in Ottawa County).

Risk locations include hazardous materials transportation through M-45, Grand Valley State University, and four EHS sites. The township is located within the 50-mile primary emergency planning zone for the Palisades power plant.

Allendale Township participates in the National Flood Insurance Program. SFHAs are delineated on the community's FIRMs.

4.3.2 Blendon Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Bowne Township.

Hazard Vulnerability Summary

The largest land use is agricultural/ rural residential (75%), and the township is home to 3,289 people. According to the 2019 American Community Survey 1-Year Estimates, 12.8% of the population is 65 years of age or older and 7.6% is under five years. The population below poverty level in the last 12 months is 3.4%.

Risk locations include hazardous materials transportation through one airport, one EHS facility, and a scrap tire collection facility. The township is located within the 50-mile primary emergency planning zone for the Palisades power plant.

Blendon Township participates in the National Flood Insurance Program. The township is in an area of minimal flood hazard.

4.3.3 Chester Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Chester Township.

Hazard Vulnerability Summary

The largest land use is cropland rotation and permanent pasture (70%), and the township is home to 2,096 people. The population increases by 1,000+ migrant workers during the growing season. According to the 2019 American Community Survey 1-Year Estimates, 14.5% of the population is 65 years of age or older and 7.9% is under five years. The population below poverty level in the last 12 months is 2.3%.

Risk locations include hazardous materials transportation through nine EHS sites, and one gas pipeline. There are no national shelter system facilities in Chester township.

Chester Township participates in the National Flood Insurance Program. Flooding at Crockery Creek has caused widespread flooding in low spots and underpasses. SFHAs are delineated on the community's FIRMs.

4.3.4 City of Coopersville

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of The City of Coopersville.

Hazard Vulnerability Summary

The City of Coopersville is home to 4,828 people. According to the 2019 American Community Survey 1-Year Estimates, 12.1% of the population is 65 years of age or older and 6.4% is under five years. The population below poverty level in the last 12 months is 8.4%.

Risk locations include hazardous materials transportation through I-96 and one railway, one gas transmission pipeline, and five EHS sites.

The City of Coopersville participates in the National Flood Insurance Program. There are 58 properties in Coopersville that have greater than a 26% chance of being severely affected by flooding over the next 30 years. This represents 4% of all properties in the city. SFHAs are delineated on the community's FIRMs.

4.3.5 Crockery Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Crockery Township.

Hazard Vulnerability Summary

The largest land use is vacant (39%), and the township is home to 4,572 people. According to the 2019 American Community Survey 1-Year Estimates, 13.5% of the population is 65 years of age or older and 5.7% is under five years. The population below poverty level in the last 12 months is 7.3%.

Risk locations include hazardous materials transportation through I-96, one railway, and two airports, and one gas transmission pipeline. Subsidence/sinkholes, particularly on State Street East of 130th Avenue have had impacts on Crockery Township.

Crockery Township participates in the National Flood Insurance Program. SFHAs are delineated on the community's FIRMs.

4.3.6 City of Ferrysburg

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of the City of Ferrysburg.

Hazard Vulnerability Summary

The largest land use is residential (34%), and the city is home to 2,952 people. According to the 2019 American Community Survey 1-Year Estimates, 28.0% of the population is 65 years of age or older (highest in Ottawa County) and 4.3% is under five years. The population below poverty level in the last 12 months is 4.4%.

Risk locations include hazardous materials transportation through M-31, one railway, and one airport, and one hazardous liquids pipeline. There are high risk erosion zones and critical dune areas along the lakeshore.

The City of Ferrysburg participates in the National Flood Insurance Program. There are 369 properties in Ferrysburg that have greater than a 26% chance of being severely affected by flooding over the next 30 years. This represents 19% of all properties in the city. SFHAs are delineated on the community's FIRMs.

4.3.7 Georgetown Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Georgetown Township.

Hazard Vulnerability Summary

The largest land use is residential, and the township is home to 54,091 people. According to the 2019 American Community Survey 1-Year Estimates, 15.6% of the population is 65 years of age or older and 7.1% is under five years. The population below poverty level in the last 12 months is 6.5%.

Risk locations include hazardous materials transportation through I-196 and M-6, one railway, and one airport, two gas transmission pipelines, eight EHS sites, and two dams. The township is located within the 50-mile primary emergency planning zone for the Palisades power plant.

According to the FEMA National Risk Index, an area of Georgetown Township between Jenison and Hudsonville (census tract 26139021500) has the highest expected annual loss in the region, with the highest losses resulting from riverine flooding. Numerous water bodies are located in this area and historical flooding has occurred along Rush Creek at Chicago Drive and Port Sheldon Road.

Georgetown Township participates in the National Flood Insurance Program. Parts of the Grand River floodplain in Georgetown are up to one mile wide. There are three repetitive loss properties in the township, all single-family residential and one is NFIP insured. SFHAs are delineated on the community's FIRMs.

4.3.8 City of Grand Haven

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of the City of Grand Haven.

Hazard Vulnerability Summary

The largest land use is single family residential (29%), and the city is home to 11,011 people. According to the 2019 American Community Survey 1-Year Estimates, 23.5% of the population is 65 years of age or older and 3.7% is under five years. The population below poverty level in the last 12 months is 8.2%.

Risk locations include hazardous materials transportation through M-31 and one railway, one hazardous liquids pipeline, and 18 EHS sites. There are high risk erosion zones and critical dune areas along the lakeshore.

The City of Grand Haven participates in the National Flood Insurance Program. There are 555 properties in Grand Haven that have greater than a 26% chance of being severely affected by flooding over the next 30 years. This represents 10% of all properties in the city. SFHAs are delineated on the community's FIRMs.

4.3.9 Grand Haven Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Grand Haven Township.

Hazard Vulnerability Summary

The largest land use is residential, and the township is home to 18,004 people. According to the 2019 American Community Survey 1-Year Estimates, 15.4% of the population is 65 years of age

or older and 4.9% is under five years. The population below poverty level in the last 12 months is 5.1%.

Risk locations include hazardous materials transportation through M-31, one railway, and one airport, one hazardous liquids pipeline, and eight EHS sites. There are high risk erosion zones and critical dune areas along the lakeshore. The township is located within the 50-mile primary emergency planning zone for the Palisades power plant.

Grand Haven Township participates in the National Flood Insurance Program. SFHAs are delineated on the community's FIRMs.

4.3.10 City of Holland

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of the City of Holland.

Hazard Vulnerability Summary

The largest land use is single family residential, and the city is home to 34,378 people. According to the 2019 American Community Survey 1-Year Estimates, 15.9% of the population is 65 years of age or older and 5.8% is under five years. The population below poverty level in the last 12 months is 11.6%.

Risk locations include hazardous materials transportation through M-31, I-196, and multiple railways, multiple sand and gravel mines, a cement manufacturer, Hope College, and 23 EHS sites. Failure of the Ottogon Dam in Allegan would affect this area. The city is located within the 50-mile primary emergency planning zone for the Palisades power plant.

The City of Holland participates in the National Flood Insurance Program. There are 571 properties in Holland that have greater than a 26% chance of being severely affected by flooding over the next 30 years. This represents 5% of all properties in the city. SFHAs are delineated on the community's FIRMs.

4.3.11 Holland Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Holland Township.

Hazard Vulnerability Summary

The largest land use is residential (33%), and the township is home to 38,276 people. According to the 2019 American Community Survey 1-Year Estimates, 30.6% of the population is 65 years of age or older and 3.5% is under five years. The population below poverty level in the last 12 months is 10.5%.

Risk locations include hazardous materials transportation through M-31, I-196, and multiple railways, three gas transmission pipelines, two hazardous liquids pipelines, and 31 EHS sites. The township is located within the 50-mile primary emergency planning zone for the Palisades power plant.

Holland Township participates in the National Flood Insurance Program. Historic flooding has happened along Adams Street due to the Macatawa River. There are four repetitive loss properties in the township, all are single-family residential, and one is NFIP insured. SFHAs are delineated on the community's FIRMs.

4.3.12 City of Hudsonville

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of the City of Hudsonville.

Hazard Vulnerability Summary

The largest land use is residential, and the city is home to 7,629 people. According to the 2019 American Community Survey 1-Year Estimates, 14.4% of the population is 65 years of age or older and 12.0% is under five years (highest in Ottawa County). The population below poverty level in the last 12 months is 6.7%.

Risk locations include hazardous materials transportation through I-196 and one railway, one gas transmission pipeline, and seven EHS sites. The city is located within the 50-mile primary emergency planning zone for the Palisades power plant.

The City of Hudsonville participates in the National Flood Insurance Program. There are 128 properties in Hudsonville that have greater than a 26% chance of being severely affected by flooding over the next 30 years. This represents 5% of all properties in the city. SFHAs are delineated on the community's FIRMs.

4.3.13 Jamestown Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Jamestown Township.

Hazard Vulnerability Summary

The largest land use is agricultural, and the township is home to 9,630 people. According to the 2019 American Community Survey 1-Year Estimates, 11.8% of the population is 65 years of age or older and 8.6% is under five years. The population below poverty level in the last 12 months is 3.3%.

Risk locations include hazardous materials transportation through I-196 and one railway, three gas transmission pipelines, two dams, and three EHS sites. The township is located within the 50-mile primary emergency planning zone for the Palisades power plant.

Jamestown Township participates in the National Flood Insurance Program. SFHAs are delineated on the community's FIRMs.

4.3.14 Olive Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Olive Township.

Hazard Vulnerability Summary

The largest land use is agricultural, and the township is home to 5,007 people. According to the 2019 American Community Survey 1-Year Estimates, 12.1% of the population is 65 years of age or older and 7.1% is under five years. The population below poverty level in the last 12 months is 7.3%.

Risk locations include hazardous materials transportation through M-31, one railway, one gas transmission pipeline, two hazardous liquids pipelines, and one EHS facility. The township is located within the 50-mile primary emergency planning zone for the Palisades power plant.

There are no warning siren locations in the township.

Olive Township participates in the National Flood Insurance Program. The township is in an area of minimal flood hazard.

4.3.15 Park Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Park Township.

Hazard Vulnerability Summary

The largest land use is agricultural and recreational, and the township is home to 18,625 people. According to the 2019 American Community Survey 1-Year Estimates, 18.3% of the population is 65 years of age or older and 5.1% is under five years. The population below poverty level in the last 12 months is 4.1%.

Risk locations include hazardous materials transportation through one airport, one hazardous liquids pipeline, and seven EHS sites. The township is located within the 50-mile primary emergency planning zone for the Palisades power plant. There are high risk erosion zones and critical dune areas along the lakeshore.

Park Township participates in the National Flood Insurance Program. There are four repetitive loss properties in the township, all are businesses and two are NFIP insured. SFHAs are delineated on the community's FIRMs.

4.3.16 Polkton Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Polkton Township.

Hazard Vulnerability Summary

Polkton Township is home to 2,565 people. According to the 2019 American Community Survey 1-Year Estimates, 17.3% of the population is 65 years of age or older and 6.8% is under five years. The population below poverty level in the last 12 months is 4.6%.

Risk locations include hazardous materials transportation through I-196 and one railway, one gas transmission pipeline, and a scrap tire collection facility. There are no warning siren locations in the township.

Polkton Township participates in the National Flood Insurance Program. SFHAs are delineated on the community's FIRMs.

4.3.17 Port Sheldon Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Port Sheldon Township.

Hazard Vulnerability Summary

The largest land use is agricultural, and the township is home to 5,206 people. According to the 2019 American Community Survey 1-Year Estimates, 18.9% of the population is 65 years of age or older and 6.2% is under five years. The population below poverty level in the last 12 months is 6.0%.

Risk locations include hazardous materials transportation through M-31 and two railways, one gas transmission pipeline, and one hazardous liquids pipeline. There are high risk erosion zones and critical dune areas along the lakeshore. The township is located within the 50-mile primary emergency planning zone for the Palisades power plant.

There are no warning siren locations in the township

Port Sheldon Township participates in the National Flood Insurance Program. SFHAs are delineated on the community's FIRMs.

4.3.18 Robinson Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Robinson Township.

Hazard Vulnerability Summary

The largest land use is agricultural/ undeveloped, and the township is home to 6,382 people. According to the 2019 American Community Survey 1-Year Estimates, 13.2% of the population is 65 years of age or older and 6.6% is under five years. The population below poverty level in the last 12 months is 3.0%.

Risk locations include hazardous materials transportation through M-45. The township is located within the 50-mile primary emergency planning zone for the Palisades power plant.

Robinson Township participates in the National Flood Insurance Program. The township has experienced major flooding on Johnson Street east of the 11500 block to 104th Avenue, and Pierce Street between 120th and 112th Avenue Southwest. SFHAs are delineated on the community's FIRMs.

4.3.19 Spring Lake Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Spring Lake Township.

Hazard Vulnerability Summary

The largest land use is undeveloped, and the township is home to 15,296 people. According to the 2019 American Community Survey 1-Year Estimates, 21.0% of the population is 65 years of age or older and 4.7% is under five years. The population below poverty level in the last 12 months is 5.4%.

Risk locations include hazardous materials transportation through M-31, two railways, one hazardous liquids pipeline, and seven EHS sites. The township is located within the 50-mile primary emergency planning zone for the Palisades power plant. There are high risk erosion zones and critical dune areas along the lakeshore.

Spring Lake Township participates in the National Flood Insurance Program. There are two repetitive loss properties in the township, both single-family residential with one NFIP insured. SFHAs are delineated on the community's FIRMs.

4.3.20 Village of Spring Lake

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of the Village of Spring Lake.

Hazard Vulnerability Summary

The largest land use is residential and commercial, and the village is home to 2,323 people. According to the 2019 American Community Survey 1-Year Estimates, 27.8% of the population is 65 years of age or older and 5.8% is under five years. The population below poverty level in the last 12 months is 7.9%.

Risk locations include hazardous materials transportation through M-45 and one railway. There are high risk erosion zones and critical dune areas along the lakeshore.

The Village of Spring Lake participates in the National Flood Insurance Program. There are 429 properties in Spring Lake that have greater than a 26% chance of being severely affected by flooding over the next 30 years. This represents 27% of all properties in the village. . There are two repetitive loss properties in the village, both residential and NFIP insured. SFHAs are delineated on the community's FIRMs.

4.3.21 Tallmadge Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Tallmadge Township.

Hazard Vulnerability Summary

The largest land use is agricultural, and the township is home to 8,802 people. According to the 2019 American Community Survey 1-Year Estimates, 14.2% of the population is 65 years of age or older and 6.4% is under five years. The population below poverty level in the last 12 months is 3.5%.

Risk locations include hazardous materials transportation through M-45, a scrap tire collection facility, one dam, and five EHS sites (between Tallmadge and Wright Townships).

Tallmadge Township participates in the National Flood Insurance Program. There is one repetitive loss property in the township, a single-family residential that it is not NFIP insured. SFHAs are delineated on the community's FIRMs.

4.3.22 Wright Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Wright Township.

Hazard Vulnerability Summary

The largest land use is agricultural, and the township is home to 3,190 people. According to the 2019 American Community Survey 1-Year Estimates, 16.7% of the population is 65 years of age or older and 5.6% is under five years. The population below poverty level in the last 12 months is 6.7%.

Risk locations include hazardous materials transportation through I-196, Berlin Raceway, one gas transmission pipeline, and five EHS sites (between Tallmadge and Wright Townships).

There are no warning siren locations in the township.

Wright Township participates in the National Flood Insurance Program. There is one repetitive loss property in the township, a single-family residential that is not insured. SFHAs are delineated on the community's FIRMs.

4.3.23 City of Zeeland

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of the City of Zeeland.

Hazard Vulnerability Summary

The largest land use is residential and commercial, and the city is home to 5,719 people. According to the 2019 American Community Survey 1-Year Estimates, 25.4% of the population is 65 years of age or older and 8.3% is under five years. The population below poverty level in the last 12 months is 7.9%.

Risk locations include hazardous materials transportation through I-196 and one railway, two gas transmission pipelines, a scrap tire collection facility, and 15 EHS sites. The township is located within the 50-mile primary emergency planning zone for the Palisades power plant.

Local sanitary sewer lift stations can't always handle the large amount of water that flows from heavy rainfall and power outages have caused lift stations to fail.

The City of Zeeland participates in the National Flood Insurance Program. Flooding along Main Street is common. There are 254 properties in Zeeland that have greater than a 26% chance of being severely affected by flooding over the next 30 years. This represents 10% of all properties in the city. There is one repetitive loss property in the city. SFHAs are delineated on the community's FIRMs.

4.3.24 Zeeland Township

Hazard Priorities

Public Health Emergencies, Flooding and Erosion, Infrastructure Failures, Severe Weather, Cyber Security, Supply Chain Disruptions, and Criminal Acts are concerns to the representatives of Zeeland Township.

Hazard Vulnerability Summary

The largest land use is agricultural, and the township is home to 12,008 people. According to the 2019 American Community Survey 1-Year Estimates, 12.9% of the population is 65 years of age or older and 5.0% is under five years. The population below poverty level in the last 12 months is 4.8%.

Risk locations include hazardous materials transportation through I-196, one railway, and one airport. The condition of the culvert and high velocities in the stream are causing sinkholes in 64th Avenue, a primary road for north-south traffic. The township is located within the 50-mile primary emergency planning zone for the Palisades power plant.

Zeeland Township participates in the National Flood Insurance Program. SFHAs are delineated on the community's FIRMs.

5. Hazard History

Hazard history analysis looks at the natural, technological, and human-caused hazards in the region and the risk of these hazards compared to impact on land use, climate change, economic impact, critical facilities/services, and existing prevention programs. As the past several decades of research have demonstrated, disasters disproportionately affect the poorest and most marginalized people, whilst also exacerbating access and functional needs.¹⁴

5.1 Civil Disturbance

According to the National Fire Protection Association (NFPA) civil unrest or civil disturbance is the act of violence and disorder detrimental to the public law and order. It includes acts such as riots, acts of violence, insurrections, unlawful obstructions, or assemblages. It also includes all domestic conditions requiring or likely to require the use of federal armed forces.

The term "civil disorder" is defined by 18 USCS § 232 as any public disturbance involving acts of violence by assemblages of three or more persons, which causes an immediate danger of or results in damage or injury to the property or person of any other individual.¹⁵

Civil unrest events typically evolve from a group of people protesting major sociopolitical issues as well as major sporting events, concerts, block parties, abortion clinics, or political conventions. Protestors may lash out in a violent way against authority, property, or people. Riots may ensue involving vandalism and the destruction of property with targets varied between public and private properties.

Historical Events

Grand Rapids—On April 19, 1911, more than 6,000 workers walked out of about 50 furniture factories in Grand Rapids, protesting pay and working conditions. Anger built among the striking workers, and tensions exploded on May 15, when a company tried to drive strikebreakers in cars to the factory through a crowd of about 1,200 strikers, and supporters gathered outside the building. That evening, people poured into the streets from the surrounding neighborhood, where a riot began when the crowd grabbed rocks and pelted the factory company's cars. In the ensuing mayhem, firefighters and police were injured.

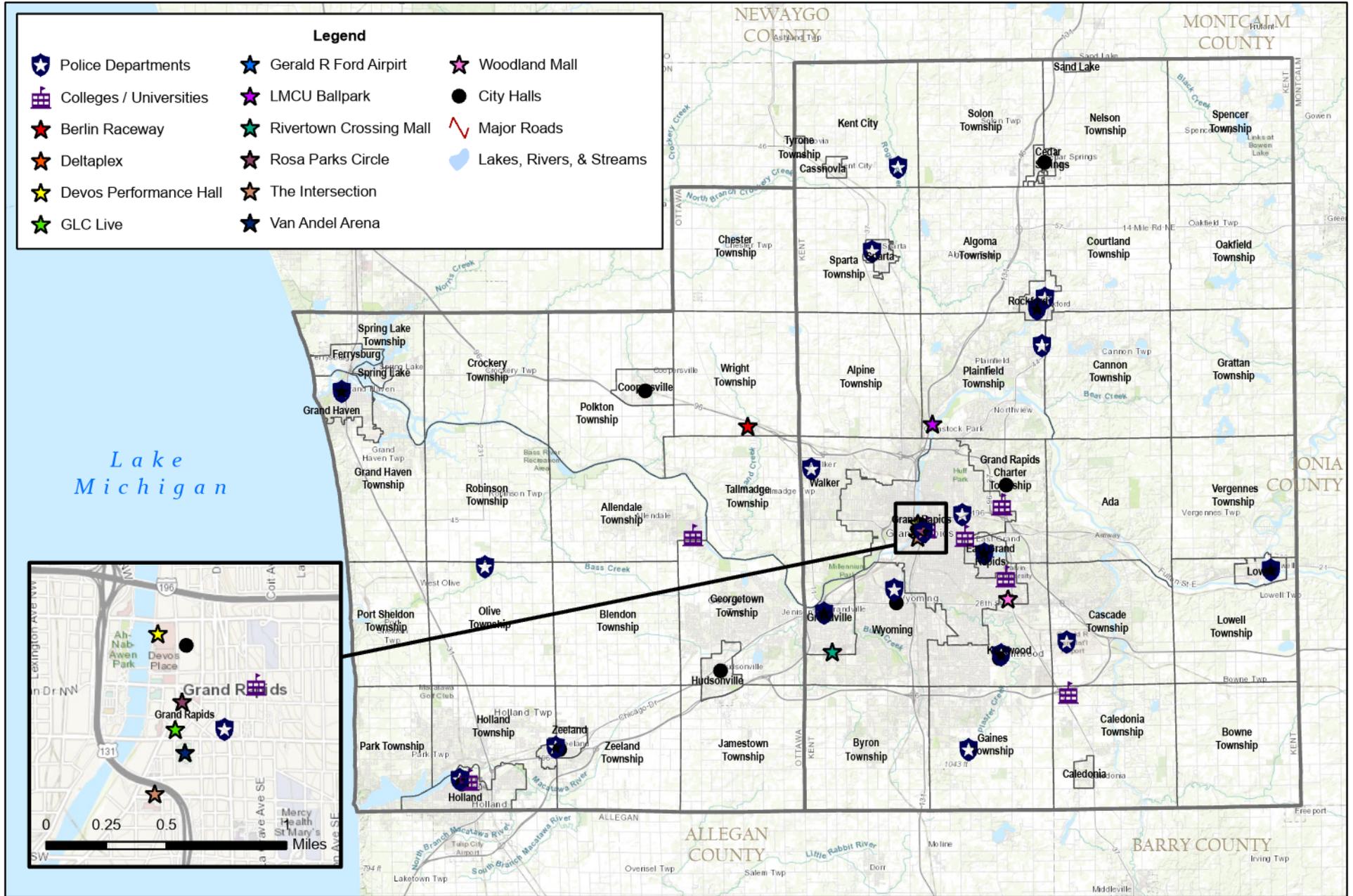
Grand Rapids—The Grand Rapids Uprising occurred on July 25, 1967, in a predominantly Black and impoverished neighborhood in the City of Grand Rapids. It was estimated that 1,000 people, both Black and white, participated in the uprising. There were 44 injuries, no deaths, and 30 arrests. Firefighters responded to 54 fires during an 11-hour period. Damage was estimated to be about \$500,000, which now amounts to about \$3.5 million when adjusted for inflation.¹⁶

Grand Rapids—Thousands of demonstrators marched in downtown Grand Rapids on Saturday, May 30, 2020, in response to the murder of George Floyd. The death of George Floyd, a 46-year-old Black man, drew widespread outrage in May 2020 after a video circulated online showing Officer Derek Chauvin holding his knee on Mr. Floyd's neck on a Minneapolis street corner as he gasped for breath. Mr. Floyd's death spurred nationwide protests against police brutality. In the early morning hours of May 31, looting and fires spread throughout downtown Grand Rapids. The

¹⁴ Mitchell, Tom. Setting, Measuring and Monitoring Targets for Disaster Risk Reduction: Recommendations for Post-2015 International Policy Frameworks. Overseas Development Institute Centre for Research on the Epidemiology of Disasters Risk Management Solutions, 2014

¹⁵ U.S. Code, Title 18, Part I, Chapter 12, Section 232. Legal Information Institute, Cornell University Law School.

¹⁶ (Mack W. , 2018)



Kent County, Ottawa County, & City of
 Grand Rapids 2022 Regional Hazard Mitigation Plan

Kent County &
 Ottawa County, MI



Figure 2 - Civil Disturbance: Vulnerable Locations

mayor of Grand Rapids, Rosalynn Bliss, enforced a curfew until June 2 and requested the support of the Michigan National Guard to secure the Grand Rapids Police Department and to help board up impacted businesses. Damage was estimated to be over 1-million dollars.

Risk/Likelihood

A civil disturbance in Michigan occurs once every 8 - 10 years¹⁷ and typically is a result of the following causes:

- Labor disputes,
- Controversial court judgments or government actions,
- Resource shortages following a catastrophe,
- Demonstrations by special interest groups,
- Unfair death or injury, or
- Celebration following a high-profile victory or defeat by a sports team.

The potential for this hazard to occur is somewhat elevated due to the number of sport/entertainment venues, educational facilities, detention facilities, large-scale industrial facilities, and government facilities within Kent County.

Economic Impact

The May 2020 civil unrest caused over 1-million dollars of damages to downtown buildings and businesses and personnel costs. Civil disturbance can impact the local economy through infrastructure damage, damage to businesses, and public perception of the area.

Impact on Critical Facilities/Services

Civil disturbance can impact critical facilities and services through physical impact on facilities and personnel.

Vulnerability assessment

Regions or neighborhoods that have experienced one or more economic, social, or political stresses, such as poverty, ethnic intimidation, corruption, or the continual presence of illegal activities, are more prone to civil disturbance. Larger more densely populated cities tend to be more vulnerable to this hazard. The most vulnerable locations can be seen in Figure 2.

5.2 Criminal Acts

5.2.1 Vandalism

Vandalism is the willful or malicious destruction, injury, disfigurement, or defacement of any public or private property, real or personal, without the consent of the owner or person having control. Examples of vandalism include graffiti, tampering with traffic signs, and damage to vacant buildings.

¹⁷ Listing of US Civil Unrest Incidents, Armstrong Economics: Devoes Per ww.armstrongeconomics.com/statistics/listing-of-uscivil-unrest-incident

Historical Events

According to the Ottawa County Parks and Recreation Department, there's been an uptick in vandalism over the past few years.¹⁸

Grand Rapids—On November 2, 2020, the eve of the presidential election, six headstones were vandalized with “TRUMP” and “MAGA” spray-painted on graves located at the Ahavas Israel Jewish cemetery.

Risk/Likelihood

Overall, the rate of vandalism in Kent County, Ottawa County and the City of Grand Rapids is lower than the United States average. Kent County is in the 96th percentile for safety regarding vandalism, Ottawa County is in the 99th percentile for safety, and the City of Grand Rapids is in the 75th percentile for safety. The likelihood of being a victim of vandalism in Kent County may be as high as one in 248 in the central neighborhoods or as low as one in 451 in the northeast part of the county. The likelihood of being a victim of vandalism in Ottawa County may be as high as one in 330 in the northwest neighborhoods or as low as one in 964 in the southeast part of the county. The likelihood of being a victim of vandalism in the Grand Rapids metro area may be as high as one in 237 in the central neighborhoods, or as low as one in 777 in the east part of the metro area.

Economic Impact

No information is available regarding the overall economic impact of vandalism in Kent and Ottawa Counties.

Impact on Critical Facilities/Services

Vandalism can have minor impacts on critical facilities and services through physical impact on facilities and personnel.

Vulnerability Assessment

According to the principles of Crime Prevention Through Environmental Design (CPTED), the following factors contribute to crime in an area:

- **Absence of activity generators:** Activity generators are uses or facilities that attract people, create activities, and add life to the public space and thus help reduce the opportunities for crime.
- **Lack of integration of mix-use:** Compatible mixed-uses can encourage activity, natural surveillance, and contact among people. When the land uses or zoning are not done in such a way that will encourage interaction and concentration of people, the outcome will be isolation in certain areas, thus exposing the space to vulnerability.
- **Poor or absence of lighting:** Insufficient and absence of lighting is a major cause of crime in the nighttime hours in public spaces. Criminals prefer low-risk situations, and visibility increases the chance that a perpetrator will be caught.

¹⁸ (Kent County, MI Vandalism Rates and Vandalism Maps, 2021)

- **Absence of clear sightlines:** Sight line is defined as the desired line of vision in terms of both breadth and depth. Large columns, tall fences, overgrown shrubbery, and other barriers blocking sight lines can shield criminal activity.
- **Poor or absence of territorial reinforcement:** Sense of ownership, or territoriality, is often considered a vital factor in making a place safer. If residents in a residential estate for instance, feel that the areas outside their doors do not belong to them, they will feel less safe, and will be less likely to intervene in a dangerous situation.

5.2.2 Arson

The FBI's Uniform Crime Reporting (UCR) Program defines arson as any willful or malicious burning or attempting to burn, with or without intent to defraud, a dwelling house, public building, motor vehicle or aircraft, personal property of another, etc. According to the U.S. Fire Administration, arson is the leading cause of fires and the third leading cause of fire-related injuries and deaths in the United States.¹⁹

Historical Events

From 2015 to 2019, there were on average 14 arson offenses in Kent County each year and 18 arson offenses in Ottawa County each year.²⁰

According to the Federal Bureau of Investigation, more than 42% of all arson offenses involved structures (e.g., residential, storage, public, etc.). Mobile property was involved in 23% of arson, and other types of property (such as crops, timber, fences, etc.) accounted for 35% of reported arson.

Risk/Likelihood

Overall, the rate of arson in Kent County, Ottawa County and the City of Grand Rapids is lower than the United States average. Kent County is in the 11th percentile for safety regarding arson, Ottawa County is in the 17th percentile for safety, and the City of Grand Rapids is in the 13th percentile for safety. The likelihood of being a victim of arson in Kent County may be as high as one in 3,031 in the western neighborhoods or as low as one in 5,093 in the southeast part of the county. The likelihood of being a victim of arson in Ottawa County may be as high as one in 5,055 in the southern neighborhoods or as low as one in 7,419 in the southeast part of the county.²¹ The likelihood of being a victim of arson in the City of Grand Rapids may be as high as one in 3,597 in the central neighborhoods, or as low as one in 6,365 in the northeast part of the metro area.

Economic Impact

In 2019, the average dollar loss per arson was \$16,371.²² In October 2021, arson and vandalism at an Ottawa County Park caused an estimated \$300,000 in damage.²³ Structural fires can cause displacement and homelessness, in addition to serious injuries, death, and economic hardship.

¹⁹ (Administration, 2001)

²⁰ "Crime in the U.S. 2019." FBI, FBI, 20 July 2020, <https://ucr.fbi.gov/crime-in-the-u.s/2019/crime-in-the-u.s.-2019>.

²¹ Kent & Ottawa County, MI Arson Rates and Arson Maps
<https://crimegrade.org/arson-ottawa-county-mi/>, January 17, 2022

²² "Arson." FBI, FBI, 12 Sept. 2019, <https://ucr.fbi.gov/crime-in-the-u.s/2019/crime-in-the-u.s.-2019/topic-pages/arson>.

²³ (Tunison, 2021)

Impact on Critical Facilities/Services

Arson can have impacts on critical facilities and services through physical impact on facilities and personnel.

Vulnerability Assessment

Any property is a potential target for arson. The most likely targets of arson are unsecured, vacant, and/or abandoned buildings are intrinsically more dangerous than occupied structures.

5.3 Drought

Drought is defined as an extended period of time with significant low precipitation levels. Drought can be classified into four types:

Meteorological	A meteorological drought is defined by the extent to which precipitation is below average and for how long. Such a drought tends to be for a relatively short period of time.
Agricultural	In this type of drought, moisture in the soil is no longer sufficient to meet the needs of the crops growing in the area. The water demands a crop has depends on weather conditions such as temperature and relative humidity, its biological makeup, what stage of growth the crop is in, and the physical/chemical makeup of the soil.
Hydrological	Hydrological drought deals with surface and subsurface water supplies such as water tables and streamflow. Extended dry periods cause these supplies to drop below normal. This type of drought usually does not occur at the same time as the others but instead lags behind. It takes a longer period of time for the lack of moisture to show up in places such as the groundwater, reservoir, and lake levels. Hydroelectric power plants and recreational areas can be significantly impacted when this happens.
Socioeconomic	Socioeconomic drought refers to what occurs when water shortages affect people and their lives. It associates economic good with meteorological, agricultural, and hydrological drought elements. It is different in that it is based on supply and demand. The supply of goods based on weather – water, food grains, fish, hydroelectric power, etc. — can usually meet a given demand in Michigan. A socioeconomic drought may occur if water availability decreases or demand increases (e.g., due to population increases and/or higher consumption).

Though climate and weather are the main contributors to hydrological drought, other factors can influence changes such as landscaping, land use, and the implementation of dams.

Historical Events

According to the 2019 Michigan Hazard Analysis²⁴, a substantial portion (one-third) of Michigan’s recent agricultural disaster declarations have involved drought impacts. The effect of climate change on Michigan has involved an overall increase in precipitation, and the severity of droughts have generally been decreasing over the past half-century.

²⁴ Michigan Hazard Analysis, https://www.michigan.gov/documents/msp/MHA_2019_full_update_natural_hazards_653708_7.pdf, April 2019

Midwest—In the summer of 1871, severe droughts were associated with enormous wildfires across the Midwest, including a fire in Holland that destroyed half of the city.

Grand Haven—The year 1904 was one of the driest on record for Ottawa County—only 23.97 inches of rain fell in Grand Haven during the entire year.

Southwest Michigan—In the 1930s, winter precipitation temporarily relieved the drought, but subsoil moisture remained abnormally dry. The most severe Palmer Drought Severity Index readings for southwest Michigan are seen during this period. Drought conditions were compounded by the extremely hot summer of 1936 when many deaths were attributed to the heat. Because of the severity of this drought, 41 counties were recognized by the Federal Drought Relief Administration as needing assistance.

Michigan—The drought of 1947-1950 was deemed moderate, but the State suffered significant crop damage, and thousands of acres of timber in northern Michigan were destroyed by forest fires.

Lower Peninsula—The longest drought since the 1930s occurred in the Lower Peninsula during 1960-1967. Many stream, lake, and groundwater levels were at or near record lows. Crops were severely damaged in 1965, and several counties were designated drought disaster areas.

Ottawa County—In 1996 and 1998, Ottawa County was granted a disaster declaration for drought by the U.S. Secretary of Agriculture.

Michigan—In 2007 and 2012, drought disaster declarations were declared by the U.S. Department of Agriculture for all 83 counties in Michigan due to drought-related crop losses.²⁵

Kent and Ottawa Counties—All of Kent and Ottawa counties were included in a severe drought area in the spring of 2021²⁶. Grand Rapids ran a precipitation deficit of 6.16 inches between the start of the year and mid-May.

Risk/Likelihood

Kent County has a low risk of drought. In May 2022, Kent County had the “50th wettest month of May on record over the past 128 years.” Additionally, Kent County is experiencing the “13th wettest year to date over the past 128 years (January-May 2022).” Long term drought indicators for Kent County project the County of experiencing wet conditions from category W0 (70 to 80 percent) to W2 (90 to 95 percent) with much of the County within the W1 (80 to 90 percent) category. A small portion of northwestern Kent County bordering Ottawa County is projected to be in the dry condition category of 30 to 70 percent. Streamflow conditions are at normal levels within Kent County. The social vulnerability index score for drought in Kent County is 0.48. Since 2019, Kent County has remained outside of the drought categories or in the D0 category.²⁷

Ottawa County has a higher risk of drought when compared to Kent County. Ottawa County had experienced the “62nd driest May on record, over the past 128 years” with a decrease of 0.11 inches from normal. However, Ottawa County is experiencing the “24th wettest year to date over the past 128 years” as of June 2022. Long-term drought indicators for Ottawa County project the county in the wet conditions of W0 (70 to 80 percent) to W1 (80 to 90 percent), with most of the

²⁵ Governor Rick Snyder announcement, http://www.michigan.gov/mdard/0,4610,7-125-1572_28248-285246--,00.html

²⁶ (Schuitema, 2021)

²⁷ “Drought Conditions for Kent County,” National Integrated Drought Information System, last modified 2022, <https://www.drought.gov/states/michigan/county/kent>.

County in the W1 category. The Northeastern, Northwestern, and Southwestern corners of Ottawa County are in the 30 to 70 percent dry condition category, being the most susceptible to drought. Streamflow conditions are at normal conditions. Ottawa County has a social vulnerability index score for drought of 0.22.²⁸

Though climate and weather are the main contributors to hydrological drought, other factors can have an influence: changes in landscaping, land use, and the construction of dams.

Economic Impact

The impacts of drought on a community include water shortages; a decrease in the quantity and quality of crops; a decline of water levels in lakes, streams, and other bodies of water; poor nourishment for wildlife and livestock; increases in wildfires; and increases in insect infestations, plant disease, and wind erosion.

The drought in 1988 impacting the central and eastern U.S. caused an estimated \$40 billion in damages from agricultural losses, disruption of river transportation, water supply shortages, wildfires, and related economic impacts.²⁹

Impact on Critical Facilities/Services

Municipal systems and infrastructure may find the maintenance of water quality and supply to be more difficult and expensive, under drought conditions. Services and operations that rely upon the availability of large amounts of quality water may find that their activities are constrained or made much more expensive. Droughts may affect a community's capacity to fight wildfires, and perhaps even major structural fires.

Vulnerability Assessment

Even though Kent County and Ottawa County border Lake Michigan, the area is still vulnerable to drought. Periods of drought in Michigan can have a significant impact on daily life due to (1) higher risk of forest and brush fires, (2) impacts on commercial agriculture, (3) impacts on gardens, (4) impacts on agricultural supply businesses, (5) lake and river levels, (6) shipping within the Great Lakes, (7) impacts on recreational boating and fishing, (8) water wells, (9) vegetation, (10) wildlife and their habitats, (11) hydroelectric power plants, (12) land use, and (13) downstream impacts from watershed drought. Most of these drought-related impacts emerge and retreat slowly, except for the brush and forest fires.

Figure 3 shows the agricultural lands in Kent and Ottawa Counties, which would be greatly impacted by a drought. Kent County contains approximately 124,769 acres of cropland. Ottawa County contains approximately 145,207 acres of cropland.³⁰

Natural resources such as lakes, rivers, streams, and other bodies of water could be affected by decreases in water levels. Water features are also shown in Figure 3.

²⁸ "Drought Conditions for Kent County," National Integrated Drought Information System, last modified 2022, <https://www.drought.gov/states/michigan/county/ottawa>.

²⁹ Michigan Department of State Police, Emergency Management Division, *Michigan Hazard Analysis*, December 2012, page 139.

³⁰ (USDA, 2017)

Existing Prevention Programs

Rainfall and stream flows are monitored by the National Weather Service (NWS), the U.S. Geological Survey (USGS), and the U.S. Department of Agriculture (USDA). Current drought conditions are updated weekly by the NWS, USGS, USDA and the National Drought Mitigation Center (NCDC). These Federal agencies do recommend states and local governments to have a drought preparedness plan containing three critical components: (1) a comprehensive early warning system; (2) risk and impact assessment procedures; and (3) mitigation and response strategies. Currently, the State of Michigan does not have a formal drought preparedness plan. The Natural Resources Conservation Service, within the umbrella of the USDA, has resources available to local farmers to develop individual drought plans.

In the event of drought-related disasters, the USDA will activate several assistance programs, including direct payments, crop insurance, emergency loans, and other assistance programs to impacted communities.

In Kent County, the local USDA/FSA office monitors the extent of weather-related events in the area to determine if a disaster condition exists. MSU Extension educators and specialists identify what information needs to be disseminated to growers and the agricultural community.

5.4 Earthquakes

An earthquake is a sudden movement or motion in the earth caused by an abrupt release of slowly accumulating strain, which results in the ground shaking, surface faulting, or ground failures. Most hazards arise from ground shaking caused by waves that emanate from the abrupt fault movement during an earthquake.

Historical Events

There have been no earthquakes in Kent or Ottawa County since the 2017 HMP.

West Michigan—On February 4, 1883, an earthquake (intensity VI³¹) cracked windows and shook buildings in Kalamazoo. The earthquake was felt in southern Michigan and northern Indiana.

West Michigan—The earthquake of 1947 is believed to be the most intense earthquake ever recorded in the state of Michigan³². The earthquake hit the town of Coldwater on August 10, 1947, and caused building damage in the city of Coldwater, Kalamazoo, and surrounding cities.

Michigan—On September 2, 1994, a 3.5 magnitude earthquake impacted the town of Potterville, MI and was felt as far away as Jackson, MI (add number of miles of this distance).

Michigan—On May 2, 2015, a 4.2 magnitude earthquake was felt across Southern Michigan; however, there were no reports of damage.

Michigan—On June 30, 2015, a 3.3 magnitude earthquake was recorded seven miles northeast of Union City, Michigan and was felt in Ottawa County and the Greater Grand Rapids area.

³¹ Earthquake Magnitude Scale <https://www.mtu.edu/geo/community/seismology/learn/earthquake-measure/magnitude/>, January 17, 2022

³² (Mike, 2018)

Risk/Likelihood

Earthquakes are rare in Michigan but are still capable of impacting the state. Since 1973, The USGS has recorded four earthquakes in the state. The majority of Michigan ranks in the lowest seismic zone category and is 36th in the U.S. for earthquake hazards.³³ An earthquake has a 2% probability of impacting Michigan over the next 50 years. According to the USGS, the impact of such an earthquake would be minor.³⁴

Economic Impact

According to the FEMA National Risk Index, if an earthquake were to occur Kent County could see an annual loss of \$237,675 and Ottawa County could see an annual loss of \$112,480.

Impact on Critical Facilities/Services

Disruption of communication systems, electric power lines, and gas, sewer and water mains can occur, as a result of the strongest known events. Distant earthquakes (out-of-state) could also be problematic for the region if they cause disruptions in the delivery of fuels or require Michigan to accommodate large numbers of evacuees from a disaster area.

Vulnerability Assessment

According to the U.S. Geological Survey, Michigan has a comparatively low risk of experiencing damaging ground movements, although the area may be affected by distant earthquakes that occur in the New Madrid Seismic Zone and upstate New York. The New Madrid Seismic Zone, spanning from approximately Cairo, Illinois through New Madrid, Missouri to Marked Tree, Arkansas poses the most significant threat. Scientists predict a substantial probability that a catastrophic earthquake will occur within the zone sometime during the next few decades. The greatest impact on the region would come from damage to natural gas and petroleum pipelines.

Existing Prevention Programs

The Federal government has several programs and initiatives in place to help reduce an earthquake threat. The most recent, and perhaps most prominent, is the development of the National Response Framework (NRF) to coordinate federal assistance to a catastrophic earthquake or other similar disaster. Coordinated through the federal Department of Homeland Security (DHS), the NRF outlines the responsibilities of all federal agencies with a role in disaster response and/or recovery.

Executive Order 12699, the Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction law, requires appropriate seismic design and construction of new federal buildings or those receiving federal assistance.

Executive Order 12941, Seismic Safety of Existing Federally Owned or Leased Buildings, established a set of seismic standards for existing Federal buildings. Under this Executive Order, Federal agencies must evaluate their owned and leased buildings for seismic design and potential mitigation when: a building's function is changed, substantially altered, or rebuilt after a disaster.

³³ (wpadmin, 2013)

³⁴ (Environmental and societal risk assessment, 2021)

Building codes for Michigan require attention to the possibility of earthquakes. These are based on historical records for the last couple hundred years which show a potential for seismic motion.

5.5 Extreme Temperatures

5.5.1 Extreme Heat

Although no standardized temperature is used to define extreme heat, the Centers for Disease Control and Prevention define extreme heat as temperatures that hover 10°F or more above the average high temperature for the region and last for several weeks.³⁵

The National Weather Service defines a heat advisory to include a heat index exceeding 100°F for at least three hours. The heat index is a calculation of relative humidity and the temperature. The National Weather Service will announce a heat warning when the heat index is at least 105°F or higher for three or more hours.³⁶ Prolonged periods of temperatures greater than 90°F are of concern, especially for vulnerable populations.

Historical Events

According to the NOAA, there has been one incident of extreme heat in Kent County since 2017 and no incidents in Ottawa County. On June 30, 2018, temperatures reached the 90s with heat indices at or above 105°F. Grand Rapids reached 94 °F with a heat index of 107 °F.

The highest recorded temperature in the region occurred in 1936 with 108° F. During this extreme heat incident, 570 people died statewide and 5,000 deaths were attributed to the heatwave nationwide.³⁷ Grand Rapids reached 100° 12 times in the 1930's.

Midwest—In July 1999, a heatwave struck the Midwest and the East Coast which resulted in approximately 256 heat-related deaths in 20 states, including one death in Kent County.

Grand Haven—In June 2013, officials opened the Grand Haven City Hall and the Grand Haven Community Center to serve as emergency cooling centers. Temperatures reached the 90s and heat indices approached 100.

In recent years, 2012 was recorded as the hottest summer on record in West Michigan. During this time, temperatures exceeded 90°F for 32 days.

Risk/Likelihood

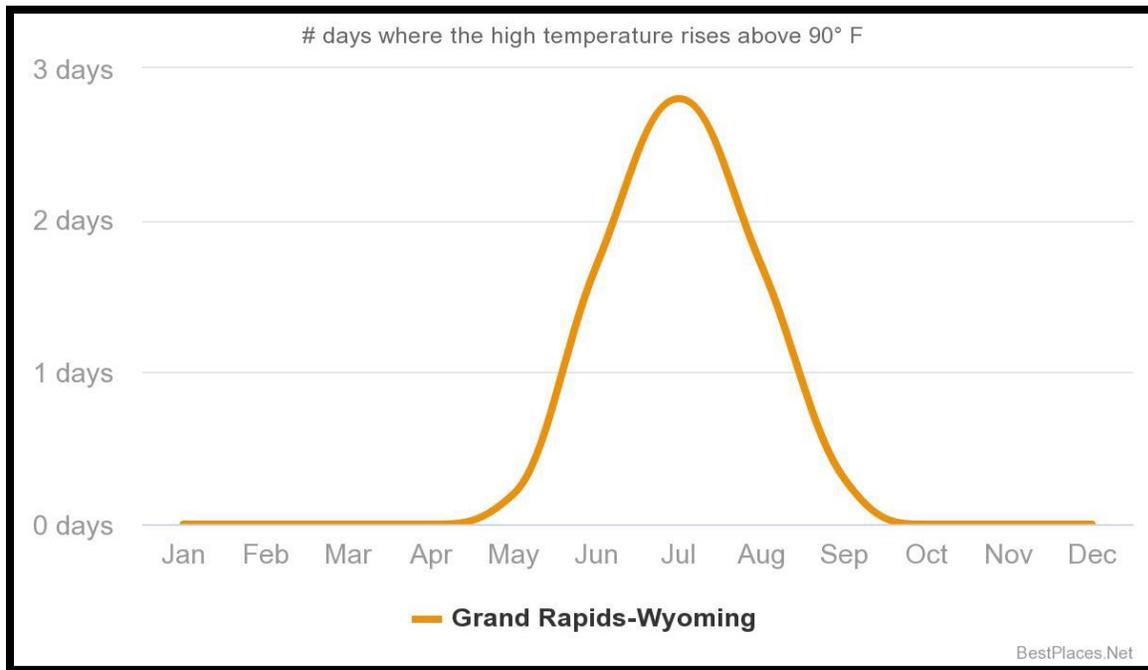
In the Grand Rapids-Wyoming metro area, there are 6.6 days annually when the high temperature is over 90°. The frequency and intensity of extreme heat events are increasing throughout most of the world, including the Great Lakes region. These trends are consistent with the expected response to a warming climate and are likely to continue.

³⁵ Department of Health and Human Services, Centers for Disease Control and Prevention, http://www.bt.cdc.gov/disasters/extremeheat/heat_guide.asp

³⁶ Michigan Department of State Police, Emergency Management and Homeland Security Division, *Michigan Hazard Analysis*, April 2019, pages 91-92.

³⁷ Michigan Department of State Police, Emergency Management and Homeland Security Division, *Michigan Hazard Analysis*, MSP/EMHSD Publication 103. July 2012, page 85.

EXTREME HEAT DAYS



Economic Impact

Extreme heat can impact the region by (1) lost labor, (2) increased electricity usage and higher bills, (3) drought conditions, (4) increased stress on farm crops, reservoirs, streams, and lakes, (5) increased stress on farm animals, pets, and wildlife, (6) increased stress on infrastructure, commercial and residential buildings, and (7) the potential for brown or blackouts. According to the FEMA National Risk Index, extreme heat could cost the region over \$500,00 annually.

Impact on Critical Facilities/Services

Extreme temperature events tend to cause greater energy use, which can involve not only higher energy costs but can also result in infrastructure failures due to limitations in the capacity of the utility system. Conditions may directly impact the health and effectiveness of responders, including the potential for dealing with impacts on overwhelmed or failed infrastructure.

Vulnerability Assessment

In the Grand Rapids region, high weather variability, high-intensity urban development, and undersized infrastructure yield severe and accelerating vulnerability to urban areas as a result of such extreme events.³⁸ Interaction of the Great Lakes with coastal urban environments modify the lake breeze and shifts the urban heat island inwards.³⁹ Increasing urban temperature and development of hot-spots adversely affect low-income urban communities and those with access

³⁸ Borden, K.A., Schmidlein, M.C., Emrich, C.T., Piegorsch, W.W., & Cutter, S.L. (2007). Vulnerability of US cities to environmental hazards. *Journal of Homeland Security and Emergency Management*, 4(2), <https://doi.org/10.2202/1547-7355.1279>.

³⁹ Sharma, A., Fernando, H.J., Hamlet, A.F., Hellmann, J.J., Barlage, M., & Chen, F. (2017). Urban meteorological modeling using WRF: a sensitivity study. *International Journal of Climatology*, 37(4), 1885-1900.

and functional needs in the region.⁴⁰ Projected increases in extremely warm and hot days, described previously, indicates that these risks are increasing. According to the Public Health Institute, the demographics below are all key factors in understanding heat vulnerability.⁴¹

Individual Vulnerability

- **Older adults:** Individuals 65 years and older are particularly vulnerable to heat-related stress and illness and show higher mortality and hospitalization rates during heat waves. Additionally, older adults are more likely to have underlying physical and medical conditions that increase susceptibility to heat-related illnesses. According to the 2019 American Community Survey 1-Year Estimates, Kent and Ottawa County have a lower percentage of population ages 65 and older than the rest of the state at 14% and 15%. Plainfield Township has the highest percentage of population 65 years of age or older in the region, at 36.7%.
- **Young children:** Children under the age of five are highly vulnerable to heat-related stress and illness due to physiological and social factors. Their core body temperature is more susceptible to external factors and require more time to adapt to changes in temperature than adults. Young children are more likely to engage in high-energy activities, spend more time outside, and be less likely to maintain adequate hydration. According to the 2019 American Community Survey 1-Year Estimates, Kent and Ottawa County have the highest percentage of the population under the age of five in Michigan, at 6%. The City of Hudsonville has the highest percentage of population under the age of five in the region, at 12%.

Socioeconomic Vulnerability

- **Individuals living alone:** Single resident households in Kent and Ottawa County. Individuals living alone are at higher risk of social isolation. They may be less likely to be aware of heat warnings, seek resources during times of high heat, or have access to necessary transportation or assistance in getting to these resources. Ottawa County has under 25% of households with single residents. Kent County is at 29.6%.⁴²
- **Unmarried individuals (separated/widowed/divorced):** Marital status is measured as a possible indicator of social isolation, which can contribute to heat. In European studies, married people were less likely to die from heat-related illness/stress than individuals who were separated, widowed, divorced, or never married. In both Ottawa and Kent counties single individuals make up 50-55% of the population.⁴³
- **Economic status:** Low-income individuals are at increased vulnerability to health outcomes during extreme heat events due to factors such as reluctance to run an air conditioner due to cost, limited transportation to seek cooling centers, and less access to medical care to treat underlying health concerns or initial heat illness. Energy burden on households can lead to utility disconnection during winter months. Ottawa County has a

⁴⁰ Sharma, A., Woodruff, S., Budhathoki, M., Hamlet, A.F., Chen, F., & Fernando, H.J.S. (2018). Role of green roofs in reducing heat stress in vulnerable urban communities—a multidisciplinary approach. *Environmental Research Letters*, 13(9), p.094011.

⁴¹ (Michigan Public Health Institute, 2011)

⁴² 2019: American Community Survey 5-Year Estimates Data Profiles, United States Census Bureau

⁴³ 2019: American Community Survey 5-Year Estimates Data Profiles, United States Census Bureau

lower percentage of the population in poverty than the rest of the state at 6.7%. Kent County is at 11.1%.⁴⁴

- **Non-English speaking:** Individuals who are non-English speaking are unable to easily recognize warnings regarding a heat event, locate resources, and understand the available community resources and coping strategies. Kent and Ottawa County have 3.4% of residents who speak English “less than well.”⁴⁵ Undocumented immigrants may not feel safe accessing shelters or relief.

Physical Environment

- **Population density:** Population density can affect heat vulnerability by raising temperatures in urban areas. Areas with a high population density tend to experience higher mortality and morbidity rates due to the urban ‘heat island’ effect. Studies found a higher incidence rate of heat-related deaths in urban counties than rural areas.⁴⁶ According to the Climate Protection Partnership Division, there is a difference in the average daytime surface temperature between developed and rural areas of 18 to 27° F.

Existing Prevention Programs

If the severity of the extreme heat is significant enough to cause a drought hazard, state and federal assistance could be available. Agricultural services and departments such as the Farm Bureau and the U.S. Department of Agriculture will be the most likely type of agency to provide assistance and aid.

Historical data and improved forecasting methods have enabled the National Weather Service to better inform the public of impending weather risks. The NWS will issue an Excessive Heat Warning when the maximum heat index (HI) approaches 105 °F. Providing these types of alerts in a timely fashion will ensure the public is able to take action appropriately.

To issue a heat alert, the National Weather Service (NWS) utilizes the following procedures: (1) analyze the inclusion of HI values in city forecasts, (2) issue Special Weather Statements detailing the hazard, those at risk, and guidelines to reduce those risks, (3) assistance to state and local health officials in preparing Civil Emergency Messages.

A list of warming and cooling centers can be found in Appendix D.

5.5.2 Extreme Cold

Extreme cold is defined as temperatures at or below 0° F. This temperature range usually occurs in the region from late November to early April.⁴⁷ Extreme cold can exacerbate other hazards including severe winter weather, transportation accidents, and infrastructure failures.

⁴⁴ 2019: American Community Survey 5-Year Estimates Data Profiles, United States Census Bureau

⁴⁵ 2019: American Community Survey 5-Year Estimates Data Profiles, United States Census Bureau

⁴⁶ Li Y, Odame EA, Silver K, Zheng S (2017) Comparing Urban and Rural Vulnerability to Heat-Related Mortality: A Systematic Review and Meta-analysis. *J Glob Epidemiol Environ Health* 2017; 9-15. doi:<https://doi.org/10.29199/2637-7144/GEEH-101016>

⁴⁷ (Michigan Department of State Police, Emergency Management and Homeland Security Division, 2019)

Historical Events

On February 9, 1934, the lowest temperature was ever recorded in the state in Vanderbilt at -51° F.⁴⁸

Michigan—In February 1996, a cold wave brought overnight lows of -15 to -30 to the Grand Rapids area. The extreme cold shattered rubberized roof membranes on several school buildings and caused a leak in another school facility when temperatures began to increase. The total estimated property damage was \$150,000.

Grand Rapids—In January 1994, an arctic air mass of historic proportions settled over the state of Michigan from the 13th to 20th of January. Numerous daytime, and monthly record lows, were broken as well as numerous daytime record low maximum temperatures. Grand Rapids' high of three below zero on the 19th was a record for that date and tied the record lowest high for the month of January.

Ottawa County—April 6-10, 1997, unseasonably cold temperatures impacted the area and caused extensive agricultural damage. This resulted in a U.S. Department of Agriculture disaster declaration for Ottawa County.

Kent County—December 27, 2007, extreme cold temperatures caused the Gerald R. Ford airport lost power for 14 hours, resulting in over 200 travelers becoming stranded.

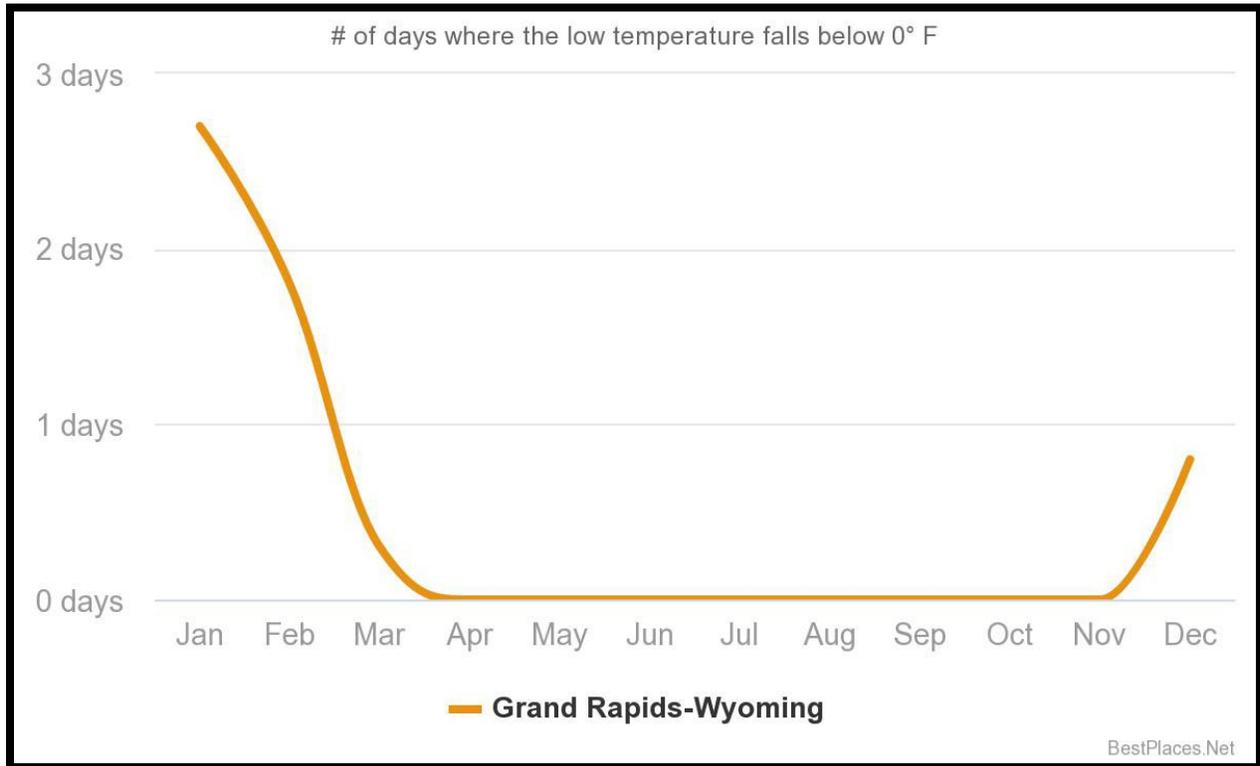
Michigan—January 29 through 31, 2019, a "polar vortex" brought below zero temperatures to the area. Many schools and government buildings throughout the region closed for a week. At times, wind-chill values below -30° F were recorded. In response to the "polar vortex," Governor Gretchen Whitmer declared a State of Emergency across the State of Michigan on January 29. Various shelters and warming centers were activated around the region. Additionally, driving conditions were treacherous causing multiple car accidents including a 24-car pileup on I-196 near Zeeland in Ottawa County.

Risk/Likelihood

In the Grand Rapids region, there are 5.7 days annually when the nighttime low temperature falls below zero. As a result of climate change, the number of extremely cold days (temperature less than 32°F) will decrease significantly.

⁴⁸ (Michigan Department of State Police, Emergency Management and Homeland Security Division, 2019)

EXTREME COLD DAYS



Economic Impact

According to the FEMA National Risk Index, extreme cold will cause over \$400,000 to the region annually.

Impact on Critical Facilities/Services

Extreme temperature events tend to cause greater energy use, which can involve not only higher energy costs but can also result in infrastructure failures due to limitations in the capacity of the utility system. Conditions may directly impact the health and effectiveness of responders, including the potential for dealing with impacts on overwhelmed or failed infrastructure. The main impacts upon property, facilities, and infrastructure come from the damaging effects of frozen pipes. Special clothing and equipment (and maintenance) tends to become necessary under conditions of extreme cold.

Vulnerability Assessment

Epidemiologic studies indicate that the populations most vulnerable to variations in cold winter weather are the elderly and those in rural locations.⁴⁹ Both have difficulty accessing warming shelters and other resources.

⁴⁹ Conlon, Kathryn C et al. "Preventing cold-related morbidity and mortality in a changing climate." *Maturitas* vol. 69,3 (2011): 197-202. doi:10.1016/j.maturitas.2011.04.004

Existing Prevention Programs

The National Weather Service (NWS) provides weather, water, and climate data, forecasts, and warnings for the protection of life and property. The NWS describes extreme cold as extreme cold means temperatures well below zero.

The American Red Cross of West Michigan is the lead agency for activating and managing shelters. The ARC has 109 shelter agreements, primarily in school facilities, retirement homes, and churches in Kent County.

A list of warming and cooling centers can be found in Appendix D.

5.6 Fire Hazards

5.6.1 Wildfires

Wildfires are classified in three types: surface fire, ground fire, or crown fires.

Surface Fire	A surface fire is the most common type and burns along dry field grass or a forest floor, moving slowly and killing or damaging trees.
Ground Fire	A ground fire is usually started by lightning and burns on or below the forest floor in the humus layer down to the mineral soil.
Crown Fire	A crown fire spreads rapidly by wind and moves quickly by jumping along the tops of trees.

Historical Events

According to the Michigan Department of Natural Resources Forest Management Division, between 1981-2018 28 wildfires occurred in Kent County impacting 213.5 acres. During this timeframe, 152 wildfires occurred in Ottawa County impacting 494.3 acres.

Grand Haven Township—In July 2017, a wildfire caused by a campfire affected 3.2 acres.

Crockery Township—In April 2019, a wildfire caused by burning debris affected 1.7 acres.⁵⁰

Tyrone Township—In May 2019, a wildfire caused affected 3.5 acres

Risk/Likelihood

According to the FEMA National Risk Index, the frequency of wildfires in the region is less than 1%.

⁵⁰ Michigan Department of Natural Resources Wildland Data

Economic Impact

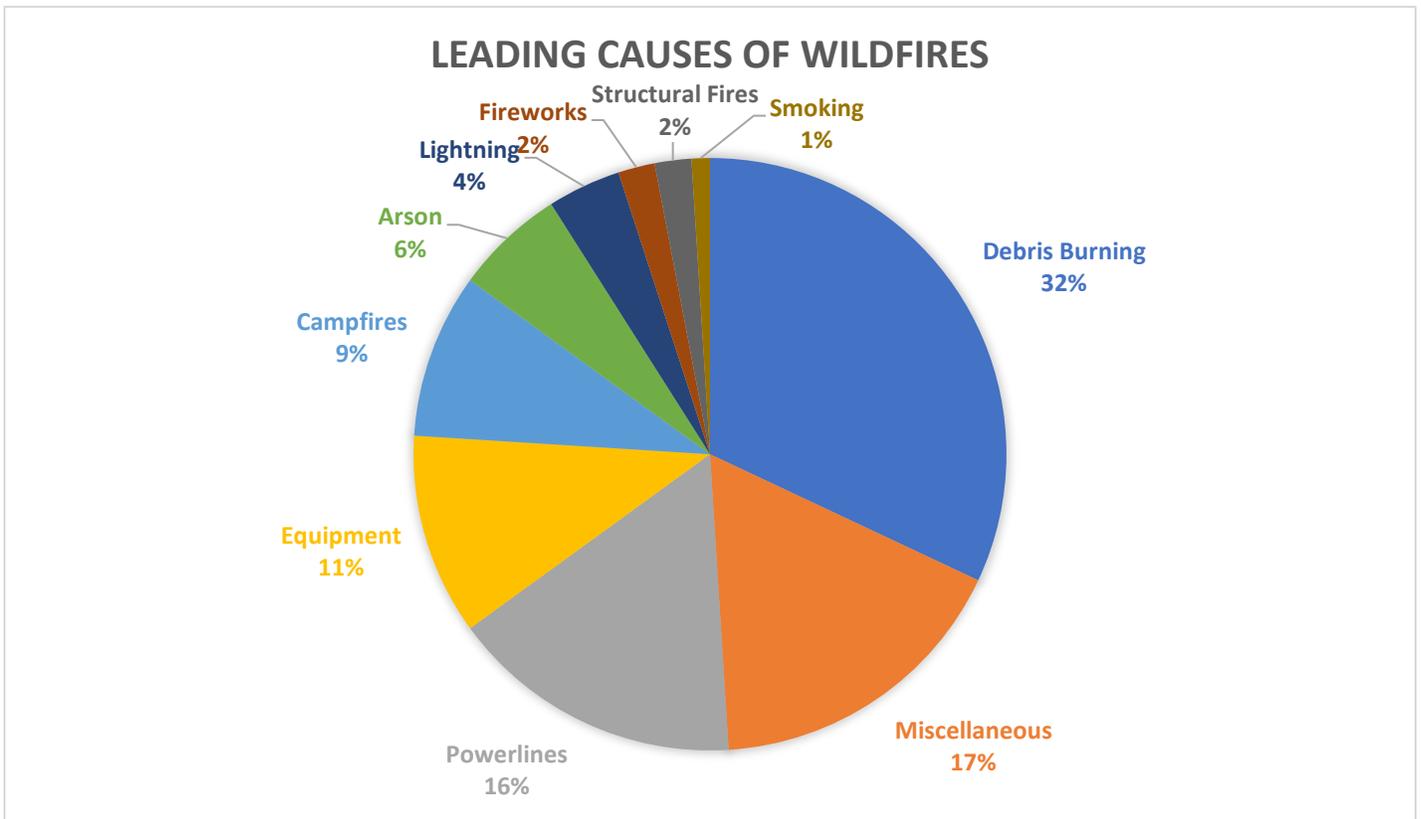
The FEMA National Risk Index expects wildfires to cause an annual loss of over \$1,200 for the region.

Impact on Critical Facilities/Services

Most critical facilities and infrastructure are not at risk; however, wildfires can damage utility lines, access to critical infrastructure and transportation routes, and the environment.

Vulnerability Assessment

All regions that are forested and wetland, grassland and shrub, and agricultural lands are vulnerable to wildfire. Figure 3 shows the location of these lands in Kent and Ottawa Counties. According to 2017 Michigan Department of Natural Resources (MDNR) information, over the last 10 years wildfires have been caused by the following triggers:



Existing Prevention Programs

The Michigan Department of Natural Resources, Forest Management Division, directs and coordinates wildfire prevention, containment, and suppression on all state land. The MDNR emphasizes prevention and public education since humans start most wildfires.

The Michigan Department of State Police, Fire Marshal Division, and the Michigan Interagency Wildland Fire Protection Association bring fire response organizations together from across the state to respond to wildfires.

The Michigan Natural Resources and Environmental Protection Act and the Solid Waste Management Act are two state acts that help mitigate wildfire hazards. The supervision of wells and implementation of environmental performance standards helps to eliminate fire hazards and eliminate conditions that constitute a hazard to health and safety of the public.

The Great Lakes Forest Fire Compact is a cooperative effort between Michigan, Wisconsin, Minnesota, Ontario, and Manitoba who have collaboratively produced a fire hazard assessment for the region. The purpose of this compact is to promote effective prevention, pre suppression, and control of wildfires in the Great Lakes region through mutual aid and cooperation. Initiatives are implemented by committees composed of members of the Compact. An example of an activity the Compact has undertaken is the development of a fire hazard assessment for the region. Michigan took the lead on this project, and the project has proven to be an extremely beneficial educational tool for communities and property owners to assess their fire hazard potential.

The National Fire Data Center established the National Fire Incident Reporting System (NFIRS) to carry out the intentions of the Federal Fire Prevention and Control Act of 1974 (P.L. 93-498). This Act authorizes the National Fire Data Center of the United States Fire Administration (USFA) to gather and analyze national information on fires. The Act further authorizes the USFA to develop uniform data reporting methods and encourage and assist state agencies in developing and reporting data. NFIRS 5.0 helps State and local governments develop fire reporting and analysis capabilities for their use. The obtained data can be used to more accurately assess and subsequently combat the fire problem at a national level. It also expands the collection of data beyond fires to include the full range of fire department activity on a national scale. As of January 1, 1999, Michigan required all fire incidents to be reported with NFIRS 5.0. This includes those fires suppressed by both the DNR and local fire departments.

There are 29 municipal fire departments and one Airport Rescue Fire Fighting (ARFF) department at Gerald Ford Airport for a total of 30 fire departments in Kent County and 23 fire agencies within Ottawa County.

5.6.2 Scrap Tire Fire

Scrap tire fires are large fires that occur at a location where scrap tires are being stored for processing, recycling, or re-use. Michigan generates 7.5 - 9 million scrap tires annually. However, since the EGLE Michigan Scrap Tire Program began in 1991, Michigan's scrap tire stockpile has been reduced from 31 million to about 3,400,000.

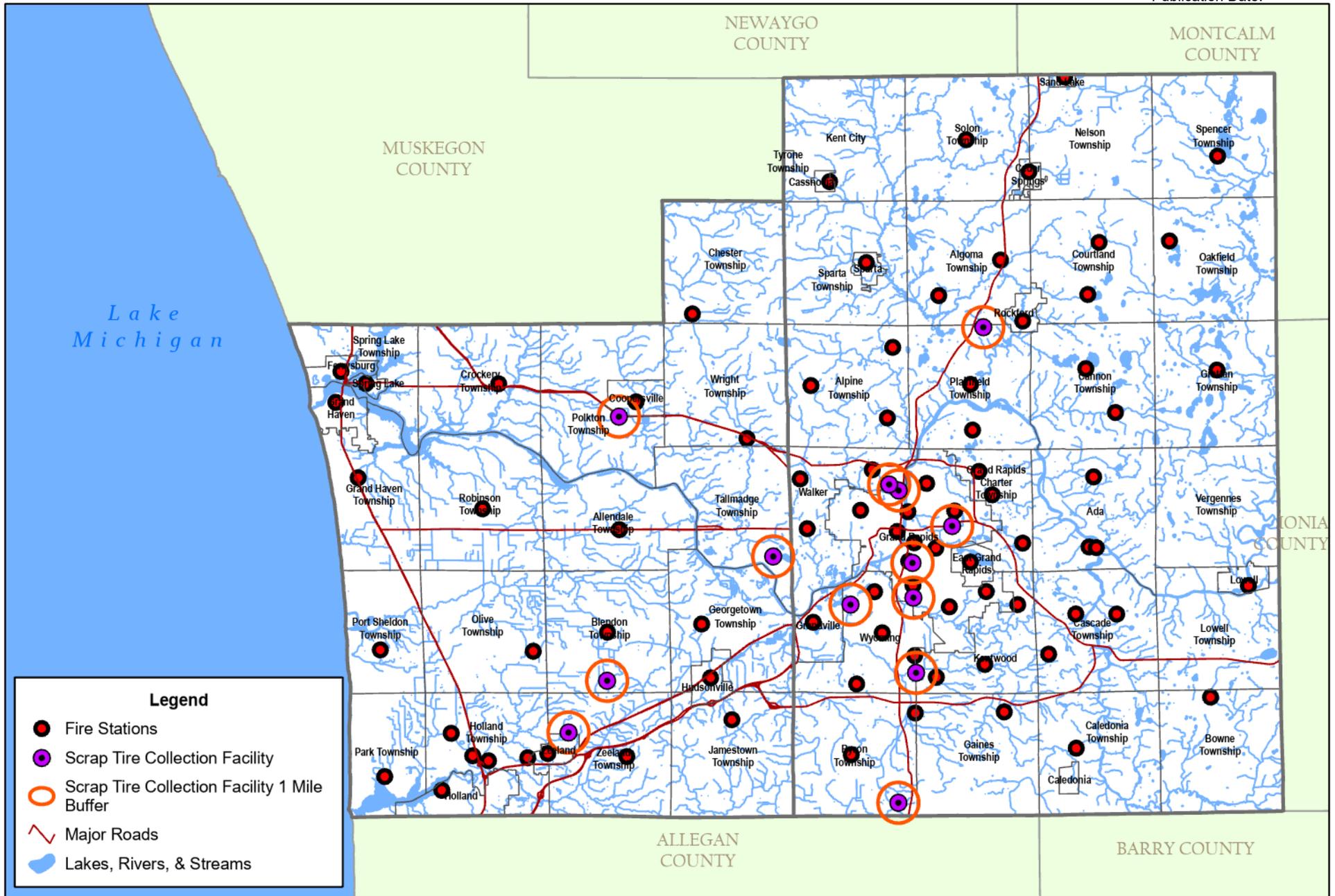
There were 475 scrap tires reported in Kent County and zero scrap tires reported in Ottawa County in 2020.⁵¹

Historical Events

There were sixteen major scrap tire fires from 1987 to 2010.⁵²

⁵¹ Michigan Department of State Police, Emergency Management and Homeland Security Division, *Michigan Hazard Analysis*, MSP/EMHSD Publication 103

⁵² Michigan Department of State Police, Emergency Management and Homeland Security Division, *Michigan Hazard Analysis*, MSP/EMHSD Publication 103, page 216.



Kent County, Ottawa County, & City of Grand Rapids 2022 Regional Hazard Mitigation Plan

Kent County & Ottawa County, MI



Figure 4 - Scrap Tire Fire: Collection Facilities

Kent County—On October 30, 1987, a large fire broke out at a scrap tire disposal site containing over one million tires. It was estimated that the blaze was contained within a fifth of the ten-acre site by establishing a fire break with bulldozers. Nearby residents were evacuated during the early stages of the fire. Firefighters ultimately concluded that the best course of action was to allow the contained portion of the fire to burn since applying water would only delay the inevitable result.

Nunica—On July 23, 2008, a scrapyard fire, fueled by 1,000 tires, kept fire departments from Spring Lake Township, Coopersville, Fruitport, Ferrysburg, Ottawa County, Marne, and Grand Haven Township busy for several hours and sent thick plumes of black smoke over the area. This fire was first reported at around 3:45 p.m. and was caused by sparks from workers cutting off an automobile's catalytic converter. The blaze was confined to roughly a 50-by-50-foot area.

Risk/Likelihood

Based on historical data, the risk of a scrap tire fire is low for Ottawa County since no scrap tires were reported in the County in 2020. Nor is there a registered commercial scrap tire collection site within Ottawa County, which may be due to the Nunica fire. The risk of a scrap tire fire in Kent County is higher due to the reported 475 scrap tires and the presence of a commercial scrap tire collection site the South Kent Landfill, 10300 South Kent Drive Southwest, Byron Center, Michigan.⁵³

Economic Impact

Tire fires often become major hazardous incidents affecting entire communities, producing toxic smoke, and frequently requiring area evacuations. The oil that seeps into ground and surface water because of tire fires is a significant environmental pollutant. For every million tires consumed by fire, roughly 55,000 gallons of runoff oil is generated. In some cases, this may trigger Superfund cleanup status. Scrap tires are also known for providing breeding grounds for mosquitoes, thus contributing hazards to public health.

Due to the amount of response required, extinguishing a scrap tire fire can be financially draining for local emergency response departments. For example, the largest scrap tire fire in recent Michigan history occurred in Osceola County in 1997. That fire burned over 1.5 million tires and cost approximately \$300,000 to extinguish. The State of Michigan paid \$100,000 to Osceola County as reimbursement for fighting that fire.⁵⁴

Impact on Critical Facilities/Services

Scrap tire fires can require substantial resources from local emergency response departments. The response effort typically requires assistance from neighboring fire departments.

Vulnerability Assessment

Table 15 details the registered scrap tire collection facilities in Kent and Ottawa Counties. Due to the toxic smoke produced by tire fires and potential environmental impact, residents living near these facilities are considered vulnerable. Figure 4 shows the location of the registered scrap tire collection facilities with a 1-mile radius. Unregistered scrap tire locations store fewer tires than

⁵³ Environment, Great Lakes, and Energy, Registered Commercial Scrap Tire Collection Site List, April 7, 2022, 1-2, <https://www.michigan.gov/-/media/Project/Websites/egle/Documents/Programs/MMD/Scrap-Tires/commercial-collection-sites.pdf?rev=8ac4bf8967d04a339ade562c6a572f11>.

⁵⁴ Michigan Department of State Police, Emergency Management and Homeland Security Division, *Michigan Hazard Analysis*, MSP/EMHSD Publication 103

registered facilities. Therefore, areas adjacent to unregistered sites are considered less vulnerable than areas near registered facilities.

Table 15: Scrap Tires Locations

Location	WDS	Notes
Belleroc/Tredroc (retreaded) 2505 Thornwood St SW Wyoming, MI	470773	CY 2017: 38,092 SEMI TIRES CY 2018: 91,960 SEMI TIRES CY 2019: DID NOT REPORT Registration expired.
Ottawa County Farms Landfill Coopersville, MI ADC	403061	Approved in license but has not used tires. Registration expired
Alpine Tire and Alignment 2221 Alpine Ave NW Grand Rapids, MI	495854	Accepts tires for recycling. Active registration for hauler
North Kent Recycling & Waste Center 2908 10 Mile Rd NE Rockford, MI		Accepts tires for recycling. No registration.
Ottawa County's Environmental Sustainability Centers		Collects scrap tires at all four centers by appointment only
Padnos Manufacturing Inc 2001 Turner Ave Nw	437571	Active registration for collection site
Meekhof Tire Sales & Service Inc 1640 Olson St Ne	444349	Active registration for hauler
Phoenix Auto Repair 820 Division Ave S	471739	Active registration for hauler
Kent County Department Of Public Works 10300 South Kent Drive Sw	475646	Active registration for hauler
Bedolla's Tire Shop 2220 Division Ave S	482637	Active registration for hauler
A & R General Services 621 Luce St Sw	484219	Active registration for hauler
Alpine Tire & Alignment LLC 2221 Alpine Avenue Nw Office 2	497764	Active registration for hauler
J And C Tires LLC 5170 Division Avenue South	498096	Active registration for hauler
JMB Demolition LLC 7357 Barry, Zeeland	498292	Active registration for hauler
Knight Transfer Services 3251 88 th Avenue, Zeeland	498293	Active registration for hauler

Existing Prevention Programs

The Scrap Tire Advisory Committee (STAC) was created by the Waste and Hazardous Materials Division of EGLE to foster interaction between the department and other stakeholders to continually improve the state's scrap tire program (administered under Part 169 of the Natural Resources and Environmental Protection Act). STAC Annual Reports and a Michigan map for scrap tire sites can be found on the STAC's webpage.

The Scrap Tire Regulatory Fund (STRF) provides grants for the cleanup or collection of abandoned scrap tires and scrap tires at collection sites in the state of Michigan. Kent County received \$16,000 in grants in 2019 for the cleanup of 7,564 tires. Ottawa County received \$14,500 in grants and \$8,000 in grants for the cleanup of 2,689 tires in 2018. Further information can be found on the EGLE Scrap Tire Cleanup Grants webpage.

5.6.3 Structural Fire

A structural fire is a fire of any origin that ignites one or more structures and causes loss of life and property.

Historical Events

According to the Bureau of Fire Services (BFS), there was a 17% increase in year-to-date fire related deaths in 2020 compared to 2019.

Grand Rapids—On December 17, 2003, A house fire killed all seven people inside, ranging in age from two to seven.

Grand Rapids—On January 28, 2008, a massive structural fire erupted, resulting in the destruction of over 100 condominium units in two adjacent buildings displacing around 200 individuals.

Wyoming—On March 19, 2010, a fire destroyed a 32-unit apartment complex displacing all 30 residents.

Comstock Park—On January 3, 2014, a fire erupted in a building attached to the West Michigan Whitecaps stadium. A whole section of the building collapsed under the effects of the intense fire.

Risk/Likelihood

The risk of a death caused by a fire has slowly increased in recent years in the State of Michigan. Based on historical data, the likelihood of structural fire has slowly increased within Kent County. When compared to 2017-2021 averages, there has been a 13 percent increase in 2022. Victims of structural fires tend to be men at 69 percent, between the ages of 40 and 79 years old at 60 percent. The leading cause of fire is smoking at 61 percent, electrical at 10 percent, and cooking at six percent. Thus far, the deadliest time for fires in 2022 is between the hours of 6 PM and 6 AM at 65 percent.⁵⁵

Economic Impact

Kent County annual fire losses average more than \$10,000,000, and Ottawa County annual losses average more than \$2,500,000.⁵⁶ Structural fires can cause displacement, homelessness, serious injuries, death, and economic hardship to those impacted.

Impact on Critical Facilities/Services

Facilities and infrastructure may be taken out of service even from smoke damage, resulting in relocation or disruption. Disaster-level events could involve multiple or major structures such as nursing homes, hospitals, and other locations that involve greater risk and complexity due to the potential numbers of people with access and functional needs involved. Any large fire has the potential to overwhelm local resources.

⁵⁵ Michigan Fire Inspectors Society, “Michigan Fatal Fire Statistics 2022,” accessed June 17, 2022, <https://mfis.org/fire-stats>.

⁵⁶ (Hazard Mitigation Plan for Kent and Ottawa Counties, 2017)

Vulnerability Assessment

Factors associated with poverty and elevated fire risk include family stability, crowdedness, the percentage of owner-occupied homes, older housing, the proportion of vacant houses, and the ability to speak English.

Structural fires can occur in any structure. The greatest loss potential within the region is within the City of Grand Rapids. Smoking is the number one cause of fatal fires with 49% of these fires starting in the living room.

Existing Prevention Programs

To better track the fatal fire data, MI Prevention established a web-based app for fire departments to submit fatal fire data, document smoke alarm installations, and provide access to the SMOKE database and the BFS home page from a mobile device in 2020. During 2020, BFS and MI Prevention has established strong partnerships with the Michigan State Police, American Red Cross, and all fire departments across the state. MI Prevention is receiving detailed fatal fire data in less than 24 hours of the fatal fire occurring.

There are 29 municipal fire departments and one Airport Rescue Fire Fighting (ARFF) department at Gerald Ford Airport for a total of 30 fire departments in Kent and 23 fire agencies within Ottawa County.

The Grand Rapids Fire Department (GRFD) was awarded two FEMA grants in 2019. The first, FEMA Fire Prevention and Safety grant, provided \$354,566 to fund the Residential Safety Program (RSP). The second grant, Assistance to Firefighters Grant (AFG), provided \$1.43 million to install source-capture exhaust removal systems for every front-line apparatus to evacuate carcinogenic diesel fumes from their fire stations.⁵⁷ Several other programs exist related to fire safety, including:

- Michigan Fire Prevention Act
- Michigan Department of State Police, Fire Marshal Division
- Michigan Department of Consumer and Industry Services, Office of Fire Safety
- National Fire Protection Association
- U.S. Fire Administration
- Fire Safety Rules for Michigan Dormitories
- Grand Rapids Fire Prevention Division

5.7 Flooding

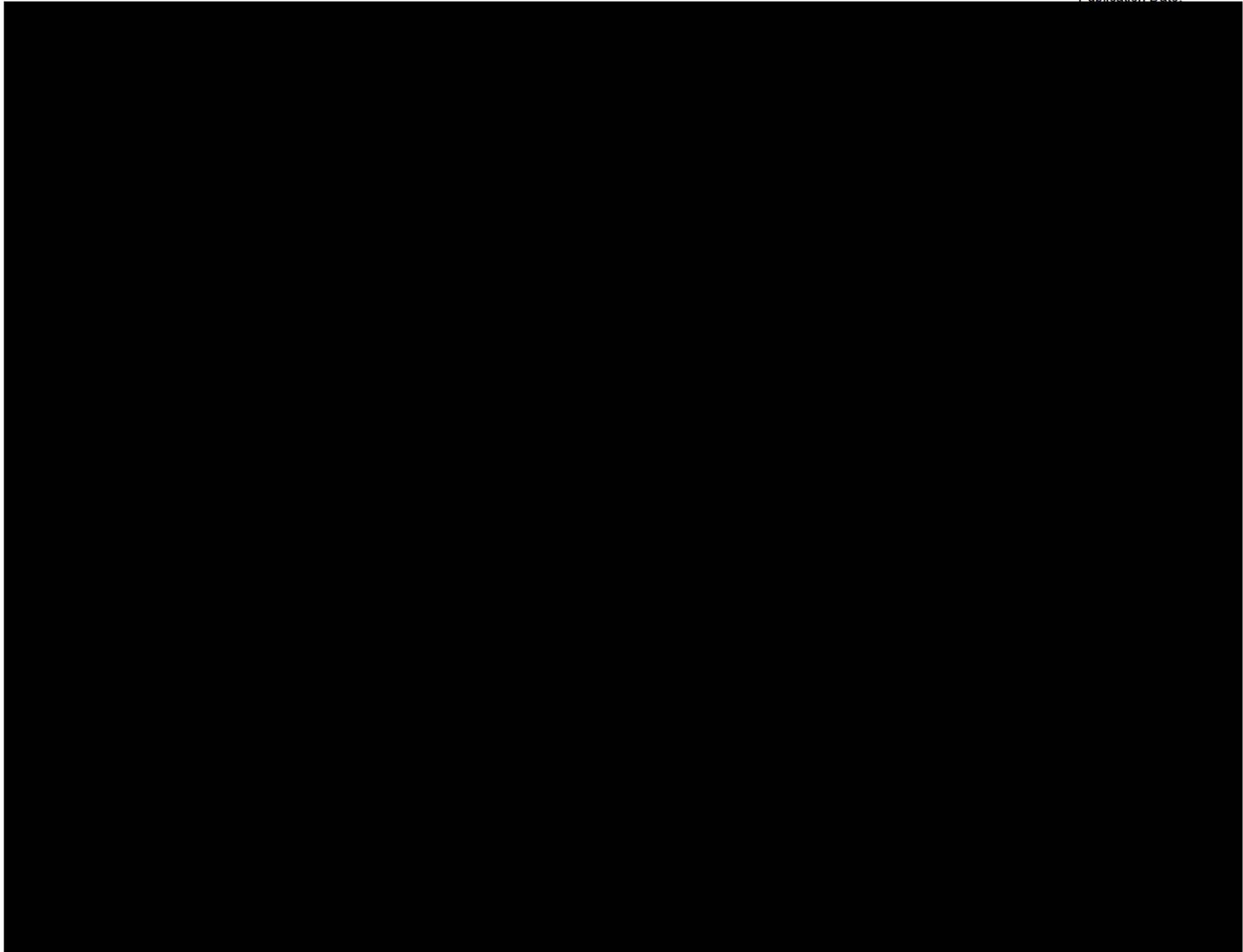
Flooding is the partial or complete inundation of normally dry land. The types of flooding events experienced in the region include dam failure, riverine flooding, shoreline flooding, and urban flooding.

5.7.1 Dam Failure

A dam failure is described as a failure of an impoundment located in a river, stream, lake, or other waterway result in downstream flooding. A dam failure can result in loss of life, property, and natural resources. Dam failures are not only caused naturally, but can also be caused by poor

⁵⁷ (Hazard Mitigation Plan for Kent and Ottawa Counties, 2017)

REDACTED FOR PUBLIC VIEW



REDACTED FOR PUBLIC VIEW

operation, lack of maintenance, and vandalism. Figure 5 shows the location of all dams in the region.

Historical Events

Since 1888, 287 dam failures have been documented in Michigan.⁵⁸ There have been no recorded incidents since the 2017 HMP.

Ottawa County- In 1986, The Fallasburg Dam experienced an inflow flood with an unknown uncontrolled release of the reservoir.

Ottawa County—In May 1996, several inches of rain fell and forced 15 inches of water to flow over the Timmer Dam spillway.

Kent County—In May 2010, after severe storms and heavy rainfall, a retaining wall one mile south of Rockford washed out and numerous homes were flooded causing over \$200,000 in damage.

Risk/Likelihood

Kent County has twelve dams and Ottawa County has seven dams. According to the County Emergency Managers, all of the dams in the counties are inspected annually. Failure is not expected to happen in the next five years. However, the risk of such an event increases as a dam's age increases. Kent County has six dams over 100 years old. Ottawa County's oldest active dam is the Kenowa Lake Level Control Structure, built in 1975.

Impact on Critical Facilities/Services

Stormwater systems can be overwhelmed by the effects of a flash flood that is caused by a dam failure.

Vulnerability Assessment

In Michigan, all dams over six feet high that create an impoundment with a surface area of more than five acres are regulated by Part 315, Dam Safety, of the Natural Resources and Environmental Protection Act (451 P.A. 1994), as amended. This statute requires EGLE to rate each dam as either a low, significant, or high hazard potential, based on downstream hazard potential to developed lands: L for Low, S for Significant, and H for High. The National Inventory of Dams (NID) registers these dam classifications based solely upon the potential downstream impact if the dam were to fail and does not consider the dam's actual physical strength and condition. Tables 16 and 17 detail the dams, as listed by the National Inventory of Dams, in Kent and Ottawa Counties.

Dam owners are required to maintain an Emergency Action Plan (EAP) for significant and high hazard potential dams. Owners must also coordinate with local emergency management officials to assure consistency with local emergency operations plans.

The definitions of dams' three hazard potential classifications, as accepted by the Interagency Committee on Dam Safety, are as follows:

⁵⁸ Michigan Department of State Police, Emergency Management and Homeland Security Division, *Michigan Hazard Analysis*, MSP/EMHSD Publication 103, page 124.

- **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those whose failure or improper operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.
- **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or improper operation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.
- **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or improper operation will probably cause loss of human life..

Table 16: Kent County Dams, as listed by the National Inventory of Dams (NID)

Dam Name	River	Jurisdiction	NID Height	NID Storage	Year Built	Hazard	County ID No.
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	Tributary to Lamberton Creek	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

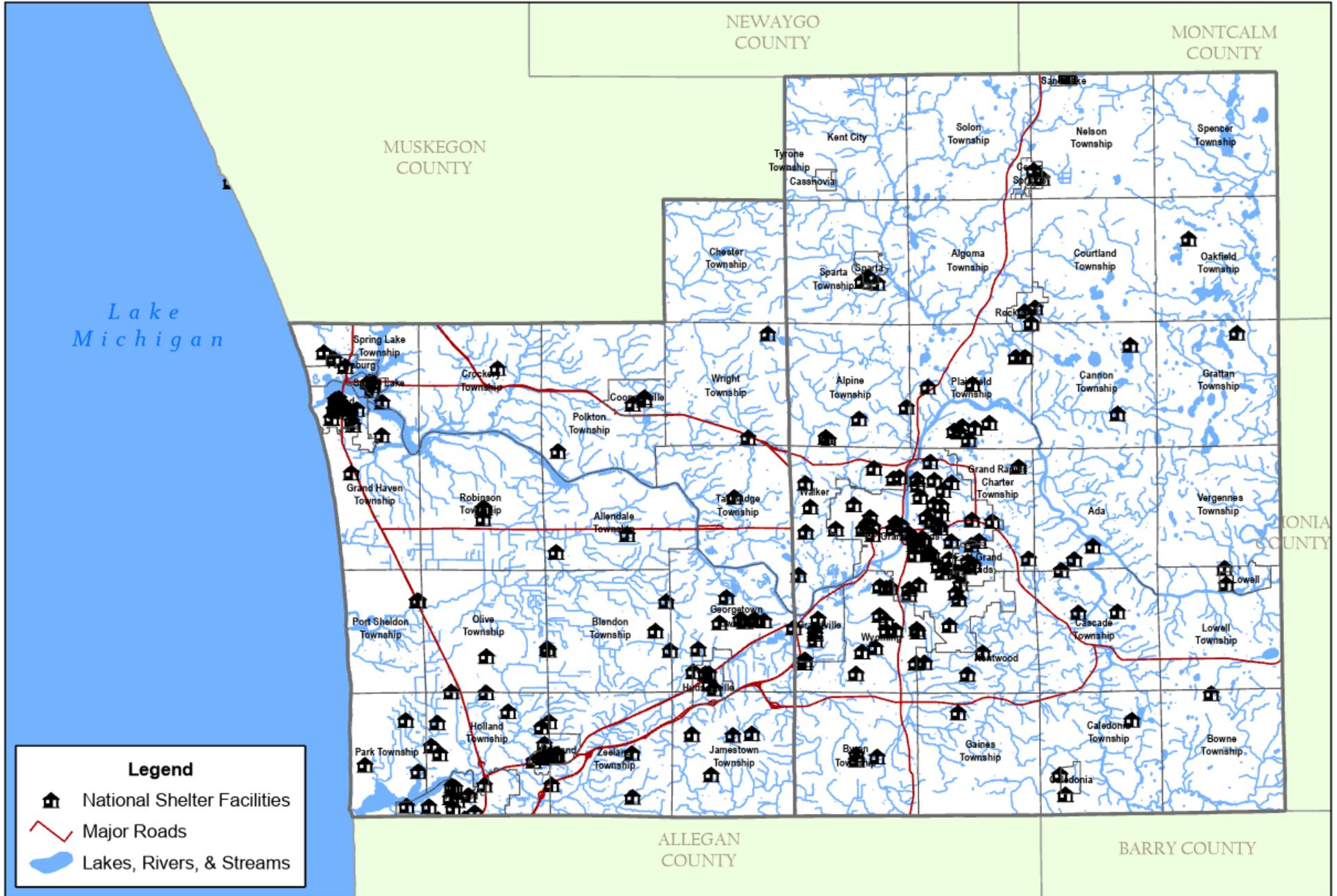
[REDACTED]							
[REDACTED]							
[REDACTED]							
[REDACTED]							
[REDACTED]							

Table 17: Ottawa County Dams, as listed by the National Inventory of Dams (NID)

Dam Name	River	Jurisdiction	NID Height	NID Storage	Year Built	Hazard	County ID No.
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED] Creek	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Areas vulnerable to dam failure are usually located just downstream or upstream from dams. The most vulnerable areas are near the six high hazard class dams. Those with Emergency Action Plans are summarized below. Emergency Action Plans are located in the Tab Attachment.

Fallasburg Dam / Flat River Diversion Dam- The Fallasburg Dam is located on the Flat River about two miles north of the City of Lowell, in Kent County, Michigan at 42° 58' north latitude, 85° 20' west longitude. The Flat River joins the Grand River Basin, which drains into Lake Michigan, which is the second largest drainage basin in Michigan. The facility consists of two separate and distinct structures which are located .5 miles apart. These structures include an earth



Kent County, Ottawa County, & City of Grand Rapids 2022 Regional Hazard Mitigation Plan

Kent County & Ottawa County, MI

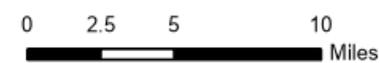


Figure 6 - National Shelter System Facilities

embankment dam with a spillway control structure. The spillway consists of an overflow spillway and two tainter gates. The second structure is a powerhouse which houses two horizontal Francis turbines. The powerhouse is located in an oxbow of the Flat River. Available head at the powerhouse is about 34 feet. The topography both upstream and downstream of the dam varies from flat valley plains to low rolling hills, some with relatively hilly land. Ground surface elevations at the dam are in the range of 680 NGVD. Located approximately two miles downstream is the town of Lowell, with a population of 4000. Located at the northern edge of town is a large manufacturing plant, Attwood Industry. Portions of Lowell, including the Attwood building, may experience flooding if a failure of the dam occurs.

Cascade Dam- The Cascade Dam is located on the Thornapple River in Cascade Township in Michigan. The dam was constructed by the Michigan Water Power Company in 1926 for hydroelectric power generation and was designed by Spooner & Merrill, Consulting Engineers. Consumers Power Company acquired the dam in 1934 from the Lower Peninsula Power Company, and operated the plant until retirement in August of 1971. At that time, Cascade Township purchased the dam and powerhouse from Consumers Power Co.. Currently, the dam has been renovated for hydroelectric power generation. The structure consists of a reinforced concrete powerhouse, an ogee shape spillway with four tainter gates, and left and right earthen embankments extending 220 feet and 170 feet, respectively. The dam's fish ladder, adjacent to the left spillway abutment, is inoperable. The total combined length of the dam is 550 feet. The earthen embankments contain a concrete core wall (combined length of 390 feet). The powerhouse has a length of approximately 57 feet, and the gated spillway is 100 feet in length. The dam impoundment surface area is approximately 300 acres at an elevation of 663.5 feet N.G.V.D.. The area upstream of the Cascade Dam is predominantly rural and residential. The area surrounding the impoundment is a mixture of residential development and forested land. The area downstream of the Cascade Dam consists of the residential development and forested land surrounding the Ada impoundment.

Ada Dam- The Ada Dam is located on the Thornapple River near the Village of Ada, Michigan. The dam was constructed by the Michigan Water Power Company in 1926 for hydroelectric power generation and was designed by Spooner & Merrill, Consulting Engineers. Consumers Power Company acquired the dam in 1934 from the Michigan Water Power Company, and operated the plant until retirement in August of 1967. At that time, Consumers Power Company transferred the dam and powerhouse to the Thornapple Association. Currently, the dam has been renovated for hydroelectric power generation. The structure consists of a reinforced concrete powerhouse, an ogee shaped spillway with four tainter gates, and left and right earthen embankments extending 130 feet and 330 feet, respectively. The dam's fish ladder, adjacent to the left spillway abutment, is inoperable. The total combined length of the dam is 615 feet. The earthen embankments contain a concrete core wall (combined length of 460 feet). The powerhouse has a length of approximately 57 feet, and the gated spillway is 100 feet in length. The dam impoundment surface area is approximately 260 acres at an elevation of 635.5 feet N.G.V.D. The area upstream of the dam is predominantly rural and residential with some lands devoted to agriculture, forest, water, or open space. The area surrounding the impoundment is a mixture of residential development and forested land. The western shore adjacent to the dam is largely undeveloped. The Grand Trunk Railroad bridge and Thornapple River Drive are located immediately downstream from the dam. Downstream from the railroad bridge are approximately five homes, a baseball field, and the community of Ada, which contains a number of residential and commercial structures.

LaBarge Dam- The LaBarge Dam is located on the Thornapple River in Michigan, approximately 1.7 miles northeast of the town of Caledonia. The city of Grand Rapids, Michigan lies approximately 13.5 miles to the northwest of the dam. The Thornapple River joins the Grand River

in Ada, Michigan approximately 14.5 river miles below the Project. The Project structures include a left embankment, a fixed-crest overflow spillway, a radial gate spillway with two, 20-foot-wide by 10-foot-high radial gates, a horizontal turbine flume, a powerhouse with integral intake, and a right embankment. Multiple bridges exist between the Project and the Thornapple/Grand river confluence. Houses and roadways are prominent along the Thornapple River in the study area. Development along the river is mostly residential with the exception of the area just downstream of Cascade Dam on the left bank and just downstream of Ada dam on the left bank. The areas surrounding the houses and roadways are either forests or farmlands.

Of particular concern to Emergency Management and Drain Commission officials are privately owned dams located upstream from populated areas or major transportation routes, such as M-45, Chicago Drive, I-196, and the CSX rail lines. Many privately-owned dams are located in Zeeland Township. Several other privately-owned earthen dams are located in Ottawa County.

Failure of dams located in contiguous counties could have an impact as well. One example is the Ottagon Dam, located just south of the Ottawa-Allegan County line in Laketown Township. Located directly south of Ottagon Street (32nd Street) near Old Orchard Avenue in the City of Holland, this dam was installed to help combat flood problems in the neighborhood nearby. Failure of that dam could potentially flood an area from Ottagon Street north to Lake Macatawa.

Precipitation and severe weather are projected to increase with climate change and will likely increase the frequency and severity of flooding near dams in the future.

Economic Impact

According to the Federal Emergency Management Agency (FEMA), if a high-hazard potential dam fails it could result in loss of life, extensive property, or environmental damage. Dams can fail for a number of reasons, including overtopping caused by floods, lack of maintenance and repairs, acts of sabotage, or structural failure of materials used in dam construction.

Existing Prevention Programs

The Federal Energy Regulatory Commission (FERC) requires Emergency Actions Plans with inundation maps for all dams. EGLE requires emergency Action Plans for all significant and high hazard dams.

The FEMA National Shelter System is a coordinated nationwide database of emergency shelter information where thousands of profiles of potential shelter resources, as well as virtually any type of facility associated with the care of disaster survivors, are maintained. FEMA, working in partnership with the American Red Cross, develop a new easy to use system that includes operational data to assist emergency management professionals in times of disaster and for planning purposes. The system has the ability to track virtually any type of facility used in response to disasters. The new system also includes an enhanced GIS mapping function that will allow emergency management professionals to see in real time, shelter locations, critical infrastructure, flood plains, fault lines, and other geospatial elements. National Shelter System facilities are found on Figure 6.

5.7.2 Riverine Flooding

Riverine flooding is defined as the periodic occurrence of over-bank flows of rivers and streams resulting in partial or complete inundation. According to the NWS/NOAA a flash flood is a life-threatening flood occurring a short amount of time after a rain event, normally less than six hours. Rivers in the region are also prone to ice jams and log jams, which can cause riverine flooding.

Riverine flooding is the most common form of flooding in the United States. The Grand River Basin is the largest drainage system in the region and the second largest drainage system in the State. The basin lies in the center of the State, is about 135 miles long and 70 miles wide, draining 5,572 square miles. The mainstream rises in Hillsdale County and flows northerly through Ionia to Grand Rapids and its outlet at Grand Haven on Lake Michigan. The river has two major tributaries in Kent and Ottawa County including the Thornapple and the Flat, and one minor, the Rogue. The major tributaries merge near Ionia in the relatively flat area east of Grand Rapids. From the points of junction to Lake Michigan the stream falls only 50 feet in a distance of 80 miles in contrast to falls of 350 feet in the tributaries. Consequently, the lower portion of the river, including the Grand Rapids area, is subject to flooding. The lower Grand River Sub-watersheds are depicted in Appendix D.

Historical Events

The worst flood on record in Grand Rapids occurred in 1904 when the Grand River rose nine feet above the danger line, displacing 14,000 persons and producing over \$2 million in damages.

West Michigan—On Sept. 10, 1986, 13 inches of rain fell over two days in the region causing 14 dams to fail and four major bridges to collapse.

Grand Rapids—Flooding lasted from April 12 to 25, 2013, affecting multiple areas in the Grand Rapids metropolitan area.⁵⁹ Sudden heavy rainfall caused the Grand River to rise dramatically cresting at 21.85 feet (6.66 m) April 21, 2013.⁶⁰ The flooding caused thousands of residents in the area to evacuate their homes. On April 21, the Mayor of Grand Rapids, George Heartwell, declared a local state of emergency. Over 1,700 people were evacuated from their homes. Some buildings located on the Grand River front in Grand Rapids had the waterline go over their windows, with some able to see fish and ducks swim by.⁶¹

Kent and Ottawa County—In February 2018, the Grand River approached an all-time record flood. Significant flooding of homes and businesses occurred in Comstock Park. Kent and Ottawa counties were issued a local state of emergency.⁶²

Lower Michigan—On July 20, 2019, a line of severe storms raced southeast across Lower Michigan including Kent and Ottawa Counties, downing trees, and power lines. Radar-estimated rainfall amounts ranged from 8 -12 inches in the hardest-hit locations leading to widespread aerial flooding and road closures.⁶³

Ottawa County—On April 28-30, 2020, a heavy rainstorm overwhelmed storm drains around the area and caused flooded roads and eroded parts of the Lake Michigan shoreline.

Risk/Likelihood

With the Grand River present in the central part of the region, flooding is the top risk for the area. According to FEMA, there are 19,851 properties in Kent County that have a greater than 26%

⁵⁹ Tunison, John (April 25, 2013). "Grand River Almost Back to Flood Stage in Downtown Grand Rapids". MLive. Grand Rapids, MI: Booth Newspapers. Retrieved February 28, 2015.

⁶⁰ Anderson, Alisha (April 22, 2013). "Mich. City Declares Emergency as Flooding Continues". USA Today. Retrieved February 28, 2015.

⁶¹ "Massive Midwest Floods Send Fish, Ducks Swimming by Building's Above-Ground Windows". Daily News. New York. April 23, 2013. Retrieved February 28, 2015.

⁶² <https://www.wzzm13.com/article/weather/near-record-flooding-continues-along-the-grand-river/69-522820753>

⁶³ (National Weather Service, n.d.)

chance of being severely affected by flooding over the next 30 years. There are 10,219 properties in Ottawa County that have a greater than 26% chance of being severely affected by flooding over the next 30 years. This represents 9% of all properties in both counties.⁶⁴ Increased developments in the region will increase the potential for flooding and damage to homes, businesses, and infrastructure.

Economic Impact

Flooding is the costliest and most common natural disaster in the United States. Flooding causes over \$100 million in property damage each year.⁶⁵ According to the FEMA National Risk Index, the expected annual loss for riverine flooding is \$744,362 in Kent County and \$1,470,199 in Ottawa County.

Kent County has had 594 NFIP claims since 1978 totaling \$9,324,123. There were 25 major flood events from 1996 to 2017, totaling \$4,670,000 in property damage and \$510,000 in crop damage. Kent County is one of the top 10 Michigan Counties for flood insurance policies, totaling 615 as of August 17, 2018.⁶⁶

Ottawa County has had 269 NFIP claims since 1978 totaling \$2,798,948. There were 25 major flood events from 1996 to 2017, totaling \$48,365,000 in property damage and \$1,905,000 in crop damage.⁶⁷

Impact on Critical Facilities/Services

Floodwaters can prevent normal access to critical facilities. Roads and bridges are often weakened and degraded by flood impacts, and a previously intact roadway area may have been eroded away under a seemingly shallow water surface. Critical facilities within sewage and pumping systems may not be operating if electricity systems go down. Drainage systems and city sewers can become overwhelmed, causing raw sewage from combined (sanitary and stormwater) sewer systems to back up in basements and onto roadways.

Vulnerability Assessment

Riverine flooding occurs more frequently between December through May due to a combination of frozen ground, high snowpack, and sudden heavy rainfall. Most flooding occurs along natural stream or river channels. The Federal standard for floodplain management under the NFIP is the “base floodplain” (also known as the 100-year floodplain, 1% annual chance floodplain, and Special Flood Hazard Area (SFHA). SFHAs are delineated on Flood Insurance Rate Maps (FIRMs) located on FEMA’s website. Vulnerabilities include roadway and other critical infrastructure (bridges and structures) and populated areas.

Previous studies have investigated the flood exposure of mobile home residents and found them to be vulnerable due to widespread siting of mobile home parks in floodplains, structural fragility, and poverty.⁶⁸

⁶⁴ https://floodfactor.com/county/kent-county-michigan/26081_fsid

⁶⁵ Michigan Department of State Police, Emergency Management and Homeland Security Division, April 2019. Michigan Hazard Analysis, MSP/EMHSD Publication 103, page 145.

⁶⁶ (Michigan Department of State Police, Emergency Management and Homeland Security Division, 2019)

⁶⁷ (Michigan Department of State Police, Emergency Management and Homeland Security Division, 2019)

⁶⁸ Tate, E., Rahman, M.A., Emrich, C.T. et al. Flood exposure and social vulnerability in the United States. *Nat Hazards* 106, 435–457 (2021). <https://doi.org/10.1007/s11069-020-04470-2>

Existing Prevention Programs

The National Weather Service and local media issue flood watches and warnings to give advance notice of potential flooding to areas.

Michigan Flood Hazard Regulatory Authorities address flood mitigation. Provisions of the Land Division Act and its administrative rules require that the floodplain limits be defined and prescribe minimum standards for new residential developments in areas within or affected by a floodplain.

Restrictive deed covenants, filed with the final plat, stipulate that any building used or capable of being used for residential purposes in areas within or affected by a floodplain shall meet the following conditions:

- Be located on a lot having a buildable site of 3,000 square feet of area with its natural elevation above the floodplain limit. (Lots with less than 3,000 square feet of buildable area above the floodplain may be filled to achieve that area.)
- Be served by streets within the proposed subdivision that have surfaces no lower than one foot below the elevation defining the floodplain limits.
- Have lower floors, excluding engineered basements, that are not lower than the elevation defining the floodplain limits. (The Michigan Building Code requires the lowest floor to be at least one foot above the 1% annual chance flood elevation level, and this requirement includes regular basements.)
- Have openings into the basement that are not lower than the elevation defining the floodplain limits.
- Have basement walls and floors that are below the elevation defining the floodplain limits made watertight and designed to withstand hydrostatic pressures.
- Be equipped with a positive means of preventing backup from sewer lines and drains serving the building.
- Be properly anchored to prevent flotation.

As amended, part 31, Water Resources Protection, Michigan Act 451 of 1994 regulates activities that result in the occupation, fill, or grading of land within floodplains along water bodies with a drainage area over two square miles. The floodplain regulatory portion of Act 451 regulates residential occupation of high-risk flood hazard areas and ensures that other uses do not obstruct flood flows. A permit is required from the EGLE for any occupation or alteration of the 100-year floodplain. In general, construction and fill may be permitted in the portions of the floodplain that are not floodway, provided local ordinances and building standards are met. New residential construction is specifically prohibited in the floodway. Non-residential construction may be permitted in the floodway, although a hydraulic analysis may be required to demonstrate that the proposed construction will not harmfully affect the stage-discharge characteristics of the watercourse.

Every community in Ottawa County is a participant in the program. Of the 35 communities in Kent County, 20 participate in the National Flood Insurance Program⁶⁹ including the City of Grand Rapids. Table 18 shows information for each community regarding their participation in the NFIP. In bold, those communities not listed as participating are recorded as “**No**” below. Individual reasons for non-participation can be found in the Appendix B survey documents. Most chose not to participate primarily due to concerns about the potential costs to those who might feel a mandate from mortgage providers to purchase insurance.

⁶⁹ (FEMA, 2021)

Table 18: Participation in the National Flood Insurance Program

Community Name	Current Effective Map Date	Program	Participating Community	Number of Repetitive-loss Properties	Type of Repetitive Loss Property	Number of Insured
Kent County						
Ada, Township	10/15/1980	Regular	Yes	6 Including 2 severe repetitive-loss properties	Single-family Residential	3
Algoma, Township	01/03/1985	Regular	Yes	3	Single-family Residential	1
Alpine, Township		Emergency	Yes			
Bowne, Township			No			
Byron, Township			No			
Caledonia, Township	07/02/1981	Regular	Yes	2	Single-family Residential	1
Caledonia, Village			No			
Cannon, Township	09/16/1988	Regular	Yes			
Cascade, Charter Township	11/06/1991	Regular	Yes			
Casnovia, Village Of			No			
Cedar Springs, City			No			
Courtland, Township			No			
East Grand Rapids, City	09/03/1980	Regular	Yes	1	Single-family Residential	1
Grand Rapids, City	11/5/1986	Regular	Yes	13	9 Single-family Residential, 2 Businesses, 3 Non-residential	4
Grand Rapids, Township			No			
Grandville, City	09/16/1982	Regular	Yes	7	4 Single-family Residential, 2 Business, 2 Non-residential	3
Grattan, Township			No			
Kent City, Village			No			
Kentwood, City	11/18/1981	Regular	Yes			
Lowell, City	05/16/1983	Regular	Yes	4	Single-family Residential	2
Nelson, Township			No			
Oakfield, Township		Emergency	Yes			
Plainfield, Township	01/02/1981	Regular	Yes	30	Single-family Residential	12

Community Name	Current Effective Map Date	Program	Participating Community	Number of Repetitive-loss Properties	Type of Repetitive Loss Property	Number of Insured
Rockford, City			No			
Sand Lake, Village			No			
Solon, Township			No			
Sparta, Township	01/03/1985	Regular	Yes			
Sparta, Village	02/16/1983	Regular	Yes	1	Single-family Residential	0
Spencer, Township			No			
Tyrone, Township			No			
Vergennes, Township			No			
Walker, City	06/01/1982	Regular	Yes			
Wyoming, City	02/05/1992	Regular	Yes	8	Single-family Residential	4
Ottawa County						
Blendon, Township	(NSFHA)	Regular	Yes			
Chester, Township	12/16/2011	Regular	Yes			
Coopersville, City	12/16/2011	Regular	Yes			
Crockery, Township	12/16/2011	Regular	Yes			
Ferrysburg, City	10/21/2021	Regular	Yes			
Georgetown, Charter Township	05/16/2013	Regular	Yes	3		
Grand Haven, City	10/21/2021	Regular	Yes			
Grand Haven, Township	10/21/2021	Regular	Yes			
Holland, City	10/21/2021	Regular	Yes			
Holland, Charter Township	10/21/2021	Regular	Yes	4	Single-family Residential	1
Hudsonville, City	12/16/2011	Regular	Yes			
Jamestown, Township	12/16/2011	Regular	Yes			
Olive, Township	10/21/2021	Regular	Yes			
Park, Township	10/21/2021	Regular	Yes	4	Businesses	2
Polkton, Charter Township	12/16/2011	Regular	Yes			
Port Sheldon, Township	10/21/2021	Regular	Yes			
Robinson, Township	12/16/2011	Regular	Yes			

Community Name	Current Effective Map Date	Program	Participating Community	Number of Repetitive-loss Properties	Type of Repetitive Loss Property	Number of Insured
Spring Lake, Township	10/21/2021	Regular	Yes	2	Single-family Residential	1
Spring Lake, Village	10/21/2021	Regular	Yes		2	
Tallmadge, Charter Township	05/16/2013	Regular	Yes	1	Single-family Residential	0
Wright, Township	12/16/2011	Regular	Yes	1	Single-family Residential	0
Zeeland, City	12/16/2011	Regular	Yes			
Zeeland, Charter Township	12/16/2011	Regular	Yes			

Repetitive Loss

In 2003, the Government Accountability Office found that repetitive-loss properties cost the program about \$200 million annually.⁷⁰ These properties which continually receive flood damage and are reimbursed for their insured losses are referred to as repetitive loss properties and are a primary concern for the NFIP. The NFIP Reform Act of 1994 is a first step at addressing repetitive loss properties through mitigation.

The NFIP Reform Act established the Flood Mitigation Assistance Program (FMAP), which makes funding available annually to states and local governments to mitigate future flood losses. Primarily, these funds are used on repetitive loss structures. Since 1978, more than \$89 million in claims have been paid due to flooding in Michigan. Although that figure is not as high as some areas of the country, Michigan does have its share of repetitive loss properties.

According to the NFIP list as of August 2022 (Tab Attachment) Kent County has 68 repetitive-loss properties and Ottawa County has 17. The table above shows the number of repetitive-loss properties in each community. Additional repetitive loss information is included in the Tab Attachment

5.7.3 Shoreline Flooding and Erosion

Shoreline erosion hazards typically involve property loss as shoreline soil is removed by water and is carried away over time. Shoreline flooding and erosion typically occurs along the Great Lakes shoreline, and connecting waters caused by high water levels, frequently exacerbated by high winds from the west. Ottawa County's Lake Michigan shoreline is 24 miles long. Shoreline flooding and erosion along the Great Lakes are caused primarily by natural factors. Long-term and seasonal variations in precipitation and evaporation rates contribute to the fluctuation of water levels. Several man-made factors can also affect water levels such as water diversion for resource use, dam regulations, and dredging.

Historical Events

The Great Lakes system experienced low water levels in the late 1920s, mid-1930s, and mid-1960s. From 1999 to 2014, the lakes experienced an unprecedented period when water levels for Lake Michigan-Huron and Superior fell below their average depth. As rocks, wrecks and dock

⁷⁰ U.S. Government Accountability Office. (2003). Challenges Facing the National Flood Insurance Program

pilings break the surface, lower water levels raise hazards above and below the surface, reviving waste chemicals stored within bottom sediments to risk ingestion by fish, birds, and people.

However, since 2013, the Great Lakes water levels have been trending upward. The increase in water levels have caused significant damage throughout the Great Lakes region due to increased lakeshore erosion.

Risk/Likelihood

According to the U.S. Army Corps of Engineers, records show a general rise and fall cycle for Lake Michigan lasts approximately 120-200 years. There is also a shorter-term fluctuation from 29-38 years (averaging about 32 years) that occurs within the longer cycle.

Predicting the rate of the rise and fall cycle is difficult. However, shoreline erosion and flooding are likely to continue in Ottawa County along Lake Michigan. Climate change will likely increase the frequency and severity of impacts on the shoreline.

Economic Impact

The Great Lakes region will spend nearly \$2 billion over the next five years combatting coastal damage exacerbated by climate change, according to 2020 survey of 241 local governments by the Great Lakes and St. Lawrence Cities Initiative, a coalition of 128 U.S. and Canadian mayors focused on protecting the Great Lakes. Great Lakes communities have spent \$878 million in the past two years responding to coastal damage, according to the Great Lakes and St. Lawrence Cities Initiative.

Impact on Critical Facilities/Services

The closure of shoreline roads (either temporarily or permanently) as a result of shoreline hazards may result in emergency response delays.

Vulnerability Assessment

There are approximately 3,750 acres of critical dunes in Ottawa County that are at risk of shoreline erosion. The Lake Michigan shoreline has experienced intense residential development, and only a few small tracts of open land still exist. In March 2020, officials in Ottawa County had assessed 84 structures within 50 feet of the bluff, with 10 homes considered high-risk.

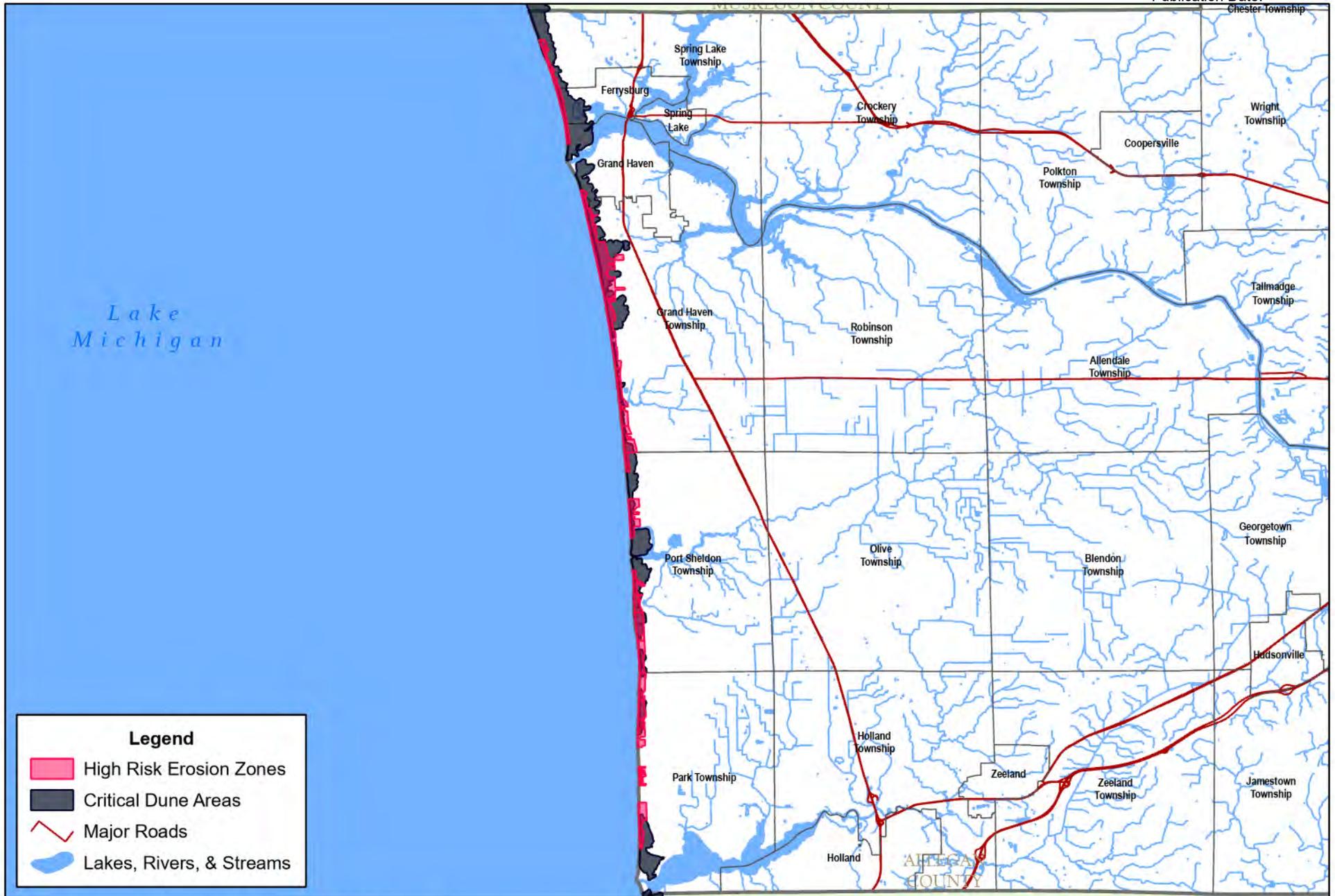
The following is a brief description of Ottawa County properties along the shoreline:

North Beach Park—Located in the City of Ferrysburg, this 20-acre facility includes 745 feet of Lake Michigan frontage and a large natural dune formation. Studies were conducted in 2004 to determine best management practices to control the migration of the dune.

Rosy Mound Natural Area—Rosy Mound is a classic Great Lakes dune system including high wooded dunes, foredunes, a dune blowout, and 0.65 miles of shoreline.

Kirk Park—Located on Lake Michigan in Grand Haven Township, this 68-acre park features rugged, forested dunes and 1,850 feet of sand beach.

Tunnel Park—Named after its unique tunnel through the dune providing beach access, Tunnel Park is located in Park Township approximately two miles north of the Holland piers. Five of the



Kent County, Ottawa County, & City of Grand Rapids 2022 Regional Hazard Mitigation Plan
 Kent County & Ottawa County, MI



park's 22.5 acres are leased from the City of Holland, including approximately 200 feet of the total 950 feet of Lake Michigan frontage.

Park 12 Properties—The property features 700 feet of Lake Michigan shoreline, Mount Pisgah, (a large migrating dune), and approximately one-half mile of Lake Macatawa shoreline. The Park consists of 12 separate parcels of land near Holland State Park, totaling 58 acres.

Port Sheldon Lake Michigan Property—Purchased in 2001, 6.68 acres of land on Lake Michigan in Port Sheldon Township with 200 feet of shoreline. A very high, steep dune is the dominant natural feature of the property, along with the Lake Michigan beach. The County has had communication with the property owners to the south for possible acquisition that would expand the property by almost 12 acres, including an additional 440 feet of shoreline.

Jurisdictional maps of high erosion risk areas are included in Appendix D.

Existing Prevention Programs

Soil Erosion and Sedimentation Control, Part 91 of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, seeks to control soil erosion, and protect the waters of the state from sedimentation. A permit is required for all earth changes that disturb one or more acres of land, as well as those earth changes that are within 500 feet of a lake or stream.

High Risk Erosion Area program is to prevent structural property loss in an area of the shoreland that is determined by the department, on the basis of studies and surveys, to be subject to erosion as required by Part 323 of the Natural Resources and Environmental Protection Act, 1994 PA 451 as amended (NREPA) and the corresponding Administrative Rules. High risk erosion areas are those shorelands of the Great Lakes where recession of the landward edge of active erosion has been occurring at a long-term average rate of one foot or more per year, over a minimum period of 15 years. EGLE staff conducted the initial recession rate research of coastal counties between 1980 and 1986; during that time, they identified high risk erosion areas in 36 of 41 coastal counties. The high-risk erosion area program also increases consumer awareness of the danger of shore erosion and allows staff to provide advice and technical assistance to many citizens living with the dynamic Great Lakes shorelines. Presently about 7,500 individual property owners are affected by setback requirements. All citizens benefit from the program's efforts to reduce the need for public disaster assistance, promote consumer protection, and reduce the loss of natural resources.

Critical dunes and high erosion risk areas in Ottawa County are shown on Figure 7 and included in Appendix.

5.7.4 Urban Flooding

Urban flooding involves the overflow of storm water and sewer systems and is usually caused by inadequate drainage following heavy rainfall or rapid snowmelt.

Historical Events

According to the NOAA, there has been one incident of urban flooding in Ottawa County and no incidents in Kent County since 2017. On May 17-18, 2020, significant rainfall fell across all of Lower Michigan with many locations in Southwest Lower Michigan reporting over three inches of rain. This was the culmination of an already wet week that had experienced three separate episodes of heavy rain. The Muskegon and Grand River Basins saw the brunt of the heaviest rain and were therefore impacted the most. Ottawa County emergency management reported that

several dozen homes as well as building complexes incurred significant flood damage, particularly in Grand Haven, Spring Lake and Ferrysburg. Several roads were also closed due to flooding.

Grand Rapids—In 1904, much of the West Side of the City of Grand Rapids was submerged after ice jams, warm weather, snowmelt, caused the Grand River to rise five feet over its flood stage (18 feet). The flooding caused more than \$1 million in damages. According to newspaper accounts, the flood affected 14,000 residents and 2,500 houses.⁷¹

Grand Rapids—The 2013 flood lasted from April 12 to 25, 2013, affecting multiple areas in the Grand Rapids metropolitan area.⁷² Sudden heavy rainfall, saturation of the ground from rainwater, and the flow of tributaries caused the Grand River to rise dramatically, with the river cresting at 21.85 feet (6.66 m) in Grand Rapids on April 21, 2013.⁷³ The flooding caused thousands of residents in the area to evacuate their homes.

According to the NWS, the highest crests in the City of Grand Rapids history are below. ^{*74}

Height of Highest Grand River Crests	Date
24.76 feet	April 21, 2013
19.64 feet	March 1, 1985
19.54 feet	May 27, 2004
19.50 feet	March 28, 1904
19.29 feet	March 8, 1976
19.25 feet	April 3, 1960
19.25 feet	September 4, 1986
18.83 feet	March 3, 1982
18.60 feet	June 9, 1905
18.50 feet	April 18, 2013
17.87 feet	February 25, 1997
17.84 feet	December 31, 2008

** Numbers have been modified in recent years by the USGS since initial records were made.*

Risk/Likelihood

According to the First Nation Flood Risk assessment, of all Michigan municipalities, Grand Rapids has the third most properties at risk of flooding, with 9,448 (15 percent of total) properties at risk. The frequency of urban flooding is dependent on seasonal weather patterns. Since urban flooding is usually caused by inadequate drainage following heavy rainfall or rapid snowmelt, this type of incident will most likely occur during the spring and summer when thunderstorms and snowmelt are more prevalent.

Many Kent and Ottawa Counties areas are urbanized and located along river corridors. Most of these areas are connected to aging municipal storm sewer systems that exacerbate flooding. It is highly probable that urban flooding will continue to occur in the counties. As development continues, and as stormwater infrastructure continues to age, an increase in urban flooding may occur. Additionally, scientists predict that climate change will increase the number of extreme

⁷¹ (Ellison, 2019)

⁷² Tunison, John (April 25, 2013). "Grand River Almost Back to Flood Stage in Downtown Grand Rapids". MLive. Grand Rapids, MI: Booth Newspapers. Retrieved February 28, 2015.

⁷³ Anderson, Alisha (April 22, 2013). "Mich. City Declares Emergency as Flooding Continues". USA Today. Retrieved February 28, 2015.

⁷⁴ (National Weather Service, 2021)

rainfall and storm events, leading to more flooding throughout the Midwest and costing taxpayers as much as \$480 million annually just to adapt stormwater systems to handle the increased runoff.⁷⁵

Economic Impact

It is estimated that Michigan sees between \$60 and \$100 million in flood damages per year.⁷⁶ The Grand Rapids area is a key economic hub for the westside of Michigan.

Impact on Critical Facilities/Services

Floods have been known to affect hospitals, infrastructure facilities, and even local emergency operations centers. Many facilities are located in downtown areas that are at-risk during severe flood events. In some cases, water pumping, and electric power facilities are located near rivers, and impacts of riverine flooding can cause infrastructure breakdowns resulting in more widespread urban flooding. Many downtown and floodplain areas include bridges and roadway segments that may become impassable, slowing response times, and even requiring boats to be used to provide emergency services to some areas. Among other impacts, urban flooding can disrupt the electricity supply service delivery.

Vulnerability Assessment

Densely populated communities are the most at risk for urban flooding.

Several small streams and creeks in the Grand Rapids Metropolitan area tend to flood within several hours of rainfall over the urban drainage basins. The most significant of these small streams and creeks are the following:

- **Plaster Creek**—Plaster creek tends to crest in about 18 - 24 hours. No flood stage is established.
- **Buck Creek**—Buck creek tends to crest in about 18 - 24 hours. No flood stage is established.
- **Mill Creek**—Mill Creek along West River Drive in Comstock Park tends to crest in about 6 - 12 hours. No flood stage is established.
- **Indian Mill Creek**—Indian Mill creek near Alpine Ave. in the city of Walker tends to crest in about 6 -12 hours. Alpine Ave. is a major growth corridor, and urbanization increases the flood threat. No flood stage is established.

Existing Prevention Programs

Low Impact Development (LID) is a program for stormwater management. LID uses the basic principle that is modeled after nature: manage rainfall where it lands. LID focuses on the on a number of stormwater outcomes, including urban flooding prevention.

The Adopt-a-Drain program is an initiative to encourage residents to clear out blocked storm drains. The AAD website allows users to "adopt" a storm drain, to help clear that storm drain out

⁷⁵ USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 1515 pp. doi: 10.7930/NCA4.2018

⁷⁶ Michigan Department of State Police, Emergency Management and Homeland Security Division, Michigan Hazard Analysis, MSP/EMHSD Publication 103, page 97.

if it gets blocked by debris. Keeping drains clear of debris helps to protect the environment, manage stormwater, and minimize flooding.

5.8 Hazmat Incidents

Hazardous materials are substances that are considered severely harmful to human health and the environment. Many hazardous materials are commonly used substances which are harmless in their normal uses but are quite dangerous if released.

If released or misused, hazardous substances can cause death, serious injury, long-lasting health effects, and damage to structures and other properties, as well as the environment. Many products containing hazardous substances are used and stored in homes and these products are shipped daily on highways, railroads, waterways, and pipelines.

5.8.1 Hazardous Materials: Fixed Site

A Hazardous Material (Hazmat) Incident at a fixed site is defined as an uncontrolled release of a hazardous material originating from a building, structure, or fixed equipment that is capable of posing a risk to life, health, safety, property, or the environment.

Historical Events

Grand Rapids—On February 26, 2008, a natural gas explosion occurred at 1500/1502 Wealthy Street SE resulting in the collapse of a two-story building. Seven people were injured, and five neighboring businesses suffered damage.

Kentwood—On May 16, 2010, a natural gas leak caused a four-unit apartment to explode, resulting in four injuries.

Grand Rapids—On July 3, 2010, a natural gas leak at a residence resulted in an explosion when the owner turned on a light switch when entering the home.

Grand Rapids—On January 10, 2011, a natural gas leak at a residence resulted in an explosion resulting in one fatality and one person injured.

Ferrysburg—On August 7, 2021, a large gasoline leak to the ground occurred at the Buckeye Terminal, resulting in a hazmat response and a lengthy environmental clean-up.

Zeeland—On August 31, 2021, a chemical release occurred at an industrial plant in Zeeland, resulting in local “shelter in place”, hazmat response, and significant recovery and clean-up.

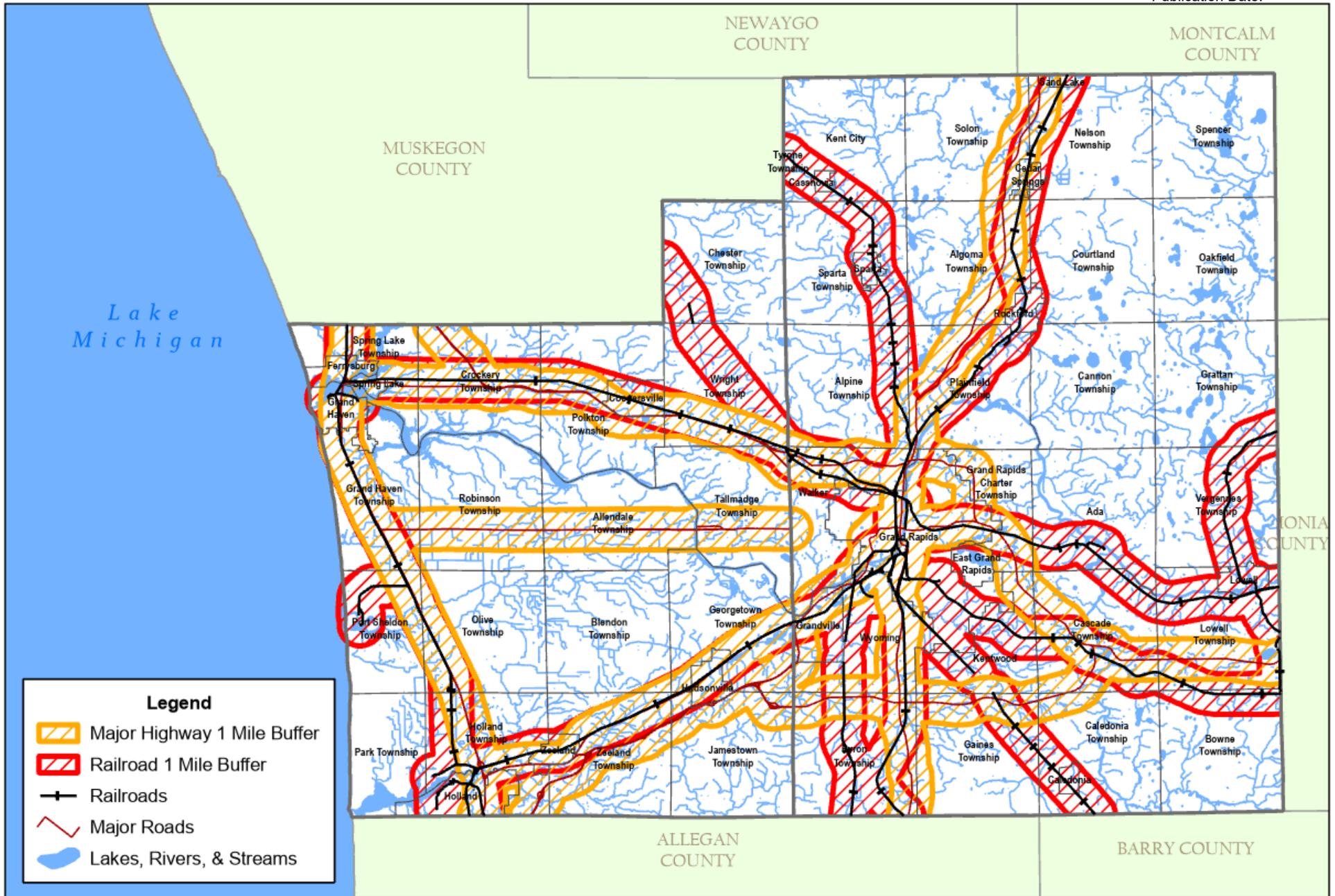
Grand Rapids—On December 7, 2021, a chemical release occurred at the Haviland Corporation resulting in a hazmat response and no injuries.

Economic Impact

The economic impact of hazmat incidents can vary. According to the U.S. EPA Environmental Response Team, a hazmat response can cost between \$1,000 to over \$100,000. Additionally, hazmat responses can cause loss in business revenue.

Impact on Critical Facilities/Services

Hazardous material incidents involve the potential for evacuation (or sheltering in place), creating significant concerns for special populations in hospitals, schools, nursing homes, and other such



Kent County, Ottawa County, & City of
 Grand Rapids 2022 Regional Hazard Mitigation Plan

Kent County &
 Ottawa County, MI

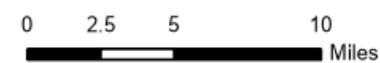


Figure 8 - Hazmat Incidents - Transportation

facilities. Certain extremely hazardous substances may result in a public health emergency and a resulting need for triage, mass treatment, and congregate care. The worst impact could be for events that would contaminate the food supply chain or drinking water.

Vulnerability Assessment

According to the U.S. Coast Guard, the majority of hazmat material releases in the region are released to water, followed by those to land and air.⁷⁷ Vulnerable locations are Sara Title III sites (sites that store hazardous substances) in the counties and those areas within the affected zone of these sites. There were 680 active facilities in Kent County and 296 active facilities in Ottawa County, according to EGLE (2019).

Existing Prevention Programs

The emergency planning provisions of SARA Title III require each state to establish a State Emergency Response Commission (SERC), emergency planning districts, and a Local Emergency Planning Committee (LEPC) for each County. These committees and commissions ensure the public can access information on the hazardous materials stored in their communities. Facilities that store a quantity that meets the EPA reporting threshold are required to submit annual Tier II hazardous substance reports to the SERC, LEPCs, EGLE and local fire departments.

The Kent County LEPC and Ottawa County LEPC both develop off-site response plans for all sites with one or more Extremely Hazardous Substances (EHS) and quantities over the threshold planning quantity (TPQ). An EHS is any of the 406 chemicals identified by the EPA as toxic and listed under SARA Title III. Resources are available on the EPA website to determine if a facility exceeds the TPQ for an EHS.

5.8.2 Transportation Incidents

A transportation hazardous material incident is defined as an uncontrolled release of a hazardous material during transport that can pose a risk to life, health, safety, property, or the environment. Over a million shipments of hazardous materials traverse the United States each day by highway, rail, air, water, and pipelines. Approximately 95 percent of those shipments move by trucks.⁷⁸ See Figure 8 for a complete view of railroads, airports, and major highways in the region.

Historical Events

According to the U.S. Department of Transportation, 612 hazardous materials incidents were reported in Kent County between December 2011 and December 2021. These reported hazardous materials incidents included 577 on the highway, 31 air (flight), and three rail incidents. Zero fatalities were reported. Of those, 214 incidents were located in the City of Grand Rapids.⁷⁹

⁷⁷ U.S. Coast Guard National Response Center Website, www.nrc.uscg.mil/foia.html, Standard Query Report for Kent and Ottawa County, Fixed Incidents, October 2005.

⁷⁸ Michigan Department of Transportation. 2012. Hazardous Materials Routing Synopsis Report, Wayne County: Proposed Recommendations. December 2012. 18 pp. <https://www.michigan.gov/mdot/-/media/Project/Websites/MDOT/Projects-Studies/Studies/Additional-Studies/Hazardous-Materials-Routing/Hazardous-Materials-Routing-Synopsis-Report-English.pdf?rev=d0d3a01024c7463193f0a8f83ff33e52&hash=CD3D54926084F42C739C2EA50AC1AF52>.

⁷⁹ Invalid source specified.

Ottawa County reported 10 hazardous materials incidents between December 2011 and December 2021, according to the U.S. Department of Transportation. These incidents include one rail incident and nine highway incidents.⁸⁰

Coopersville—On February 1, 1983, a gasoline tanker truck rolled over on I-96 near Coopersville, resulting in a spill of 9,000 gallons of gasoline. The gasoline caught fire, forcing the closure of I-96 for several hours until the fire could be suppressed, and the scene was cleaned up and restored.

Holland Township—On November 12, 1979, a freight train derailed, causing a hydrogen fluoride spill resulting in 1,500 having to evacuate.

Wright Township and Tallmadge Township—On January 3, 2011, a semi-tractor-trailer jackknifed causing a diesel tank to rupture and spill approximately 60 gallons.

Jamestown Township—On June 21, 2011, a fire involving a trailer carrying dichlorobutane required a hazmat response.

Jamestown Township—On May 23, 2021, a fatal accident involving a passenger vehicle and a semi-truck resulted in the spill of hot tar on an M-6 overpass. This spill resulted in damage to the roadway and overpass due to the extreme heat of the fire.

Risk/Likelihood

Based on historical events, Kent County has a higher risk of transportation hazardous materials incidents than Ottawa County. Kent County had 612 hazardous materials transportation incidents between 2011 and 2021, with 214 occurring in Grand Rapids. Whereas, Ottawa County only had 10 hazardous materials incidents 2011 and 2021.

Economic Impact

The economic impact of hazmat incidents can vary. According to the U.S. EPA Environmental HazMat Response Team, a hazmat response can cost \$1,000 to over \$100,000. Economic impact can also trickle down to the public through commuter delays and damage to the transportation infrastructure. An incident with perhaps the greatest potential impact on the economy would be one involving a massive petroleum spill in the Great Lakes, which would significantly impact fishing, tourism, and other industries depending on its location.

Impact on Critical Facilities/Services

A significant hazardous materials incident may shut down traffic, affecting emergency services. Continuity of operations would be largely unaffected in most circumstances.

Vulnerability Assessment

The one-mile radius of railroads and major roadways were determined to be the most vulnerable for transportation hazmat incidents. If a rail car, or trailer carrying certain explosives are involved in a fire, the U.S. Department of Transportation Pipeline and Hazardous Materials Administration

Existing Prevention Programs

⁸⁰ Invalid source specified.

The Secretary of the Department of Transportation receives the authority to regulate the transportation of hazardous materials from the Hazardous Materials Transportation Act (HMTA), as amended and codified in 49 U.S.C. 5101 et seq. The Pipeline and Hazardous Materials Safety Administration (PHMSA) (formerly the Research and Special Provisions Administration (RSPA)) was delegated the responsibility to write the hazardous materials regulations, which are contained in 49 CFR Parts 100-180. The applicability of the hazardous materials regulations was extended to all intrastate shipments of hazardous materials by highway effective October 1, 1998. PHMSA is responsible for regulating and ensuring the safe and secure movement of hazardous materials to industry and consumers by all modes of transportation, including pipelines. To minimize threats to life, property, or the environment due to hazardous materials related incidents, PHMSA's Office of Hazardous Materials Safety develops regulations and standards for the classifying, handling, and packaging of over 1-million daily shipments of hazardous materials within the United States.

5.8.3 Wellhead and Pipeline Accidents

A wellhead incident involves an uncontrolled release of oil, natural gas, or a release of hydrogen sulfide gas.

A petroleum or natural gas pipeline incident involves an uncontrolled release of petroleum, natural gas, or hydrogen sulfide gas from a pipeline.

Historical Events

Grand Rapids—On February 26, 2008, a natural gas explosion resulted in the collapse of a two-story building. Seven people were injured, and five neighboring businesses suffered damage. A fire burned for an extended period due to the inability to shut off the natural gas pipeline because of the fire. A gas leak was also detected under the road during the response.

Kentwood—On May 16, 2010, A natural gas leak caused a four-unit apartment to explode, resulting in four injuries. The gas leak occurred in a vacant apartment in the complex.

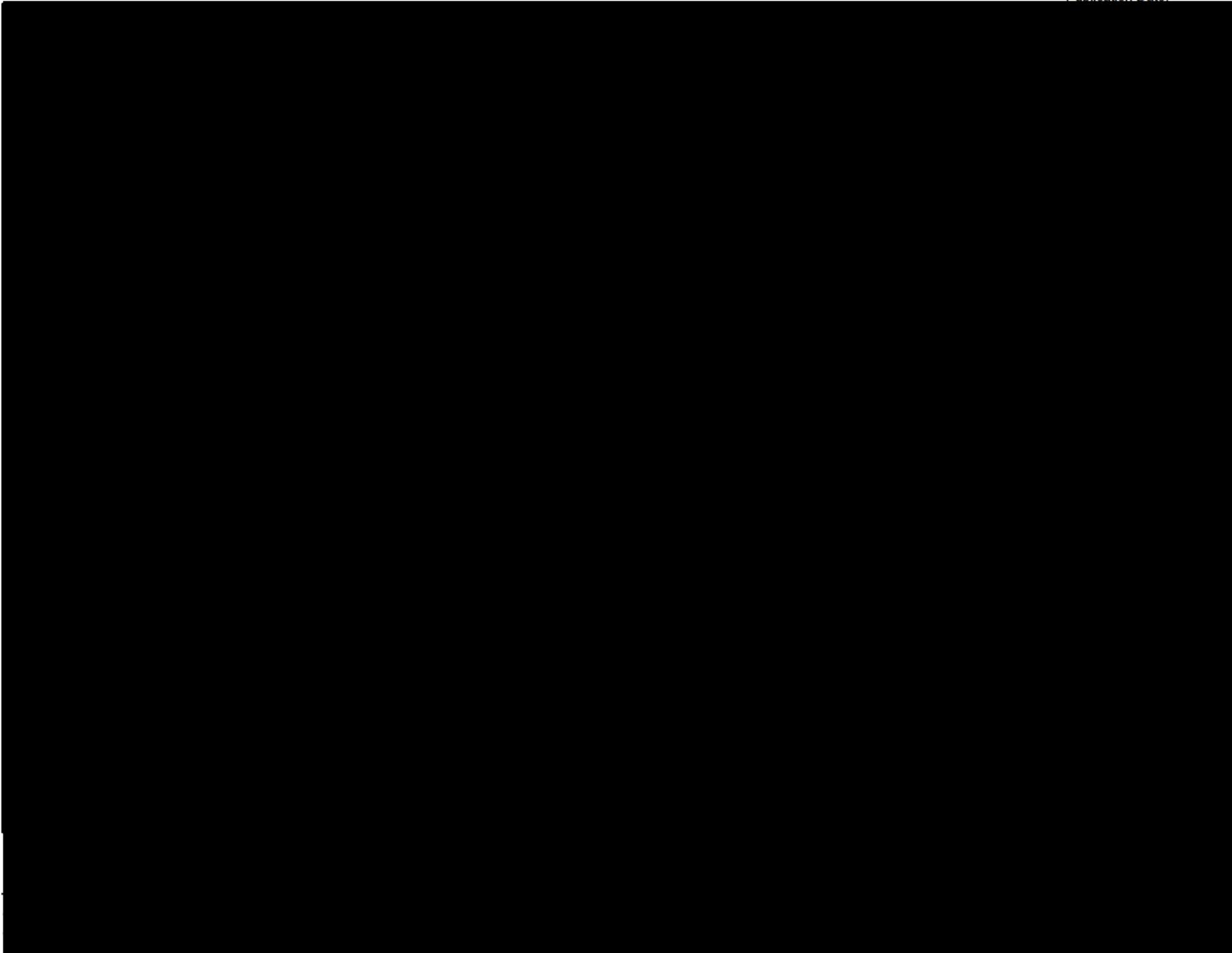
Straits of Mackinac—On April 1, 2018, a barge traveling in the Straits of Mackinac unintentionally dragged its 6-ton anchor damaging an underwater electrical transmission cable and two oil pipelines. This impact resulted in 800 gallons of dielectric fluid being released into Lake Michigan and Lake Huron.

Georgetown Township—On Jan. 1, 2019, an oil leak from a privately owned oil well resulted in the release of approximately 10 barrels worth of oil into the bayou along the Grand River. Fortunately, the oil did not make it out of the bayou and into the flow of the Grand River.

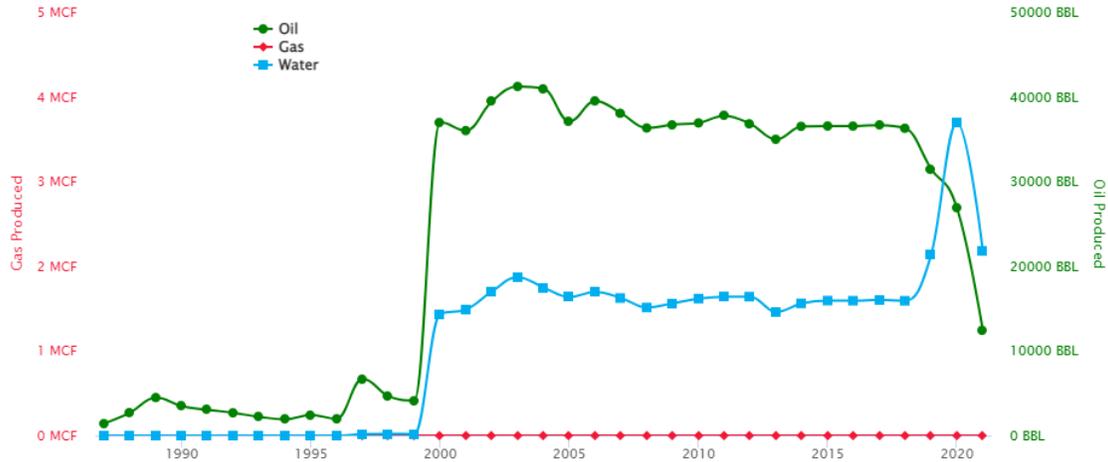
Risk/Likelihood

Since 1987, 138 oil wells have been drilled in Kent County. Currently, 65 of the 138 wells are producing wells with one active producer. Over the last five years, oil production has decreased.

REDACTED FOR PUBLIC VIEW

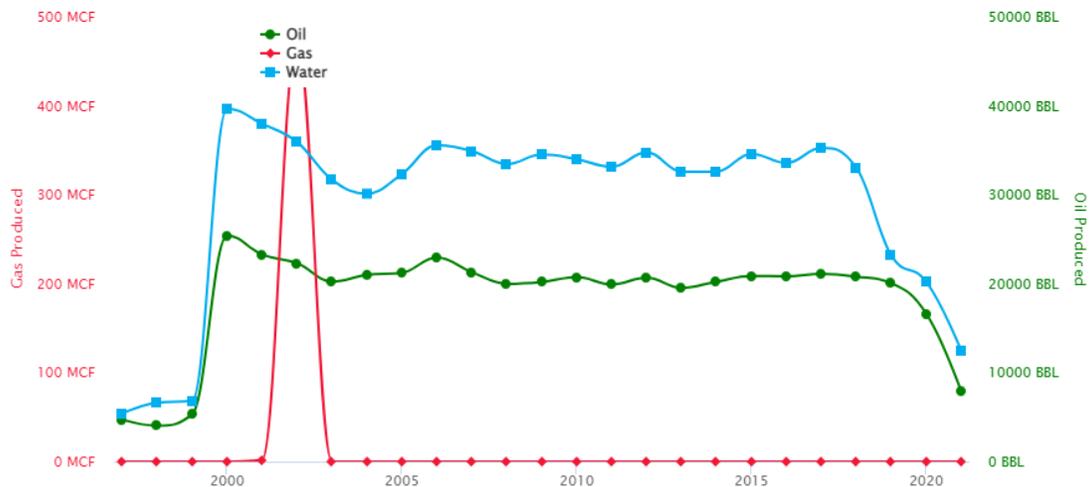


REDACTED FOR PUBLIC VIEW



Kent County Well Production by Year

Since 1997, 129 oil wells have been drilled in Ottawa County. Currently, 56 of the 129 wells are producing wells with three active producers. Similar to Kent County, oil production has decreased over the past five years.



Ottawa County Well Production by Year

Michigan is a major producer and consumer of petroleum and natural gas products. According to the Michigan Public Service Commission, Michigan ranks 11th in the United States for natural gas production and 6th for natural gas consumption. Therefore, transmission and distribution pipelines are common throughout the state. Pipeline incidents are uncommon but could pose serious risks.

Economic Impact

In the United States, the 5-year average total cost of property damage due to pipeline accidents is \$733,597,833.⁸¹ These costs are primarily due to damage to the pipeline structures. Other impacts include the loss of life, property, and decreases in product availability.

Impact on Critical Facilities/Services

The regional network of natural gas, crude oil, and refined product pipelines is integral to local energy supply and has vital links to other critical infrastructure such as power plants and airports. Pipeline incidents could impact the use of these services and may involve the contamination of drinking water sources.

Vulnerability Assessment

Pipeline and wellhead incidents typically impact the immediate area; however, these types of incidents may require evacuations or shelter-in-place orders. Additionally, these types of incidents can impact the watershed and surrounding environment. The location of hazardous liquid and gas transmission pipelines in Kent and Ottawa Counties can be found on Figure 9.

Existing Prevention Programs

The Pipeline and Hazardous Materials Safety Administration (PHMSA), Office of Hazardous Materials Safety (OHMS), facilitates a national safety and security program to protect against life and property risks caused by the transportation of hazardous materials by all transportation modes. OHMS performs research and develops improved guidance for the transportation of containment/packaging materials, coordinates the implementation of hazardous material transportation standards, the management of data information systems pertaining to the transportation of hazardous materials, and the development of safety training policies and programs. These regulations require companies who transport hazardous materials to provide a manifest providing the following information: type of material, quantity, origin, destination, and emergency contact information.

DTE Energy provided the following summary of actions they are taking to mitigate gas pipeline hazards:

DTE diligently monitors thousands of miles of natural gas pipelines and inspects gas delivery systems, both by air and land, to look for evidence of a pipeline leak or damage.

DTE has established a Pipeline Integrity Management program in conjunction with federal and state regulations. Inspection and maintenance work is performed regularly, such as leak surveys and corrosion control. Pipeline segments are replaced if necessary. This program enhances preventive and mitigative measures DTE Energy already has in place to maintain the continued safe and reliable operation of our pipeline system. Across the State of Michigan, these measures include:

- Upgrading more than 500 miles of pipeline for our customers this year.
- Conducting more than 300,000 gas meter safety inspections annually.
- Performing routine inspections inside some pipeline sections, using a sophisticated electronic device sent through pipelines to identify internal problems.

⁸¹ Bureau of Transportation Statistics, Pipeline and Hazardous Materials Safety Administration, January 18, 2022, https://portal.phmsa.dot.gov/analytics/saw.dll?Portalpages&PortalPath=%2Fshared%2FPDM%20Public%20Website%2F_portal%2FSC%20Incident%20Trend&Page=All%20Reported

- Continuously monitoring our natural gas system using sensors, computers, and remote telemetry equipment that detect changes in pressure that might indicate a concern.
- Surveying nearly 10,000 miles of pipeline each year.

Additionally, DTE's Energy Gas Renewal Program's focus is to modernize natural gas infrastructure by renewing gas mains, service lines and upgrading natural gas meters to further improve the safety and reliability of our natural gas system. Cast iron and steel gas main service lines are being replaced with new and improved materials, reducing the risk of gas leaks."

5.9 Infrastructure Failure

An infrastructure failure is defined as a failure of a critical public or private utility infrastructure, resulting in loss of service.

5.9.1 Electrical System Failure

An electrical system failure is a transient energy disruption caused by weather damage (downed power lines) or temporary shortages (brownouts). These failures have a relatively small impact, but even minor inconveniences have become more problematic as society's dependence on technology grows.

Historical Events

Lower Peninsula—On July 7, 1991, A powerful windstorm affected a large portion of central North America and knocked out power to over one million customers from Iowa to Ontario. Almost the entire lower half of Michigan's Lower Peninsula was affected by this windstorm causing power outages to over 850,000 customers.

United States—August 14, 2003, an electrical blackout left 50 million people in North America, including Michigan, with no electricity.

Western Lower Peninsula—In February 2003, a break in a primary transmission line caused a 60-mile electrical blackout stretching over parts of six counties, including Kent County.

Michigan—In December 2013, an ice storm hit Michigan knocking out power to approximately 380,700 homes and businesses along the I-69 corridor.

West Michigan—In February 2019 the polar vortex, a heavy ice storm, hit West Michigan causing power outages affecting 150,000 customers. Power was out for an average of five days.

Risk/Likelihood

There is almost one major electrical failure within Kent and Ottawa Counties each year. In November 2021, Northern and Northwestern Kent County experienced widespread power outages for unknown reasons.⁸² Thousands experienced power outages in Southern Ottawa County in March 2022 due to wind.⁸³

⁸² 13 On Your Side Staff, "Kent County Outages Leaves Thousands of Customers Without Power," ABC, November 10, 2021, <https://www.wzzm13.com/article/news/local/widespread-interruption-leaves-more-than-9000-consumers-energy-customers-without-power/69-33edacc7-b03f-4848-83f7-e0313974897d>.

⁸³ Stacy Aukeman, "Thousands without Power in Allegan and Ottawa County," Fox 17, March 31, 2022, <https://www.fox17online.com/news/local-news/lakeshore/ottawa/thousands-without-power-in-allegan-and-ottawa-county>.

Economic Impact

Electricity is a vital component to operating businesses and critical services. Information regarding the economic impact of electrical outages is not available.

Impact on Critical Facilities/Services

As demonstrated by the August 2003 blackout, electricity is an integral part of every service the county provides to its residents. The blackout caused traffic backups, loss of water service, and gasoline shortages - making it difficult to provide even the most common services. Fortunately, large-scale electrical failures are not common.

Vulnerability Assessment

Although rare, major electrical failures similar to the August 2003 blackout, can occur due to the aging electrical grid. According to DTE, severe weather is the greatest threat to the electrical system.

According to a 2018 study on socioeconomic vulnerability and electric power restoration timelines, three socioeconomic variables were found to be statistically significant in assessing vulnerability to power outages: minority groups, population with sensory, physical, and mental disability, and economic vulnerability expressed as unemployment rate. It was also found that rural counties, predominantly served by rural electric cooperatives and municipally owned utilities, experienced longer power outages and much slower and uneven restoration times.⁸⁴

Existing Prevention Programs

DTE's protocol can be found in Appendix F.

The Michigan Public Service Commission (MPSC) is the primary liaison to the electric and natural gas industry operating within the state. It is responsible for the state's energy emergency planning and response and deals with issues related to service disruptions and restoration, system damage, and emergency services. As part of these duties, the MPSC:

- Develops, administers, and coordinates energy emergency contingency plans.
- Acts as the communications focal point for federal, state, and local activities related to energy emergency planning and management.
- Monitors Michigan's energy supply system for the purpose of detecting unusual imbalances that may indicate the potential for an energy emergency and advises appropriate state officials of such events.
- Maintains ongoing contact with the petroleum, natural gas, and electric industries concerning the state's energy status.

The Michigan Energy Assurance Plan is a comprehensive, all-hazards plan that outlines state regulatory authority, roles and responsibilities, energy monitoring, emergency curtailment measures for electric and natural gas, and communication procedures. The plan outlines the roles and responsibilities of local, federal, and state governments during an emergency. State involvement typically occurs when a local government's capacity to address an emergency is

⁸⁴ Mitsova, D., Esnard, AM., Sapat, A. et al. Socioeconomic vulnerability and electric power restoration timelines in Florida: the case of Hurricane Irma. *Nat Hazards* 94, 689–709 (2018). <https://doi.org/10.1007/s11069-018-3413-x>

exceeded, with federal government involvement occurring when the state's capacity is exceeded. In these latter two instances, an Energy Emergency or a Disaster is declared, and the agency leading the response and recovery efforts change.

5.9.2 Water System Failure

A water system failure is an undesirable or unintended event, occurrence, or situation involving the city's water infrastructure or the discontinuation or significant disruption of water services that could seriously compromise public safety. The supply of water may be interrupted by pipe freezes, water main breaks, or water main failures.

Historical Events

Lake Michigan—The infamous Armistice Day storm in the mid-1940s washed away a section of intake piping in Lake Michigan. Improper construction was likely part of the cause.

Holland—On July 21, 1998, the Holland Board of Public Works had a chemical incident at their water plant, resulting in the release of chlorine gas and the evacuation of the plant. This incident resulted in a request to the community to reduce water use until the situation could be fully evaluated and stabilized.

Holland—In June 2004, a contractor was excavating near one of the 36-inch transmission lines at the Holland Board of Public Works removing backfill supporting this line, which caused the transmission line to separate. This incident made the transmission line unusable for three weeks. This impact did not impact water supply to the public.

Grand Rapids—In 2013, a water main break created a sink hole on the Southeast side of the City.

Risk/Likelihood

Water line breaks are common in the region; however, impacts to the water system are rare. The most likely occurrence of water system is within the summer, fall, and winter months of Grand Rapids, based on 2016 to 2021 data, with the average of 20 outages in a month.⁸⁵

Economic Impact

Water service interruption not only causes a fiscal impact, but also the inability for the community to operate effectively. Water is vital for the operation of schools, hospitals, businesses and to maintain public health.

Vulnerability Assessment

The COVID-19 pandemic brought attention to the importance of having access to clean water for public health. Interruptions in the water system are usually localized and intermittent but can have a consequence on public health.

⁸⁵ "Water Outages: Outages by Year," City of Grand Rapids, accessed June 20, 2022, <https://www.grandrapidsmi.gov/Government/Departments/Water-System/Outages#section-2>.

Existing Prevention Programs

The region's water system has a variety of redundancy and backup systems in place to help prevent a full water system failure. Redundancy includes ability to transition to additional water lines, use of generators, and access to multiple water pump stations.

5.9.3 Storm Water System Failure

Storm Water Systems failure is an undesirable or unintended event, occurrence, or situation involving the city's storm water infrastructure or the discontinuation or significant disruption of storm water services that could seriously compromise public safety. Stormwater drains are the primary access point for runoff, but can be impacted by log jams, clogged drains, and siltation. Increased impervious surfaces decrease the amount of rainwater that can naturally infiltrate into the soil and increase the volume and rate of stormwater runoff. These changes lead to more frequent and severe flooding and potential public and private property damage.

Historical Events

Holland—On July 17, 1982, storm sewer backups occurred when the 8th street lift station lost power.

Risk/Likelihood

Based on historical data, storm water system failures are rare for both Kent and Ottawa Counties. Though, changing land use and expanding urbanization are reducing water infiltration into the soil and increasing surface runoff. These changes exacerbate impacts, including flooding, caused by increased precipitation intensity. Impervious surfaces, combined with more frequent extreme precipitation events, have led to over-taxed storm water systems failing throughout the Great Lakes region.

Economic Impact

The impact of specific emergencies can vary in the short and long run, depending on the success of mitigation efforts, robustness of recovery programs, and the resilience of a community. Strong correlations exist between state economies and the condition of their infrastructure.

Vulnerability Assessment

The storm water system is usually impacted during periods of high rain or snowmelt. Impacts to the storm water system can create flooding throughout the community.

When storm drainage systems fail due to damage or an overload of capacity, severe flooding can occur. These situations can lead to disastrous public health and safety consequences if immediate mitigation steps are not taken. Typically, the segments of society with the most access and functional needs, such as the elderly, children, and ill or frail individuals, are 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 even regions can be negatively impacted.

In 2015, the City of Grand Rapids completed a multimillion-dollar upgrade of the storm water system. This upgrade separated its sanitary and storm sewers ensuring that sewage backups would not happen as a result of heavy rains. The likelihood of a storm sewer failure is low, based on recent updates to the system.

Existing Prevention Programs

In 2009, infiltration basin was installed at Joe Taylor Memorial Park in Grand Rapids. The basin captures water and holds it until it can percolate down through gravel and sand and into the earth, keeping it out of sewers, refreshing water tables, and cleaning it of pollutants in the bargain. The basin under the park drains about 40 acres and can hold 270,000 gallons of stormwater, the equivalent of the first inch of fast-falling rain.⁸⁶

Maintaining a functional water system is a critical service provided by Kent and Ottawa Counties. The storm sewer system is vital to protect public and private property and maintain public health. Grand Rapids has separated its sanitary and storm sewers since 1991. The final project to separate the city's sanitary sewers from its storm sewers ended July 28, 2015.⁸⁷ Combined sewers, in which stormwater and sewage run through the same pipes, can be problematic during heavy rains; when sewers fill to capacity, raw sewage can back up into basements or overflow into waterways.

5.9.4 Sewer System Failure

A sewer system failure can result in sewer backups in homes or businesses discharging untreated sewage to rivers and lakes. A sewer system failure can result in risks to public health. Severe weather can impact the power supply to sanitary pump stations resulting in overflow of sewage into waterways and other parts of the community.

Historical Events

Grand Rapids—In 1969, the design of the stormwater and wastewater system allowed 12.6 billion gallons of untreated sewage to flow into the Grand River. In 2015, the City of Grand Rapids completed the separation of its sanitary and storm sewers, ensuring that sewage backups would not happen as a result of heavy rains.

Grand Rapids—In April 2003, flooding created an overflow in the sewer system forcing 436 million gallons of wastewater to flow into the Grand River.

Grand Rapids—In 2019, flooding and the impact of a faulty gate forced 38.7 million gallons of partially treated sewage to flow into the Grand River.

Risk/Likelihood

Based on historical data, sewer system failures are rare. However, Kent County has a higher risk than Ottawa County for sewer system failures.

Economic Impact

Sanitary sewer system infrastructure is complex, costly to replace, and vital to the community's health. When an obstruction blocks the flow of wastewater within a pipe, the wastewater may back up and overflow through a maintenance hole, cleanout, or drain. This overflowing wastewater may make its way into the environment, a house, or a business. The overflow of wastewater from a sanitary sewer system is classified as a sanitary sewer overflow (SSO). SSOs can lead to significant environmental, health, and safety risks. SSO prevention is important in

⁸⁶ Invalid source specified.

⁸⁷ Invalid source specified.

ensuring the safe and unimpeded transport of raw wastewater from each source to wastewater treatment plants.

Vulnerability Assessment

The Kent County Water System Department and the Ottawa County Health Department operate and maintain county storm drains throughout the county as well as other water, wastewater, and storm sewer infrastructure. Minor problems with the sanitary and storm sewers are common with major rain or snowmelt events. The primary consequence of this hazard is potential public health impacts. As a result, schools, hospitals, and elderly care facilities have been identified as the most vulnerable.

Existing Prevention Programs

Sewer systems can include community-wide systems and residential septic tank systems. To ensure these systems don't fail, systems have the following prevention measures:

- Generators to operate plants and life stations
- Have interconnections between municipal systems to provide redundancy
- Have existing comprehensive contingency plans

Both Kent County and Ottawa County Health departments provide guidance to homeowners on testing residential septic systems.

In 2015, the City of Grand Rapids finished a multimillion-dollar upgrade of the system that carries and treats the area's sanitary sewage and stormwater, reducing, if not eliminating, the danger that untreated sewage would again flow into the Grand River during major rain events.

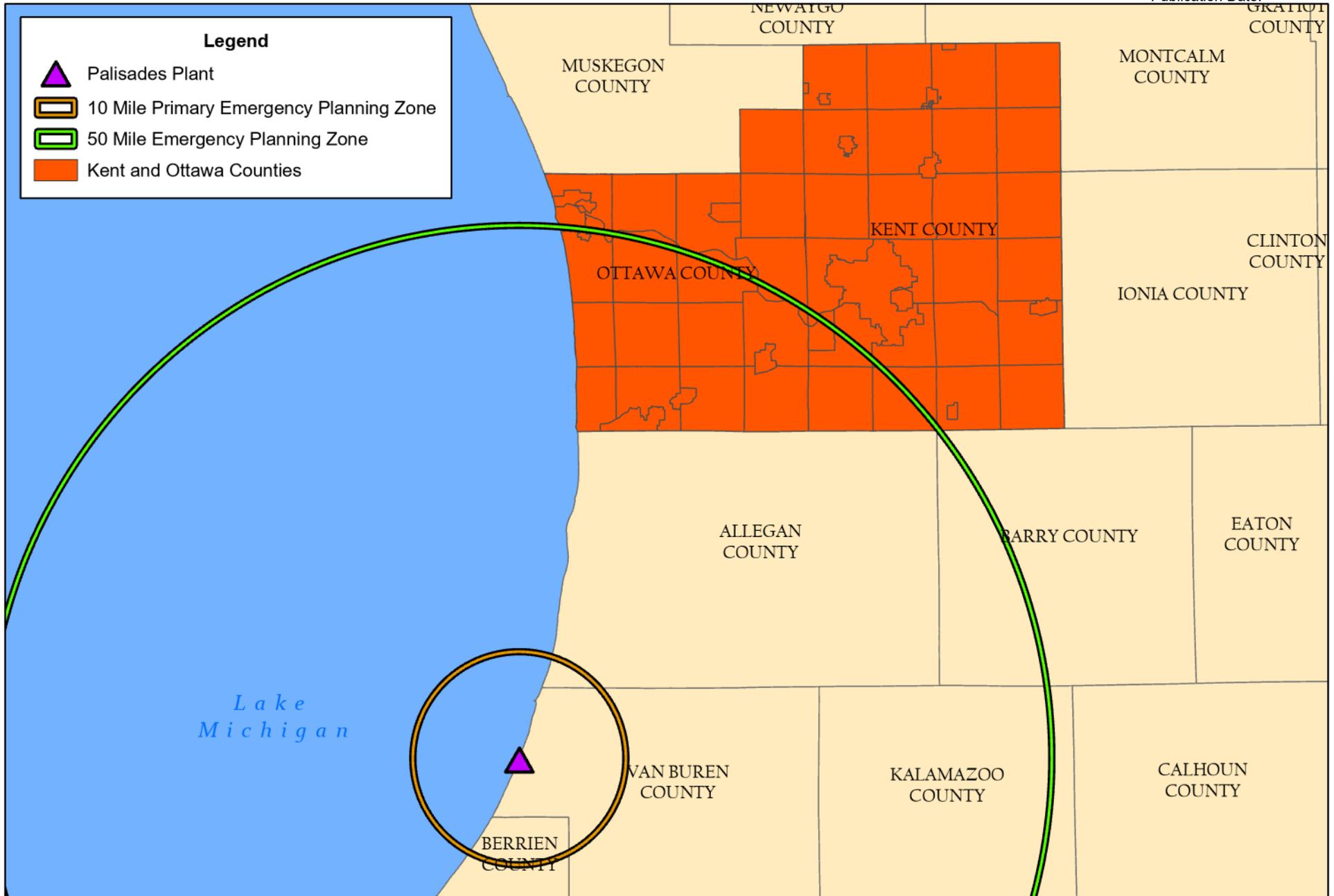
5.9.5 Communication Systems Failure and Cyber Attack

Communication systems are defined as systems through which entities and individuals send and receive information. They include wireless, wireline and landline phone networks, and alert and warning systems. These networks fail during disasters when power is lost due to infrastructure damage; large segments of the power grid are de-energized during Public Safety Power Shutoffs (PSPS); or due to the lack of adequate backup power at communications network facilities and end user premises. Congestion contributes to failures when portions of a network go down and diminish its capacity to handle increased call volumes during emergencies.

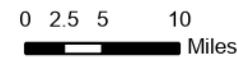
Cyber threats to a control system refer to persons who attempt unauthorized access to a control system device and/or network using a data communications pathway. This access can be directed from within an organization by trusted users or from remote locations by unknown persons using the Internet. Threats to control systems can come from numerous sources, including hostile governments, terrorist groups, disgruntled employees, and malicious intruders.

Historical Events

Kentwood—On July 23, 2018, the City of Kentwood, MI was the subject of a ransomware attack that impacted their daily operations and required reimaging of dozens of computer devices including laptop computers in police and fire vehicles. Ripple effects of this attack were experienced by numerous other agencies who had to immediately interrupt shared network connections and search their systems for suspicious email or other cyber threats.



Kent County, Ottawa County, & City of Grand Rapids 2022 Regional Hazard Mitigation Plan
 Kent County & Ottawa County, MI



Michigan—On January 31, 2020, Peninsula Fiber Network, LLC experienced a technical issue, which caused an outage to 911 across the state.

Grand Rapids—On October 22, 2020, Steelcase, an office furniture manufacturer, Steelcase was hit by a cyber-attack forcing the company to halt global operations for two weeks.

Cyber-attacks are increasing in size, sophistication, and cost. Many of the recent attacks have targeted the energy sector. A recent report from the Institute for Security and Technology found that the number of victims paying the ransom increased more than 300 percent from 2019 to 2020.

Risk/Likelihood

The likelihood of cyber-attacks is high in both Kent and Ottawa Counties. The frequency of cyber-attacks and aging digital security. A study from Positive technologies concluded that an external attackers could penetrate 93 percent of organizational networks.⁸⁸

Economic Impact

Communication and cyber systems are vital for critical services and functions within daily life. Disruptions have widespread impacts on people and the economy, with even partial disturbances affecting productivity. The impacts of a temporary shutdown of communications infrastructure grow larger as the region develops and as a more mature online system emerges.

Impact on Critical Facilities/Services

Communication services are a potential target for hackers, and responders who can't communicate with others may have operations impaired. If the computer system of law enforcement (or other responders) is the focus of the attack, response and continuity of operations could be severely compromised. An inability to convey messages between responders, officials, and the general public may cause preparedness, response, and recovery operations to be severely handicapped. Alternative means of communication are usually less effective and efficient, involving extra time and effort to be expended by responders who could otherwise be engaged in other productive activities.

Communication systems remain operational during most infrastructure failures; however, the increased demand by people phoning home may leave circuits overloaded during extreme events. Cellular telephones may experience significant service disruptions as their transmission towers are overloaded with a sudden increase in the volume of calls.

Vulnerability Assessment

Government and industry have been reluctant to publicly report any type of vulnerability information on a large scale. For the purposes of this plan, the entire region is vulnerable to disruptive cyber-related events. Impacts can range from minor malware incidents to more catastrophic impacts to services and facilities which provide critical support to residents. The most vulnerable industry to cyber-attack and communication loss is healthcare, which saw a 123 percent increase in attacks in 2020.

⁸⁸ Chuck Brooks, "Cybersecurity in 2022 – A Fresh Look at Some Very Alarming Stats," *Forbes*, January 21, 2022, <https://www.forbes.com/sites/chuckbrooks/2022/01/21/cybersecurity-in-2022--a-fresh-look-at-some-very-alarming-stats/?sh=618a9bdb6b61>.

Cell phone towers are at risk of an outage caused by wildfires, according to researchers at the University of Wisconsin–Madison. The wildfire risk in the region is low.

Existing Prevention Programs

The Michigan Cyber Civilian Corps is a team of voluntary experts who are activated by the Governor to assist the state, local governments, and businesses who are experiencing a cyber-attack.

NASA's Solar Shield Project shows strong currents for solar storms and warns power companies to protect their systems. Power companies and other private or government agencies can use these warnings, as well as those from NOAA's Space Weather Scales to prepare for the potential impacts from a cyber-disruption.

Telecommunications companies focus on protecting facilities and systems from disaster-related damage.

5.10 Nuclear Power Plants

A nuclear power plant accident involves an actual or potential release of radioactive material at a nuclear facility. Kent and Ottawa Counties do not have a nuclear power plant within their boundaries; however, portions of Ottawa County lie within the 50-mile ingestion pathway zone (IPZ) of the Palisades Power Plant located in Van Buren County (Figure 10).

Historical Events

No historical impacts have been recorded in Kent and Ottawa Counties as a result of nuclear power plant incidents.

Risk/Likelihood

Since 2007, the Palisades Power Plant has been cited for both workplace accidents and leaked radioactive water into Lake Michigan. These incidents did not impact communities within the 50-mile radius of the plant. Entry plans to permanently shut down the Palisades Power Plant by May 2022, so the likelihood of a future event is very low.

Economic Impact

Due to the low frequency of nuclear power plant incidents in the United States, the economic impact is minimal.

Impact on Critical Facilities/Services

A typical power plant accident at a United States facility would tend to pose limited threats, directly involving the environment and public over a distance no greater than 10 miles away. If the area's electric base load is substantially affected, critical services that use extensive power could be impacted. In most cases, however, the overall strength of the grid would make up for any associated shortfalls if the accident was isolated and other potential energy demand issues were not present.

Vulnerability Assessment

Entry plans to permanently shut down the Palisades Power Plant by May 2022.

Existing Prevention Programs

FEMA's Nuclear Regulatory Commission requires all nuclear power plants to have a plans and procedures for responding to any possible emergency.

5.11 Public Health Emergencies

The U.S. Department of Health and Human Services defines a public health emergency as significant outbreaks of infectious disease or bioterrorist attacks, or other disease or disorders exists impacting the health of the public.

Historical Events

Ottawa County—In November of 2008, Hope College had a norovirus outbreak causing the Ottawa County Health Department to close the campus. Over 400 students and staff developed “norovirus-like symptoms.”

United States—In 2009, the H1N1 influenza pandemic impacted the entire United States resulting in 60.8 million cases and 12,469 deaths. Kent County recorded 516 cases and Ottawa County recorded 213 cases of the H1N1 influenza virus.

Worldwide—In March 2014, the largest outbreak in history of Ebola began in West Africa Ebola with 28,652 cases and 11,325 deaths. Ebola is a virus transmitted through contact with blood or bodily fluids of a person infected with Ebola. Symptoms include fever, vomiting, diarrhea, and hemorrhaging. This outbreak presented a unique challenge for public health as Ebola has not been recorded in humans in the United States. Even though the outbreak was geographically distant local health departments collaborated with a variety of preparedness partners, to ensure a coordinated response occurred if Ebola arrived. Preparedness actions included the monitoring of anyone who traveled from an affected country for 21 days after their arrival in the United States. Kent County monitored 48 travelers and Ottawa County monitored seven. Protocols were established to transport travelers with confirmed fevers to a pre-identified treatment hospital. If a traveler presented symptoms, public health performed contact tracing and monitoring and worked with companies to ensure that their place of residence was sanitized. No cases of Ebola were detected in Michigan.

Ottawa County—In March of 2014 the Ottawa County Department of Public Health (OCDPH) responded to a foodborne illness complaint submitted through a surveillance survey. Analysis performed by OCDPH revealed 294 cases of illness were reported over a 4-day period from this specific restaurant. Southwest Michigan- In 2018 and 2019, the Eastern Equine Encephalitis (EEE) virus, is a rare mosquito-borne disease, occurred in ten people and resulted in six deaths.

Kent County—In 2016, the Kent County Health Department (KCHD) responded to two vapor intrusions within the City of Grand Rapids involving tetrachloroethylene (PERC). The first vapor intrusion incident was from a former dry-cleaning business. KCHD issued an order to prohibit occupancy at the affected properties until the concentration of PERC fell below the maximum allowable indoor air concentration. This order displaced 28 people from two non-profit organizations and two apartments.

The second vapor intrusion incident involved trichloroethylene (TCE) vapor intrusion in a heavy commercial area formerly occupied by a solvent reclamation facility. Based on air monitoring of several commercial properties in the area only one property was required to vacate.

Plainfield Charter Township—Plainfield Charter Township operates a lime softening water treatment plant that supplies water for over 40,000 people in Plainfield and adjacent communities. As part of regular monitoring activities, elevated levels of PFAS were detected in one of the well-fields which was closed in October 2015. From that time going forward, the Township continued regular testing for PFAS with all results well below the EPA's Health Advisory levels. At that time, Plainfield's water treatment process was not designed to remove PFAs compounds, and the plant operators and engineers proposed retrofitting the water treatment plant with a new treatment process using granular activated carbon (GAC). In March 2018, a \$750,000 grant was received from the State of Michigan to retrofit the water treatment plant with GAC and to further study the removal of PFAS/PFOS from municipal water treatment plants. Plainfield's water system was one of the first in Michigan to experience significant demand for the filtration and removal of PFAS.

Kent County—In 2017 a group of concerned citizens began identifying sites in Plainfield and Algoma townships where shoemaker Wolverine Worldwide may have deposited waste from its tannery that contained PFAS which was used to waterproof its boots and shoes. Since that time, EGLE and the United States Environmental Protection Agency have taken various investigative, clean-up, and enforcement efforts to require the sampling of soil, sediment, soil gas, surface water and groundwater for hazardous substances. While extensive site investigations were underway, 1,704 drinking water wells were sampled, and Wolverine voluntarily supplied more than 531 whole-house filters and more than 234 point-of-use filters to residents with high concentrations of PFAS in their well water.

Worldwide—In 2020, SARS-CoV-2 (COVID-19) was declared a pandemic by the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC). The first COVID-19 case was confirmed in Michigan on March 10, 2020.

As of January 2022, Kent County has reported over 125,000 cases of COVID-19 and over 1,100 deaths. Ottawa County has reported over 50,000 cases of COVID-19 and 530 deaths. The state of Michigan has reported over 1.6 million confirmed cases of COVID-19 and over 27,000 deaths. The United States has over 50 million confirmed cases of COVID-19 and over 800,000 deaths. The World Health Organization (WHO) has confirmed over 272 million cases worldwide with over 5.3 million deaths.

Risk/Likelihood

Public health emergencies can arise from a wide range of causes and exhibit varying levels of severity, thus making it difficult to establish a frequency of occurrence. The Michigan Hazard Analysis anticipates public health hazards will become more likely as the population ages and population increases.

Economic Impact

Economic impacts from this hazard can be severe if the source is infrastructure-related, such as the public water supply system. However, it is more likely that economic impacts will result through lost wages and medical expenses for impacted persons. An additional impact may result if a business is determined as the source of the emergency (i.e., a restaurant must close).

Impact on Critical Facilities/Services

Medical resources may become overwhelmed and unable to deal with acute needs or routine services. Responders will be at risk for contracting the contagious illness being responded to. Travel may become limited, either directly through governmental orders that limit movement, or

indirectly through limitations placed on infrastructure, such as airports or other modes of mass transit. If elected officials and other leaders are sickened, steps will need to be contemplated and plans put into place to ensure continuity of operations. Governmental services at all levels may be stretched thin.

Vulnerability Assessment

Public Health Emergencies can exacerbate many of the challenges already faced by populations with access and functional needs: food security, transportation, housing, and more. Vulnerable populations, as a result of race, ethnicity, and socioeconomic status, may face an increased risk of contracting illnesses, greater demand for services and social support, and reduced treatment access. Individuals who cannot meet these needs may face difficulties in adhering to physical-distancing recommendations.

The most vulnerable population during the COVID-19 public health emergency are those aged 65+. Older people (65+) are especially vulnerable to infection, serious illness and death, accounting for about three-quarters of the total American COVID-19 deaths. Plainfield Township has the highest percentage of population 65 years of age or older in the region, at 36.7%.

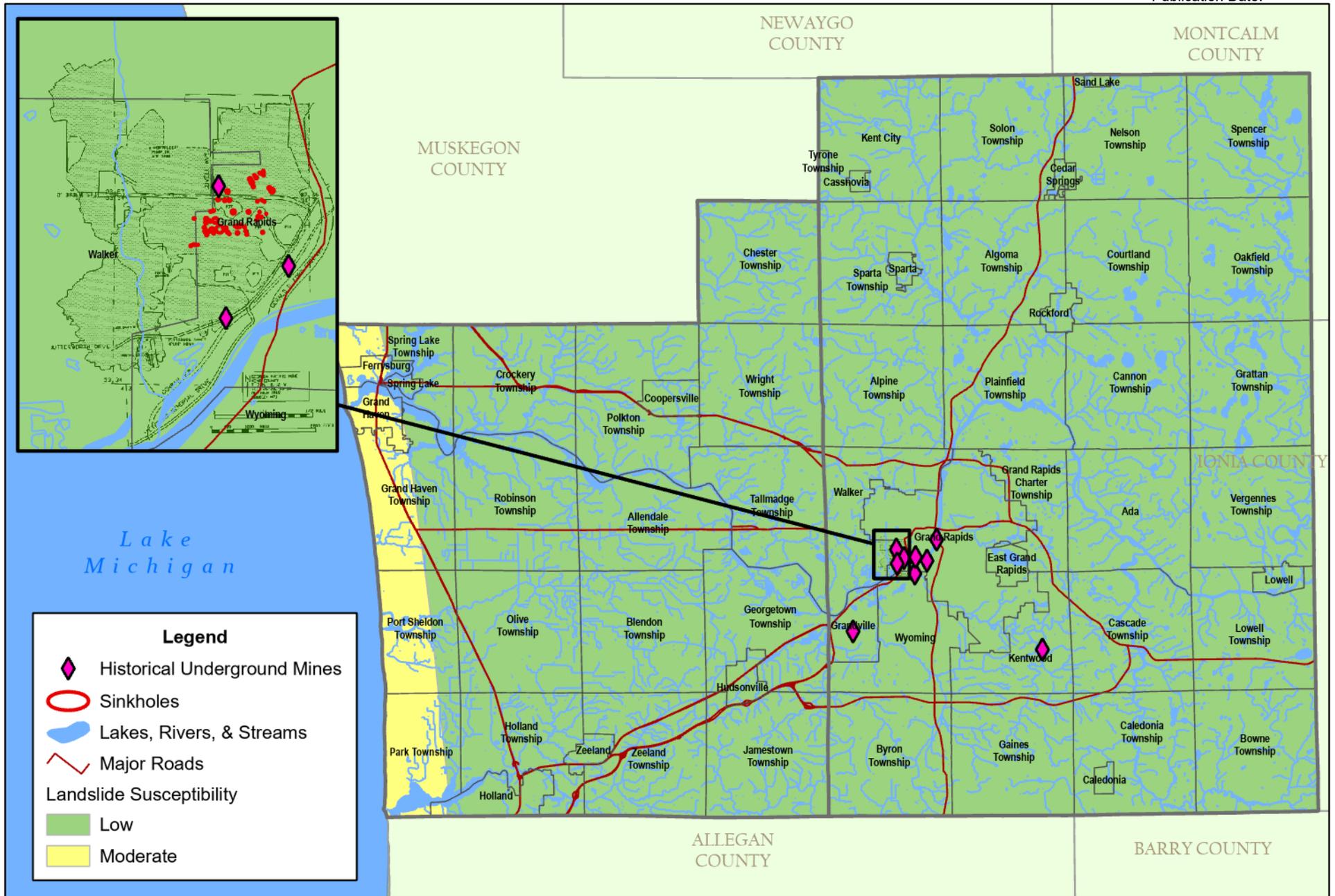
Existing Prevention Programs

The Health Education and Promotion Section of the Kent County Health Department provides services including training, wellness services, and educational classes based on nationally recognized evidence-based programs and promising practices. Staff also develop educational materials, write grants, and plan and evaluate programs.

The Health Department operates four public health clinics throughout the county that offer immunizations and the Women, Infants, and Children program (WIC). These programs prevent disease and ensure adequate nutrition for moms and babies from pregnancy to childhood. KCHD also operates a tuberculosis (TB) and Personal Health Services (PHS) clinic. Through testing and directly observed therapy, the TB clinic aggressively treats cases of TB to eradicate the disease from Kent County. PHS offers testing, counseling, and in some cases, treatment of HIV, gonorrhea, syphilis, and Chlamydia. KCHD has a state-of-the-art laboratory to test virus cultures, water samples, and more. As part of its work, the Communicable Disease and Epidemiology units of KCHD work with local health care providers to track disease, investigate outbreaks, and report County-wide case numbers for these diseases and approximately 75 other illnesses ranging from influenza to salmonella.

The CDC has federal responsibility and authority to investigate public health emergencies to determine their cause, probable extent of impact, and appropriate mitigation measures. It also has a webpage dedicated to pandemic influenza. The CDC can also assist state and local public health officials in establishing health surveillance and monitoring systems/programs and disseminating information on prevention and treatment to the public. The CDC has made dedicated funding available for bioterrorism response, and Michigan has strengthened its surveillance and intervention infrastructures with these funds.

The Michigan Department of Health and Human Services (MDHHS) and local district health departments across the state have several programs and initiatives to protect the health and safety of Michigan's residents. The MDHHS director and local public health officers have authority (under the Michigan Public Health Code—1978 PA 368, as amended) to take necessary steps to prevent epidemics and the spread of hazardous communicable diseases. They may issue written



Kent County, Ottawa County, & City of
 Grand Rapids 2022 Regional Hazard Mitigation Plan

Kent County &
 Ottawa County, MI



orders to implement these preventive steps and responses. State and local health departments also have detailed emergency operation plans to address other public health emergencies.

The World Health Organization (WHO) has established a pandemic preparedness webpage and has established six levels of pandemic “phases” based upon observable phenomena and allowing for the incorporation of recommendations and approaches into existing preparedness and response plans. Phases 1–3 concern preparedness activities, including capacity development and Page 139 Public Health response planning, while Phases 4–6 indicate a need for response and mitigation efforts.

5.12 Subsidence and Landslides

Landslides are a natural disaster that involves the breakup and downhill flow of rock, mud, water, and anything caught in the path.

Subsidence (from the root word, subside) is the lowering or collapse of a land surface, due to the loss of subsurface support. It 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 dissolution of limestone or other soluble materials by groundwater. Human-induced subsidence is caused principally by groundwater withdrawal, drainage of organic soils, and underground mining.

Historical Events

Grand Rapids—In September 1965, a house in Grand Rapids was damaged due to a sinkhole.

Grand Rapids—In 2004, a landslide occurred in Belknap Park blocking Monroe Avenue.

Walker—On July 19, 2018, an 8-foot by 10-foot sinkhole developed as a result of a water main break and shut down the roadway temporarily.

Grand Rapids—In January 2019, a sinkhole developed above the previous William T. Powers mine along the west side of the Grand River near the Blue Bridge and the Grand Valley State University Eberhard Center.

Risk/Likelihood

Subsidence due to old underground mines is unpredictable and the risk is low. Subsidence is primarily caused when a water main or stormwater line breaks. As infrastructure ages, the probability of subsidence occurring increases.

While landslides may occur in the bluff area of the shoreline of Ottawa County, the relatively flat terrain and ground cover of the area as well as other factors combine to form a low overall hazard from landslides throughout the region.

Economic Impact

According to the FEMA National Risk Index, the expected annual loss for landslides is \$38,471 in Kent County and \$29,628 in Ottawa County. Economic impacts incurred from the occurrence subsidence could include disturbance to transportation, communications, and utilities. Economic impacts can include the cost to repair roadways, utilities, repair foundation and stabilize a building.

Impact on Critical Facilities/Services

Subsidence may affect roadways or other public infrastructure. Roadways that are in proximity to, if not completely overlaying, abandoned mine lands that therefore may be vulnerable to collapse. A major subsidence event within an old central section of a city may involve critical facilities and social service agencies, and thus could cause some interruption in service delivery and continuity of operations, but fortunately this level of impact is an unlikely scenario.

Vulnerability Assessment

Land use practices have dramatically altered runoff, erosion, and slope stability throughout the region. Areas along the lakeshore, particularly critical dune areas, are all at risk of landslides and subsidence.

Flowing water can result in the dissolution of underground mine’s support pillars, compromising long-term stability. Results from a study on the stability of the mines concluded that pillars with a minimum width in the mine (6 m) will start to fail anywhere from 40 to 120 years after abandonment. All underground mine areas are at risk of subsidence in the future but have low risk in the next five years. Kent County has nine known underground mines, all of which are gypsum mines. The locations of these mines can be seen on Figure 11.

Table 19: Kent County Underground Mines

Mine	Location	Description
Alabastine Mine	1200 Judd Ave SW, Wyoming	The Alabastine Mine was started in 1907. Around 1949, the mine went bankrupt and was left abandoned. The mine reached a depth of 160 feet, including the dug well. By 1960, the mine was bought and used for storage. It is now used for cold storage by the Michigan Natural Storage company.
Durr Mine	3860 N Big Spring Dr SW, Grandville	This mill was built for the manufacturing of plaster in 1875. The mine reached a depth of 32 feet.
English Mine	1700 Butterworth St SW, Grand Rapids	The English mill was erected in 1900 by Mr. P. A. English, and in February 1902, was incorporated with the United States Gypsum Co. The English Mine reached a depth of 62 feet.
Georgia Pacific Mine	330 Covell Ave SW, Grand Rapids	The Georgia Pacific Mine is the largest mine in the area, located beneath both the cities of Grand Rapids and Walker. The mine had five openings: an air shaft located north of Butterworth Dr, the hoisting shaft located south of Butterworth Dr, the Pittsburg pump shaft located south of Butterworth Dr, the portal located north of Butterworth Dr and south of O'Brien street, and the port fleet pump shaft located north of O'Brien street.
Godfrey Mine	875 Sheffield St SW, Grand Rapids	In 1860, Freeman Godfrey built a mill near the mouth of Plaster creek.
William T. Powers Mine	60 front Ave NW , Grand Rapids	Mr. Powers, in 1896, put down a shaft within the city on the bank of the river near the west end of the G. R. & I. R. R. bridge, and struck the 12-foot gypsum stratum about 60 feet below the bed of the river.
Kentwood Mine	3900 East Paris Avenue, Kentwood	The Kentwood Mine began in 1971. The mine was closed in 2000. The mine had three openings: the main shaft located east of East Paris Avenue, an air shaft located to the west of the main shaft, and another air shaft located to the east of Shaffer Avenue.
Noble and	2001 Butterworth St	This Eagle mill No. 2 was built in 1869. The Noble and Co. Mine

Mine	Location	Description
Co. Mine	SW, Grand Rapids	underground excavations extend over an area of about seven acres. ⁸⁹
Grand Rapids Plaster Co.	624 Wabash Ave SW, Grand Rapids	In the year 1841, the first mill was erected for working the gypsum deposits.

Existing Prevention Programs

A risk assessment was completed in 2004 to determine the stability of I-196 over the Domtar mine. The assessment was based on the following information: (1) survey elevations of I-196, (2) existing documents from the Grand Rapids Gypsum Company, which in 1983 became the Domtar Mine, (3) I-196 construction documents, (4) recently conducted deflectometer and GPR data, (5) discussions with individuals that were involved with the mine and/or construction of I-196 and (6) a report produced by Williams and Works of Grand Rapids, Michigan titled: Kent County Geologic Stability Study for the John Ball Zoological Garden Expansion West of I-196 in September 2002. A copy of this report can be found in Appendix D.

There is very limited state funding for mine subsidence mitigation. Therefore, most of the funding for such projects comes from the federal government. The primary federal funding source is the Abandoned Mine Lands (AML) Reclamation Fund in the Surface Mining Control and Reclamation Act (SMCRA), P.L. 95-87, administered by the U.S. Department of Interior's OSMRE. AML funds are derived through a tax on coal production targeted at reclaiming land and water resources adversely affected by pre-1977 coal mining. These funds can also be used for mine subsidence mitigation measures and salt sealing, which Michigan has done on numerous occasions.

5.13 Thunderstorm Hazards

Severe thunderstorms are weather systems accompanied by strong winds (at least 56mph), lightning, heavy rain (that could cause flash flooding), hail (at least 3/4" diameter), or tornadoes. 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.

5.13.1 Hail

Hail is a form of precipitation consisting of solid ice that forms inside thunderstorm updrafts. The intensity category of a hailstorm depends on its size and the potential damage it could cause, as depicted in the National Climatic Data Center (NCDC) Intensity Scale in Table 20.

Table 20: National Climatic Data Center Intensity Scale

Size Code	Intensity Category	Size (Diameter in Inches)	Descriptive Term	Typical Damage
H0	Hard Hail	Up to 0.33	Pea	No Damage
H1	Potentially Damaging	0.33-0.60	Marble	Slight damage to plants and crops
H2	Potentially Damaging	0.60-0.80	Dime	Significant damage to plants and crops
H3	Severe	0.80-1.20	Nickel	Severe damage to plants and crops
H4	Severe	1.2-1.6	Quarter	Widespread glass and auto damage

⁸⁹ ANNUAL REPORT OF THE COMMISSIONER OF MINERAL STATISTICS OF THE STATE OF MICHIGAN, FOR 1881

H5	Destructive	1.6-2.0	Half Dollar	Widespread destruction of glass, roofs, and risk of injuries
H6	Destructive	2.0-2.4	Ping Pong Ball	Aircraft bodywork dented and brick walls pitted
H7	Very Destructive	2.4-3.0	Golf Ball	Severe roof damage and risk of serious injuries
H8	Very Destructive	3.0-3.5	Hen Egg	Severe damage to all structures
H9	Super Hailstorms	3.5-4.0	Tennis Ball	Extensive structural damage, could cause fatal injuries
H10	Super Hailstorms	4.0 +	Baseball	Extensive structural damage, could cause fatal injuries

Historical Events⁹⁰

The region averages 1-2 hail events each year. According to the NOAA, there have been three hail events in Kent County since 2017. On August 29, 2019, there were numerous reports of wind damage as a result of severe storms in the form of downed trees and tree limbs and power lines. In addition, there were several reports of very large hail ranging from an inch and three quarters to two and a half inches in diameter. This event resulted in \$10,000 of property damage and \$25,000 of crop damage.

According to the NOAA, there have been two hail events in Ottawa County since 2017. On August 3, 2017, large hail was reported with isolated severe thunderstorms that affected portions of Allegan and Ottawa counties. A trained spotter reported that an isolated severe thunderstorm produced hail up to an inch in diameter near Hudsonville. This event resulted in \$5,000 of crop damage.

Kent and Ottawa County—In August 1962, hail up to three inches long damaged tree fruit and ground crops in the area. Orchards in the Sparta vicinity suffered the most damage.

Ottawa County—In June 1975, hail up to three inches destroyed 10 greenhouses, damaged 360 mobile homes, broke windows in 5,000 buildings and 5,000 cars, and damaged 2,000 roofs.

Kent County—In May 1985, severe thunderstorms accompanied by hail struck the region causing two million dollars in damage in Kent County.

Kent and Ottawa County—In July 1999, reports of three-quarters to one-and one-quarter inch size hail caused over \$100,000 in damage.

Kent County—In June 2003, three-quarters to one-inch diameter hail was reported causing over \$100,000 in property damage and \$25,000 in crop damage.

Kent County—In August 2003, one and three quarters inch diameter hail was reported causing over \$100,000 in property damage and \$50,000 in crop damage.

Kent and Ottawa County—In April 2011, hail up to two inches in diameter fell in a one-mile-wide swath from Jamestown to Kentwood and East Grand Rapids. The region had over 12 million dollars' worth of property damage

⁹⁰ (NOAA, 2021)

Risk/Likelihood

The risk of hail is at least on an annual basis for Kent and Ottawa Counties based on historical data. However, recent historical data suggests the risk of hail may be increasing.

Economic Impact

Hailstorms can impact infrastructure, power lines, roads, businesses, and personal property. According to the FEMA National Risk Index, the expected annual loss due to hail in Kent County is \$810,328 and \$48,742 for Ottawa County.

Impact on Critical Facilities/Services

A hail event may cause infrastructure failures and utilities may require repair and maintenance resulting from hail. Responders are exposed to and at-risk from the impacts of hail first-hand.

Vulnerability Assessment

All areas of the region are vulnerable to hail damage. Much of the damage from hail occurs during the spring and summer, when warm and humid weather fuels severe thunderstorms, yet hail can occur at any time of year. Vulnerable communities include those living in manufactured home sites. Mobile home communities are shown in Figure 12.

Existing Prevention Programs

National Weather Service Doppler Weather Radar can detect severe weather events that threaten life and property—including storms that are likely to produce damaging hail. The National Weather Service (NWS) Doppler Weather Radar Network (WSR-88D) has undergone many upgrades since 2010 in the Service Life Extension Program that will keep the system operational well into the 2030s.

5.13.2 Lightning

According to NOAA, lightning is a giant spark of electricity in the atmosphere between clouds, the air, or the ground. In the early stages of development, air acts as an insulator between the positive and negative charges in the cloud and between the cloud and the ground. When the opposite charges build up enough, this insulating capacity of the air breaks down and there is a rapid discharge of electricity known as lightning. The flash of lightning temporarily equalizes the charged regions in the atmosphere until the opposite charges build up again.

Lightning can occur between opposite charges within the thunderstorm cloud (intra-cloud lightning) or between opposite charges in the cloud and on the ground (cloud-to-ground lightning).

Lightning is one of the oldest observed natural phenomena on earth. It can be seen in volcanic eruptions, extremely intense forest fires, surface nuclear detonations, heavy snowstorms, in large hurricanes, and obviously, thunderstorms.

Historical Events

Jamestown—In May 1998, the Muskegon Chronicle reported Collin Zackrison, a 34-year-old male, was critically injured when he was struck by lightning at Spring Grove Park near Jamestown, in southeastern Ottawa County. The Ottawa County Parks and Recreation Department employee suffered severe leg and chest injuries

Kent and Ottawa County—In July 1998, lightning strikes caused several major fires across Muskegon, Kent, and Ottawa Counties, causing over half a million dollars in damages.

Kent County—In September 2010, local fire departments reported that around a dozen house fires were produced by lightning from Ada south to Caledonia.

Grand Rapids—In September 2021, a line of strong to severe storms that rolled through West Michigan is thought to be at fault for knocking a Grand Rapids weather radar out of commission.

Risk/Likelihood

According to the FEMA National Risk Index, the region should expect an annual frequency of 45 lightning events per year.

Economic Impact

Although it is possible for impacts upon an important production facility or infrastructure component to cause notable impacts in a particular economic sector or geographic area of the state, no such impacts are expected. According to the FEMA National Risk Index, the expected annual loss for lightning is \$861,009 for Kent County and \$38,532 for Ottawa County.

Impact on Critical Facilities/Services

Electrical and communications infrastructure can be affected by lightning strikes, causing widespread inconvenience and, in some cases, life-threatening impairment of needed medical equipment and emergency response. Utility companies (DTE Energy, Consumers Energy, AT&T, cable companies, etc.) and their services are often affected by lightning strikes. Electric utility companies across the county estimate as much as \$1 billion per year in damaged equipment and lost revenue from lightning.⁹¹ Responders are exposed to and at-risk from lightning first-hand.

Vulnerability Assessment

Michigan averages 1.5 deaths and 10.7 injuries per year from lightning strikes.⁹² Lightning deaths are usually caused by the electrical force shocking the heart into cardiac arrest or throwing the heartbeat out of rhythm. Lightning can also cause severe skin burns that can lead to death if complications from infection ensue. Ninety-one percent (91%) of lightning strikes impact a single person, and only 9% of strikes impact two or more victims.⁹³ Approximately 20% of lightning strike victims die, and 70% of survivors suffer serious long-term effects such as memory and attention deficits, sleep disturbance, fatigue, dizziness, and numbness.

Existing Prevention Programs

The National Weather Service and local media can alert the public of the severe storms capable of producing large hail and lightning. Warning sirens can alert those not near a radio or television of an approaching storm. Warning sirens are located throughout the county. Figure 12 displays community siren locations applicable to this Plan.

⁹¹ Michigan Department of State Police, Emergency Management Division, Michigan Hazard Analysis, December 2012

⁹² Michigan Department of State Police, Emergency Management Division, Michigan Hazard Analysis, December 2012, page 34.

⁹³ Michigan Department of State Police, Emergency Management Division, Michigan Hazard Analysis, December 2012

To prevent injuries and deaths, the NWS and EMHSD utilize awareness weeks in the spring to promote severe weather awareness. The National Lightning Detection Network provides real-time information on location of lightning to help public safety to make decisions.

5.13.3 High Wind

According to the NWS, high winds are defined as sustained winds of 40 mph or greater or winds gusting to 58 mph or greater. Winds greater than 58 mph, not including tornadoes, are classified as windstorms, severe, or straight-line winds. Often Occurring during thunderstorms, severe winds may be very damaging. Severe winds have the potential to cause injury or loss of life from breaking and falling trees, property damage, and flying debris. The extent or magnitude of a thunderstorm wind event is measured by the Beaufort Wind Scale.

FORCE	WIND (KNOTS)	WMO CLASSIFICATION	APPEARANCE OF WIND EFFECTS
0	Less than 1	Calm	Calm, smoke rises vertically
1	1-3	Light Air	Smoke drift indicates wind direction, still wind vanes
2	4-7	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	8-12	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	13-18	Moderate Breeze	Dust, leaves, and loose paper lifted, small tree branches move
5	19-24	Fresh Breeze	Small trees in leaf begin to sway
6	25-31	Strong Breeze	Larger tree branches moving, whistling in wires
7	32-38	Near Gale	Whole trees moving, resistance felt walking against wind
8	39-46	Gale	Whole trees in motion, resistance felt walking against wind
9	47-54	Strong Gale	Slight structural damage occurs, slate blows off roofs
10	55-63	Storm	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	64-72	Violent Storm	If experienced on land, widespread damage
12	73+	Hurricane	Violence and destruction

Historical Events

Between 1996 and 2017, the Michigan Hazard Analysis recorded over 200 high wind events in the region.

Lower Peninsula—On April 30, 1984, a windstorm struck the entire Lower Peninsula, resulting in scattered damage, one death, and several injuries.⁹⁴ Wind gusts up to 90 miles per hour (mph) were measured with 6,500 buildings, 300 mobile homes, and 5,000 vehicles damaged.⁹⁵

Lower Peninsula—On May 31, 1998, a derecho caused extensive tree and structural damage and left over 861,000 homes and businesses without power. NWS Storm Damage Field Studies suggest winds in the region reached over 120 mph causing four fatalities, 146 injuries, and over 800 businesses damaged or destroyed.

West Michigan—In July 2011, the northern end of a strong bow echo produced wind damage to the region.

Grand Rapids—On September 12, 2019, a severe thunderstorm brought strong winds causing roof damage to an apartment building on the Northeast side of the city.

Risk/Likelihood

The National Weather Service predicts the region can expect five to seven high wind events in the region per year. The Intergovernmental Panel on Climate Change 2012 “Special Report on Extreme Events,” which details the latest scientific consensus on the likely impact of climate change on natural disasters, predicts that once-in-20-years storms are likely to become 1-in-5 or 1-in-15 events in many regions by the end of the twenty-first century, leading to increased high events.

Economic Impact

The most common economic impact of severe winds involves the loss of electrical power. Most power failures are of limited duration—interruptions might happen only for a moment, or last for days. In any given location, it is relatively rare for prolonged power losses to occur as a result of severe winds. Most wind-caused damage can be located and repaired by utility companies within a reasonable time frame, thus helping to keep economic impacts limited. The expected annual loss is \$6,755,408 in Kent County and \$3,044,698 for Ottawa County, according to the FEMA National Risk Index.

Impact on Critical Facilities/Services

Strong winds can exacerbate the existing difficulties and challenges involved in emergency response—impeding traffic, causing power loss and road closures. Electrical and communications infrastructure can be affected by high winds, causing widespread inconvenience and, in some cases, life-threatening impairment of needed medical equipment and emergency response.

Vulnerability Assessment

Lightweight roof decks (such as steel, wood sheathing, lightweight insulating concrete over form deck, cementitious wood-fiber, and gypsum) are especially vulnerable to uplift forces during high-wind events. Smaller structures are vulnerable to becoming rolling debris, such as sheds, portable classrooms, or large trash receptacles.

⁹⁴ Michigan Department of State Police, Emergency Management Division, Michigan Hazard Analysis, December 2001,

⁹⁵

Vulnerable communities include those living in manufactured home sites, especially those beyond the emergency siren effectiveness range. Mobile home communities are shown in Figure 12, which also includes the locations of the county’s warning sirens and effectiveness ranges. There are at least 32 mobile home communities in Kent and Ottawa County beyond the warning siren effectiveness range. At least 5,686 mobile homes are outside the effective range of sirens in Kent County (siren map, Appendix D).

Existing Prevention Programs

Through radar, weather data, and spotters, the National Weather Service, NOAA, and local media can alert the public of severe storms capable of producing large hail, severe winds, and lightning. Warning sirens can alert those not near a radio or television of an approaching storm. Warning sirens are located throughout the region. Due to emergencies from high winds, initial response activities would primarily be associated with local response from police, fire, and emergency medical services.

To prevent the impacts of high wind, local municipalities implement building codes that require buildings and portions thereof to be constructed in accordance with wind provisions.

5.14 Tornadoes

A tornado is a violently rotating column of air touching the ground, usually attached to the base of a thunderstorm. Tornadoes can cause catastrophic damage to either a limited or an extensive area. A tornado can have winds exceeding 200 miles per hour and can have widths over one mile. Tornado magnitudes are determined by the Enhanced Fujita Scale (EFS).

STORM CATEGORY	DAMAGE LEVEL	3 SECOND GUST (MPH)	DESCRIPTION OF DAMAGES
EF0	Gale	65 – 85	Some damage to chimneys; breaks branches off trees; pushes over shallow- rooted trees; and damages sign boards.
EF1	Weak	86 – 110	The lower wind speed is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off roads; and attached garages may be destroyed.
F2	Strong	111 – 135	Considerable damage; roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; and light object missiles generated.
EF3	Severe	136 – 165	Roof and some walls torn off well- constructed houses; trains overturned; and most trees in forest uprooted.
EF4	Devastating	166 – 200	Well-constructed homes leveled; structures with weak foundations blown off some distance; and cars thrown, and large missiles generated.
EF5	Incredible	200+	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles flying through the air in excess of 330 yards; trees debarked; and steel reinforced concrete badly damaged.

The most powerful tornadoes are produced by “super cell thunderstorms.” Super-cell thunderstorms are created when horizontal wind shears (winds moving in different directions at different altitudes) begin to rotate the storm. This horizontal rotation can be tilted vertically by

violent updrafts, and the rotation radius can shrink, forming a vertical column of very quickly swirling air. This rotating air can eventually reach the ground, forming a tornado.

Historical Events

According to the NOAA, there has been one tornado incident in Ottawa County since 2017. On June 26, 2021, storm damage surveys were conducted, and it was determined that two EF-1 tornadoes occurred and that several EF-0 tornadoes occurred. NWS storm damage survey revealed a broken path of small to medium limbs down and several locations of small groups of trees uprooted indicating winds of 55 to 70 mph. The worst damage was found near Fillmore St between 108th and 104th Ave indicating winds of 75 to 85 mph.

According to the NOAA, there has been three tornado incidents in Kent County since 2017. On September 11, 2019, A quasi linear convective system (QLCS) produced wind damage along a fifty mile long and a half to 5-mile swath that cut through parts of downtown Grand Rapids. The most intense damage occurred at Belknap apartments in downtown Grand Rapids where two thirds of the roof was ripped off of the 3-story complex. A microburst containing winds of up to around 100 mph caused the damage. On April 10, 2021, a very small, brief, and weak tornado touched down in the Preservation Lakes subdivision in southern Kent county just south of Cutlerville and east of Byron Center in Gaines Township, causing damage to six to 12 homes. On June 26, 2021, an NWS storm survey determined that an EF-0 tornado was on the ground for a minute with a path length of 0.6 miles. Several trees and limbs were snapped from Bennett Street and Cumberland Avenue to Vergennes Street east of Cumberland Avenue.

The deadliest Tornado in Michigan occurred on April 9, 1947. An F5 tornado killed 181 people. National Weather Service data since 1950 indicated that Michigan has experienced an average of 15 tornadoes and four tornado-related deaths per year.

Kent and Ottawa Counties—On April 3, 1956, a category F5 tornado struck the region, killing 14 people, injuring 200 and destroying over 700 homes.

Kent and Ottawa Counties—On April 11, 1965, a category F4 tornado struck the region and was responsible for the deaths of six people and 100 injuries.

Southern and Central Michigan—On May 21, 2001, a line of severe thunderstorms created tornadoes causing damage in Kent County.

Kent County—On July 6, 2014, late night tornadoes injured six persons south of Grand Rapids causing more than \$4.5 million in property damage.

Risk/Likelihood

The FEMA National Risk Index predicts an annual frequency of one tornado every three years in the region.

Economic Impact

According to the FEMA National Risk Index, it is expected tornadoes will cause an annual loss of \$4,957,510 in Kent County and \$931,625 for Ottawa County. Property damage is the greatest contributor to economic loss from tornadoes. The amount of damage varies with the severity of the tornado. Also, damage or destruction to utility lines (primarily overhead lines) can result in

power and other utility loss. Tornadoes can also destroy or damage agricultural fields, disrupt transportation services, and destroy greenery.

Although tornadoes can be locally devastating and easily overwhelm local resources, most tornadoes do not have a broad impact on the entire state or regional economy.

Impact on Critical Facilities/Services

Electrical and communications infrastructure can be affected by tornadoes, causing widespread inconvenience and, in some cases, life-threatening impairment of needed medical equipment and emergency response.

Vulnerability Assessment

As seen below, spring is the most likely time to experience killer tornadoes in Michigan. With June being the deadliest month of the year.

JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
0	0	3	77	23	130	3	1	1	0	1	0	239

Source: National Climatic Data Center

Vulnerable communities include those living in manufactured home sites, especially those beyond the emergency siren effectiveness range. Mobile home residents are one of the most socioeconomically and demographically marginalized populations in the United States and are more susceptible to tornado impact and death. Mobile home communities are shown on Figure 12, which also includes the locations of the county’s warning sirens and effectiveness ranges. There are at least 32 mobile home communities in Kent and Ottawa County beyond the warning siren effectiveness range.

Existing Prevention Programs

The National Weather Service utilizes the Integrated Public Alert and Warning System (IPAWS) to simultaneously broadcast their tornado warning information over a variety of systems and channels such as the Emergency Alert System (EAS), Wireless Emergency Alerts (WEA), NOAA Weather Radio, as well as data feeds monitored by television and radio stations.). The National Weather Service stations in Michigan transmit information directly to radio and television stations, which in turn pass the warning on to the public. The National Weather Service also provides detailed warning information on the Internet at www.weather.gov, where interactive maps are available. The graphic below shows the difference between alerts issued by the National Weather Service.

Warning	Watch	Advisory	Outlook
Weather hazard is occurring, imminent or likely	Risk of weather hazard in the near future	Weather hazard is occurring, imminent or likely	Risk of weather hazard in the next 7 days
Poses a threat to life/property	Could pose a threat to life/property	Could cause significant inconvenience	Could pose a threat to life/property
Take Protective Action	Have a Plan of Action	Use Caution	Prepare a Plan of Action

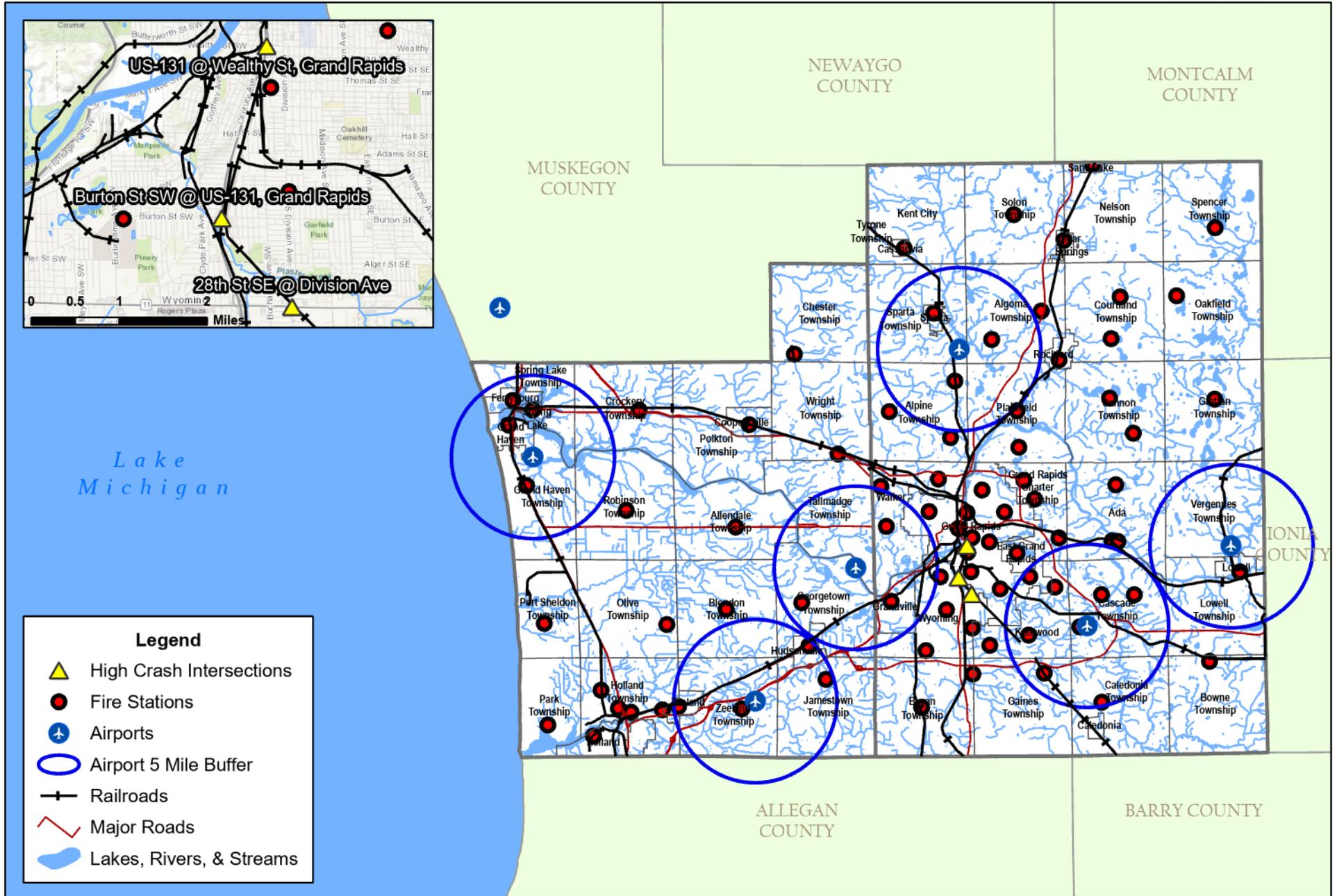
Kent County, Ottawa County, and the City of Grand Rapids have outdoor siren systems to provide an external notification when a tornado warning is broadcasted. The siren systems are designed to provide an alert to community members who are present outside of homes or buildings. Each jurisdiction tests this siren system at noon on the first Friday of the month from April to October each year. (Figure 12 displays community siren locations applicable to this Plan). The National Weather Service and local media (television and radio) provide advanced warnings to communities. Community warning sirens can be heard for several miles. Initial response activities due to tornadoes would primarily be associated with local response from fire, police, and emergency medical care.

The National Weather Service issues tornado watches for areas when the meteorological conditions are conducive to the development of a tornado. People in the watch area are instructed to stay tuned to NOAA weather radio and local radio or television stations for weather updates and watch for developing storms. Once a tornado has been sighted and its existence is confirmed and reported, or Doppler Radar shows strong probability of the development or occurrence of a tornado, the National Weather Service will issue a tornado warning. The warning will identify where the tornado was sighted, the direction in which it is moving, and the time frame during which the tornado is expected to be in the area. Persons in the warning area are instructed to seek shelter immediately.

5.15 Winter Hazards

A severe winter storm is defined as a prolonged event involving snow or ice. The characteristics of severe winter storms are determined by the amount and extent of snow or ice, air temperature, wind, and event duration (National Weather Service, 2009). Winter precipitation comes in a variety of forms, each with its own particular hazards.

TYPE OF ALERT	DESCRIPTION
Winter Weather Advisory	Weather advisories may be announced for snow, blowing, or drifting snow, freezing drizzle, freezing rain, or a combination of weather events.
Winter Storm Watch	Severe winter weather conditions may include freezing rain, sleet or heavy snow, and conditions may occur separately or in combination.
TYPE OF STORM	DESCRIPTION
Winter Storm Warning	Severe winter weather conditions are imminent.
Freezing Rain or Freezing Drizzle	Rain or drizzle is likely to freeze upon impact, resulting in a coating of ice glaze on roads and all other exposed objects.
Sleet	Small particles of ice usually mixed with rain. If enough sleet accumulates on the ground, it makes travel hazardous.
Blizzard Warning	Sustained wind speeds of at least 35 mph are accompanied by considerable falling or blowing snow. These are the most perilous winter storm conditions with visibility dangerously restricted.
Frost/Freeze Warning	Below freezing temperatures are expected and may cause significant damage to plants, crops, and fruit trees.
Wind Chill	Strong wind combined with a temperature slightly below freezing can have the same chilling effect as a temperature nearly 50 degrees lower in a calm atmosphere.



Kent County, Ottawa County, & City of Grand Rapids 2022 Regional Hazard Mitigation Plan

Kent County & Ottawa County, MI

0 2.5 5 10 Miles



Historical Events

According to NOAA, there have been three winter storm events in Kent and Ottawa County since 2017. On April 14-15, 2018, a significant late season winter storm brought a mix of high winds, heavy rain, sleet, and freezing rain. Numerous accidents and slide-offs were reported across the region, including on I-94 during the early afternoon hours of the 15th. Total ice accumulations ranged from around a tenth of an inch to about half an inch. Total sleet accumulations reached one to two inches in some areas. Numerous flights were either delayed or cancelled. A total of 450,000 customers were impacted by power outages across Michigan, with 110,000 Consumers Energy Customers being impacted. The storm resulted in approximately \$100,000 in property damage.

On January 28, 2019, Michigan Governor Gretchen Whitmer declared a state of emergency due to the record low windchill temperatures. Governor Whitmer and Consumers Energy asked residents to turn down their thermostats to 65 °F until midnight ET on February 1, after a fire at the compressor station in Macomb County on January 30 due to extra gas usage during the cold wave, to avoid "heat interruptions".⁹⁶

Central Lower Michigan—During March 2-7, 1976, an ice storm with accompanying high winds and tornadoes struck Michigan causing over \$56 million in damage.

Risk/Likelihood

According to the FEMA National Risk Index, the expected annual frequency for ice storms is 1.4 events per year in Kent County and 0.7 events per year for Ottawa County. Based on the NCDC snow and ice event reports, Kent County can expect, on average, five significant snow storms each winter and Ottawa County can expect seven. Due to climate change, warmer temperatures are likely to shorten the season when the ground is covered by snow but there will be an overall increase in precipitation.

Below illustrates the frequency distribution of ice and sleet storms in Michigan for the period 1970-July 2018. All events occurred between November and April.

AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	TOTAL
0	0	0	3	12	18	12	14	8	0	0	0	67
0%	0%	0%	4%	18%	27%	18%	21%	12%	0%	0%	0%	100%

Source: National Weather Service; Storm Data, National Centers for Environmental Information. Each listed date of occurrence (rather than each of the county event listings) was counted as one case, and these counts supplemented those from the previous edition of this document. Percentages are rounded off.

Economic Impact

The FEMA National Risk Index predicts an annual loss for ice storms of \$360,277 for Kent County and \$240,417 for Ottawa County. Economic loss includes property damage and response costs (clearing roadways, downed power lines or trees, etc.). Widespread infrastructure failures can cause disruptions to the workforce and school systems.

⁹⁶ Consumers Energy apologizes for equipment failure, thanks residents for turning down heat Archived January 31, 2019, at the Wayback Machine WEYI-TV, January 31, 2019

Impact on Critical Facilities/Services

Ice and sleet storms tend to cause power or other infrastructure failures that interfere with residents' activities, comfort, and safety (often through the impact of infrastructure failures on needed medical and emergency response capabilities). Traffic efficiency and road capacity tends to be impeded by these weather events, which cause a large increase in the risks involved in all modes of travel.

In addition to the risks from winds, obscured vision, impaired control of vehicles, power failures and blocked roadways, winter storm events also expose responders to extremely cold temperatures for long periods of time, and may thus compound the difficulties, risks, and expenses of response.

Vulnerability Assessment

According to the NOAA National Severe Storms Laboratory about 70% of deaths related to ice and snow occur in automobiles and 25% are people caught out in the storm. Deaths related to exposure to cold: 50% are people over 60 years old. Over 75% are males. About 20% occur in the home.

Snow and ice-related vulnerabilities include:

- Icy walkways
- Accident damage to vehicles
- Broken tree limbs, power lines, telephone lines
- Disrupted utilities
- Flooding from the melting of snow and ice
- Roof damage from ice build-up and snow loads
- Increased stress to livestock and wildlife

Existing Prevention Programs

The National Weather Service, NOAA, and local media can alert the public of severe storms capable of producing sleet and freezing rain.

One of the major problems associated with ice storms is the loss of electric power. Michigan has had numerous widespread and severe electrical power outages caused by ice storms, several of which have resulted in a power loss to 250,000 – 500,000 electrical customers for several hours to several days at a time. Ice-related damage to electric power facilities and systems is a concern that utility companies across the state are actively addressing. Detroit Edison, Consumers Energy, and other major electric utility companies have ongoing programs to improve system reliability and protect facilities from damage by ice, severe winds, and other hazards. Typically, these programs focus on trimming trees to prevent encroachment of overhead lines, strengthening vulnerable system components, protecting equipment from lightning strikes, and placing new distribution lines underground. The Michigan Public Service Commission (MPSC) monitors power system reliability to help minimize the scope and duration of power outages.

City and county road crews are the area's first line of defense against snow and ice storms. Plowing snow, sanding, and salting roadways occupy a great deal of time and budgets during the winter season. Kent County budgeted \$3.4 million for 2004 snow removal and Ottawa County

budgeted \$3 million. The actual amount can easily exceed 150% of the budgeted amount. Their response relies heavily on NWS and local weather forecasts and alerts of storm conditions.

Seasonal parking restrictions allow the jurisdiction to sweep and plow the streets during the fall and winter months. It also helps to prevent the city's street from becoming flooded in the winter due to clogged catch basins and allows emergency vehicles access to neighborhoods during heavy snow seasons.

Local jurisdictions operate a comprehensive snow removal program each winter to ensure the maximum degree of safety to the motoring public. Residents have 24 hours from the time it stops snowing to clear sidewalks. Uncleared sidewalks can be reported on the City of Grand Rapids website.

Certain institutions, such as schools, are likely to close when bad weather, such as snow, flooding, tropical cyclones, or extreme heat or cold impairs travel, causes power outages, or otherwise impedes public safety or makes opening the facility impossible or more difficult.

Park and recreation departments identify and abate hazard from trees that are likely to fail and cause injury to either people or property on Forest Service system roads or at Forest Service facilities (i.e., campgrounds, boat ramps, trailhead parking, summer home tracts, administrative sites, kiosks, information centers, etc.)

The Michigan Committee for Severe Weather Awareness has created a safety information campaign to encourage residents to prepare for the hazards of Michigan winter weather. In conjunction with the Michigan Committee for Severe Weather Awareness, the National Weather Service will issue daily information statements this week offering winter weather safety tips and definitions of winter weather terms. All news media are strongly encouraged to pass this information to their audiences at every opportunity. Additional information on Winter Hazards Awareness Week is available from the Michigan Committee for Severe Weather Awareness.

5.16 Transportation Accidents

A transportation accident is a crash or other accident involving an air, land, or water-based passenger carrier. (Note: Transportation accidents involving hazardous materials are addressed in Section 5.8.2, HazMat Incidents – Transportation.) The location of regional railroads, major roadways, and major airports can be seen on Figure 13.

Air transportation incidents primarily occur when an airplane crashes while taking off, landing, or mid-air. An inflight crash may result from mechanical problems, sabotage, or a collision with objects.

Land transportation incidents involve passenger buses, motor coaches, tractor trailers, and private vehicles.

Rail transportation is mostly limited to freight uses, rather than passenger travel, though passenger rail carries risk due to the greater number of people they carry.

A water transportation incident involves commercial passenger ferries, private water vessels, and barges.

Historical Events

Coopersville—On November 12, 1979, a gasoline tanker truck rolled over on I-96 near Coopersville, resulting in a spill of 9,000 gallons of gasoline. The gasoline then caught fire, forcing the closure of I-96 for several hours until the fire could be suppressed, and the site cleaned up and restored.

Holland Township.—In February 1983, a freight train derailed, causing a hydrogen fluoride spill prompting the evacuation of 1,500 people.

Holland Township.—In February 2003, four tanker trucks exploded and burned at an oil company in Holland Township. The blaze injured four people who were rushed to the hospital for burns and smoke inhalation. A warehouse nearby also reportedly caught fire, but firefighters were able to extinguish the blaze within an hour.

Plainfield Township—In January 2011, a snowplow truck rear-ended a Grand Rapids bus, injuring ten people.

Kent County—In 2019, a train stopped over a misaligned switch causing three cars to derail. The accident totaled \$29,000 in equipment damage and \$3,536 of track damage.

Risk/Likelihood

Climate trends seem to involve an increased chance of ice storm events (and the transportation accidents they cause), as temperatures during and around wintertime are more often close to, and crossing above and below, the freezing point.

According to MDOT, the data on rail incidents for the state of Michigan shows roughly 40 crashes occurring every year, with the likelihood of significant injury for rail passengers generally low.

Many competing factors (e.g., weather, deer population, alcohol) play a role in traffic crash frequency and severity, but statistically these events happen daily throughout the region with the largest number of fatalities occurring July through September. A copy of the 2020 traffic crash data report for Kent and Ottawa Counties can be found in Appendix D.

There have been no major aircraft or maritime incidents in Kent and Ottawa Counties. The likelihood of an event is low.

Economic Impact

The economic impact of any one incident for the region is likely to be small for most transportation incidents. The location of an incident would be a determining factor, with, for example, a plane crash in the middle of the city of Grand Rapids being more financially disruptive than the same plane crashing in Lake Michigan. Destroyed roads or bridges along major trade routes would carry a greater impact. Commercial passenger crashes of any kind may result in a temporary reduction in tourism.

Impact on Critical Facilities/Services

The highway transportation system plays a vital part in the county's ability to provide services to the public. Traffic crashes are notorious for causing temporary traffic delays that complicate the

county's ability to maintain a well-operating transportation network. The locations of Police stations, fire stations, and critical vulnerable assets in the county are included in Figure 13.

Given the frequency of rail and air events, they are not anticipated to impact county services or facilities greatly. Impact to county services may result if an accident blocks a railroad crossing or runway, thus causing traffic problems.

Vulnerability Assessment

Statistics show that most airline passenger crashes occur during the takeoff or landing phases. The largest airports, specifically the Gerald R. Ford International Airport, would tend to experience a higher probability for commercial passenger crashes due to the nature of their flights and overall traffic volume. Outside of the airports themselves, adjacent developed areas are the most vulnerable to this hazard.

Automobile accidents occur daily and can occur anywhere. High-frequency crash intersections are located in Figure 13. According to the Michigan State Police 2020 car accident reports, three intersections in Grand Rapids are listed in the top 10 most dangerous intersections:

1. U.S. 131 and Wealthy Street in Grand Rapids; 114 crashes, 23 injuries
2. Burton Street SW and U.S. 131 in Grand Rapids; 89 crashes, 23 injuries
3. 28th Street SE and Division Avenue, Grand Rapids; 66 crashes, 17 injuries

The confluence of increasing road congestion, aging infrastructure, an aging population, and increased truck traffic presumably exacerbates the potential for transportation accidents, including accidents involving the transport of hazardous materials.

Existing Prevention Programs

The National Transportation Safety Board (NTSB) is an independent federal accident investigation agency. Since its creation in 1967, the Safety Board's mission has been to determine the probable cause of transportation accidents and to formulate safety recommendations to improve transportation safety. Safety recommendations are the Board's most important product. In each recommendation, the Board designates the person, or the party, expected to act, describes the action the Board recommends, and clearly states the safety needs to be satisfied.

The Federal Aviation Administration (FAA) developed the Air Transportation Oversight System to inspect the nation's airlines. The FAA and the general aviation (GA) community's national #FlySafe campaign helps educate GA pilots about the best practices to calculate and predict aircraft performance, to operate within established aircraft limitations, prevent Loss of Control (LOC) accidents and save lives.

The Federal Railroad Administration (FRA) Office of Safety promotes and regulates safety throughout the Nation's railroad industry. Federal safety inspectors focus on five safety disciplines and promote numerous grade crossing and trespass-prevention initiatives: (1) hazardous materials; (2) motive power and equipment; (3) operating practices; (4) signal and train control; (5) track; and (6) highway-rail at-grade crossing and trespassing prevention programs.

Michigan Operation Lifesaver is part of a national, nonprofit continuing education program dedicated to ending tragic collisions, fatalities, and injuries at highway-rail grade crossings and railroad rights of way.

The MDOT Local Grade Crossing Program provides local governmental units and railroad companies with assistance for developing and implementing projects to enhance motorist safety at public highway-railroad grade crossings. Locations are selected using a statewide prioritization system that identifies crossings where safety enhancements will greatly benefit the motoring public.

The United States Coast Guard is charged with enforcing federal regulations in the Great Lakes. The Coast Guard investigates maritime accidents, merchant vessels, offshore drilling units, and marine facilities. Additionally, the Coast Guard is responsible for licensing mariners, documenting U.S. flagged vessels, and implementing a variety of safety programs. Promoting safe boating practices is a key objective to help prevent an incident.

The Federal Motor Carrier Safety Administration (FMCSA), within the U.S. Department of Transportation, regulates and supports the Nation's interstate commercial carrier industry. FMCSA's primary mission is to reduce crashes, injuries, and fatalities involving large trucks and buses.

5.17 Terrorism and Active Assailant Incidents

Terrorism is the unlawful use of violence and intimidation, especially against civilians, in the pursuit of political aims. The most recognized forms of terrorism include assassination, bombings, and extortion. These acts are often identified with groups or organizations. The Middle East and portions of Europe, South America and Asia have been greatly impacted for many years by acts of terrorism and sabotage. In more recent years, the United States has been victim to acts of terrorism.

An active assailant is an individual actively engaged in killing or attempting to kill people in a confined and populated area. An Active Assailant may or may not be affiliated with a terrorist organization and may not otherwise be considered a terrorist. In the US many active assailant events have been lone shooter driven. For the purposes of this plan, they are described together despite ideological objectives.

Historical Events

No major terrorist events have happened in the region. According to the FBI, the frequency and lethality of active shooter incidents in America is increasing.

Risk/Likelihood

There have been no major incidents in Kent and Ottawa Counties. The likelihood of an event is low.

Economic Impacts

The economic impact of terrorism is smaller than many other forms of violence, accounting for approximately 0.1 per cent of the global economic impact of violence in 2019.⁹⁷ The main concern would involve potential impacts from a public health emergency.

⁹⁷ 1 Byman, D., & Amunson, A. (2020). Counterterrorism in a time of COVID. Brookings. Retrieved October 18, 2020, from <https://www.brookings.edu/blog/order-from-chaos/2020/08/20/counterterrorism-in-a-time-of-covid/>

Critical Facilities/ Services

Infrastructure, such as schools, transportation, computer networks, or communications might be directly damaged or subsequently overwhelmed by a fearful population. Services, such as mail delivery, could be slowed, as new precautionary or detection measures are adopted. Some operations may have to shift to an increased use of teleconferencing and telecommuting.

Vulnerability Assessment

High-risk targets for acts of terrorism include military and civilian government facilities, schools, international airports, large cities, and high-profile landmarks. Terrorists might also target large public gatherings, water and food supplies, utilities, and corporate centers. Vulnerable locations can be found on Figure 2. Terrorist groups more often choose to strike soft targets.⁹⁸ A "soft target" is a person, thing, or location that is easily accessible to the general public and relatively unprotected, making it vulnerable to military or terrorist attack. By contrast, a "hard target" is heavily defended or not accessible to the general public.

More than one in four (29%) of these tragedies has occurred at educational institutions. In most cases, active shooters use firearms and there is no pattern or method to their selection of victims.

Existing Prevention Programs

"If You See Something, Say Something™" is a national campaign that raises public awareness of the indicators of terrorism and terrorism-related crime, as well as the importance of reporting suspicious activity to state and local law enforcement. Informed, alert communities play a critical role in keeping our state safe.

OK2SAY is a student safety program that allows anyone to confidentially report tips on potential harm or criminal activities directed at school students, school employees, and schools. Threats of retaliation and stigmatization often discourage students from reporting the dangerous behaviors of their peers. OK2SAY aims to eliminate this culture of silence by providing a confidential, collaborative communication system where students and authorities can work together to respond to safety threats.

The School Safety Grant program provides funding to help purchase equipment and/or technology which will improve the safety and security of school buildings, students, and school staff. The goal of this program is to create a safer school environment through equipment and technology enhancements.

Silent Observer is a non-profit organization dedicated to public safety and since 1972 has remained committed to its mission to solve and prevent serious crime in the Greater Grand Rapids area in partnership with community members, the media, and law enforcement. By guaranteeing a caller's anonymity, Silent Observer allows the caller to give information in a positive atmosphere without fear of retaliation. By offering cash rewards for information leading to indictment or arrests, the program encourages otherwise reluctant callers to provide information.

The Homeland Security Act of 2002, Public Law 107-296, established the Department of Homeland Security (DHS) with the mandate and legal authority to protect the American people from the continuing threat of terrorism. In the act, Congress assigned the DHS the primary mission

⁹⁸ McGovern, Glenn P. (2012). "Securitization After Terror". In Margaret E. Beare (ed.). *Encyclopedia of Transnational Crime and Justice*. Sage.

to (1) prevent terrorist attacks within the United States, (2) reduce the vulnerability of the United States to terrorism at home, (3) minimize the damage and assist in the recovery from terrorist attacks that occur, and (4) act as the focal point regarding natural and manmade crises and emergency planning.

5.18 Weapons of Mass Destruction

A weapon of mass destruction is a nuclear, radiological, chemical, biological, or other device that is intended to harm a large number of people.

Historical Events

No incidents of Weapons of mass destruction have been reported in the region.

Risk/ Likelihood

The likelihood of an event involving weapons of mass destruction in Kent and Ottawa County are low. Today's globalization means that even international events can affect our energy needs, supply of goods, and the well-being of the state's residents.

Economic Impacts

Since no incidents involving weapons of mass destruction have occurred, it is difficult to estimate the economic impact of this type of incident. Analyzing weapons of mass destruction incidents that have occurred elsewhere, it is anticipated that such an incident would be damaging to life, property, infrastructure, and the economy.

Critical Facilities/ Services

An attack using weapons of mass destruction against public infrastructure can directly impact the county's ability to operate essential facilities and provide services. Successful attacks would require a large-scale response from all levels of government.

Vulnerability Assessment

Various criteria may be used in determining the vulnerability of facilities to attack. These include factors such as population, accessibility, criticality to everyday life, economic impact, and symbolic value. A nuclear power would have the ability to attack several locations at the same time. These attacks would probably be targeted on large cities and military bases and would use strategic nuclear weapons. Other potential targets may include critical infrastructure and facilities (e.g., commercial power plants, chemical facilities, refineries), military support facilities (e.g., counterforce military installations, military support bases and industries), and political targets (e.g., state capitals). In evaluating the vulnerability of facilities, State and local planners need to consider the existing security measures in place and the need, if any, to upgrade security.

In addition, the FBI has a standard vulnerability assessment paradigm that can be used for evaluating the vulnerabilities of potential targets. Planners should also be aware that once target lists and vulnerability information are developed, careful decisions must be made regarding security considerations for handling this information based upon applicable State and Federal law regarding confidentiality and public information.

Existing Prevention Programs

The DHS Countering Weapons of Mass Destruction Office (CWMD) works to prevent attacks against the United States using a weapon of mass destruction through timely, responsive support to operational partners. Strategic goals include:

- Anticipate, identify, and assess current and emerging WMD threats.
- Strengthen detection and disruption of CBRN threats to the homeland.
- Synchronize homeland counter-WMD and health security planning and execution.

The 10 Plus 10 Over 10 Program is a global partnership against the spread of weapons and materials of mass destruction. The Partnership is a formal multilateral nonproliferation initiative created by the G-8 countries in 2002. G-8 countries fund and implement projects to prevent terrorists and other proliferators from acquiring WMDs.

6. Hazard Mitigation

6.1 Previous Action Plans

The criterion in Section 2.4.2 was used to evaluate Action Plans from the 2017 Plan and to select strategies for new Action Plans. The 2017 prioritized hazards and Action Plans are summarized below. A multi-functional approach was considered to be the most cost-effective and efficient criteria, along with cost-effectiveness, political feasibility, equity and environmental issues, and technical feasibility. Additional information on scoring and methodology can be found in the 2017 Plan.

Severe Weather (and other emergencies) notification: tornado, thunderstorm, intentional acts, hazardous material releases, dam failures, nuclear power plant accidents, and wildfires.

- a. Survey needs and adds sirens to regions as needed.
- b. Enhance, strengthen, and maintain emergency notification systems throughout the region. Investigate and acquire new warning technology as it becomes available.
- c. Consider (and encourage) construction techniques and structural upgrades for weather resistance (e.g., wind resistance, safe rooms, ice dam prevention, leak prevention, storm sheltering, etc.)

Flooding: riverine flooding, urban flooding, dam failures, and shoreline flooding/erosion

- a. All communities in Kent County consider NFIP participation.
- b. Purchase eligible properties that are vulnerable to flooding as funds become available.
- c. Decrease human susceptibility to flooding. Encourage flood-proofing homes and businesses.
- d. Identify and enforce existing building and zoning regulations to limit and manage new construction and alterations in floodplains, and where feasible, include flood considerations in local and regional development plans; building permits; transportation and other infrastructure projects and plans; and capital facilities planning, construction and renovation.

Communication Failure: electrical failure and communications failure

- a. Identify infrastructure vulnerabilities.
- b. Work with local utilities to develop a plan.
- c. Implement measures identified in the plan.

Other Hazard Mitigation Measures: individually or jointly as appropriate: transportation accidents, urban/structural fires, water system failures, natural epidemic, sanitary sewer failure, earthquakes, drought, other fires, and landslides.

- a. Area Master Plan updates to consider hazard mitigation concepts and actions.

6.1.1 Incorporation of the 2017 Plan

The 2017 Hazard Mitigation Plan has since been incorporated into local plans and mechanisms, such as general plans, stormwater plans, Fire Plans, Emergency Operations Plans (EOP), evacuation plans, and other hazard and emergency management planning efforts for Kent and Ottawa County and participating jurisdictions. The following examples provide an overview of the work completed since the previous plan update.

Severe Weather (and other emergencies) notification:

Ottawa County has added one permanent outdoor warning siren in Zeeland Township and acquired one portable/mobile siren that can be deployed to poor coverage areas that have temporary population spikes (ex: the Grand Haven beach during Coast Guard festival). Several attempts have been made to survey emergency notification needs. The most recent effort was a FY20 Homeland Security Grant Program request to conduct an assessment of each siren site to determine options for potentially consolidating all of the disparate siren sub-systems in Kent County into a single controller with built in redundancy. This re-structuring of the various systems could allow use of the National Weather Service warning polygons for increasing the accuracy of the warnings and allow both 9-1-1 communications centers in the county to control the system.

In 2020, Kent County acquired a cloud-based mass notification system to use for Integrated Public Alert and Warning System (IPAWS) access including Wireless Emergency Alerts (WEA). As of June 2022, the system has been used twice to provide targeted messaging about threats occurring in Kent County. Kent County Emergency Management now uses an application specially developed by the Kent County Sheriff's Office in 2019 for subscription-based notifications. This application allows emergency management to send out pre-incident messages about impending weather, preparedness information, and general process information (such as outdoor warning siren testing schedules) to the public and media simultaneously. Kent County continues to invest in emergency notification systems such as the IPAWS access and subscription-based systems previously referenced.

There is currently an effort to seek American Rescue Plan (ARPA) funds to streamline the siren systems.

CoGR expanded the capabilities of the emergency alert system to have the ability to perform a reverse 911 style notification to landlines and allow phone calls (cell and landline) for notifications requiring immediate action (i.e., tornado warnings).

The City of Holland is attempting to secure funding for a PA system in addition to their sirens, especially for the annual Tulip Time Festival that raises the population in Holland significantly for a week each year.

Communications

Since the 2017 HMP, three public safety communications towers (Chester Township 6405, Grand Haven Water Tank Hill 6406, Jamestown Township 6412) and one new site (Holland Water Tank Site) to improve comms/coverage have been built.

Ottawa Co. has met with Consumers Power to establish clear and consistent lines of communication for power outages in Ottawa County. This includes priority restoration for the Ottawa County complex, as well as a developed relationship with the Consumers Power Public Safety Liaison for priority restoration for critical infrastructure. Ottawa Co. now has only eight

locations that would require a portable generator. OCRC garages are now receiving portable generators when they are updated. The Coopersville garage now has a standby generator.

In 2016, Kent County public safety leaders made the decision to move mission-critical public safety communication to a locally owned sub-system of Michigan's Public Safety Communications System (MPSCS). In November of 2016, Kent County voters approved an increase to the local 9-1-1 surcharge to pay for the roughly \$25M radio system. In June of 2021, all local public safety agencies in Kent County began using the system, dramatically increasing interoperability and radio coverage for their users.

Flooding

Cascade Township acquired property along the Thornapple River just downstream from the Cascade Dam with the hopes that this will reduce repetitive losses from flooding.

The City of Holland constructed a new force main to alleviate wet weather issues. A drainage crossing on Azalea at South Shore Drive has been improved.

Other Hazard Mitigation Measures

Several Kent County communities actively participate in Community Risk Reduction (CRR) programs in coordination with the State Fire Marshal's office.

The CoGR Water Department has applied for Hazard Mitigation Grant funds to purchase generators for all water pump stations, but the project was not chosen to receive funds. Grand Haven township was able to purchase one generator for a lift station. Generators have been purchased and installed at all lift station locations in Ferrysburg. Station 1 and 2 in Spring Lake now have standby power. Spring Lake also added two portable generators for lift stations and all stations are now monitored.

The Grand rapids Fire Department developed a program to install smoke detectors and engage with the public on the importance of these detectors.

GVSU has installed "area of rescue assistance phones" in their newer buildings. Classroom locks have been installed. Cameras and license plate readers have been installed at all three entries to the GVSU campus. Other action plan steps are in progress.

Chester Township purchased a 4wd rescue vehicle using local funding. The township has identified and fitted with connections several water supplies using local funding. They have drilled a large diameter deep well at the fire station. Other large diameter wells were identified and fitted with valves and fittings. Other wells have been identified and waiting on funding to install valves and fittings. This has been done using local funding.

The City of Ferrysburg purchased a new snowplow truck, as well as an ATV for off road fires/EMS incidents. Strengthening inspections on Ridge bridge and Smith's bridge in Ferrysburg are now current.

The City of Holland installed a water supply interconnect with Wyoming Water Supply to provide emergency water supply to each entity. 15 backup generators have been precured for sewage lift stations. New bypass pump for the head of treatment plant has been installed. The city installed pump station emergency generators.

6.2 Regional Action Plans

This section contains the final regional Action Plans for each of the top four prioritized hazards organized by the four regional objectives. Each Action Plan includes a short description of the relevant hazard(s), the strategy aimed to mitigate its impact, the agencies responsible for implementation with the lead agency in bold, the general type of costs associated with each strategy, and the benefits.

These action plans were chosen based on community vulnerabilities and gaps in local resources, capabilities, programs, and authorities. A list of existing local authorities and resources can be found in Appendix E.

Implementation of each Action Plan will be guided by an analysis of the cost and impact benefits expected relative to program costs. Implementation will be determined, in part, based upon the availability of grant or shared funding, how well each Action Plan fits within established programs, goals, initiatives of the responsible agencies, and program needs identified through ongoing feedback from municipal officials, emergency response staff and the LEPC. Completion of all Actions Plans, unless otherwise noted, is anticipated within the 5-year cycle for reviewing and updating the HMP.

Priority rankings are as follows:

- **HIGH PRIORITY** actions were determined to be a top priority for >85% of Advisory Committee members,
- **MEDIUM PRIORITY** actions were determined to be a top priority for 85>50% of Advisory Committee members and
- **LOW PRIORITY** actions were determined to be a top priority for <50% of Advisory Committee members but necessary for inclusion.

Goal #1- Education and awareness: Promote life and safety through public education, hazard analysis, and early warning

Action 1.1: Utilize various mechanisms to communicate credible and actionable information to the public

High Priority:	All Hazards
Primary Responsibility:	Emergency Management , Public Health, Communications Departments/Public Information Officers, Executive Leaders, Public Safety, and Non-profit partners.
Initiatives Needed:	Develop policies to ensure coordinated communication occurs. Improve relations between all communications and public information officers in the region. Develop and utilize JIS and JIC plans. Mandate FEMA based PIO and communications training.
Implementation:	By 2027 or sooner, if funding is available. Ensure all public information officers and public safety/health personnel are trained. Train and exercise on JIC/JIS plans. Ensure all jurisdictions have 20% of the population registered for opt-in emergency notifications.
Cost(s):	Staff time, training, and communication tools \$45,000-\$60,000
Benefit(s):	Coordinated and consistent communication to internal/external partners and the community. Improve the community's ability to take action
Anticipated Funding:	Federal mitigation grants as well as general funds

Action 1.2: Educate and train local businesses, community organizations, and the general public in mitigation, preparedness, response, and recovery actions

High Priority:	All Hazards
Primary Responsibility:	Emergency Management , Public Health, Community Organizations, and Public Safety.
Initiatives Needed:	Augment current disaster volunteer organizations. Invest in resources to provide training sessions to external partners. Ensure training and education opportunities are offered to the whole community, i.e., multi-lingual, access, and functional needs
Implementation:	By 2027 or sooner, if funding is available Develop and distribute programs focused on business continuity planning, Emergency Action Planning, local and regional coordination planning, and other emergency management topics. Partner with appropriate resources to ensure offerings are provided in various languages, formats, and all access and functional needs areas.
Cost(s):	Staff time, training and exercise materials, and translation services \$5,000-\$7,000
Benefit(s):	Whole community preparedness. Increased resilience throughout the community
Anticipated Funding:	Federal mitigation grants as well as general funds, community grants, non-profit sponsorships, and partnerships if available.

Action 1.3: Develop education and notification strategies for communicating with non-English speakers, and those with disabilities and access and functional needs.

High Priority:	All Hazards
Primary Responsibility:	Public Information Officers and communications teams
Initiatives Needed:	Ensure areas and facilities with higher populations of vulnerable people are adequately prepared to serve vulnerable populations. Perform an assessment on those who have access and functional needs in the region. Identify and invest budgetary needs to support this initiative. Develop a list of regional services to partner with.
Implementation:	By 2027 or sooner, if funding is available. Educate regional Public Information Officer's and communications teams on the vulnerable populations' needs. Improve access to translation services for all stakeholders. Coordinate with services in the region to develop effective materials in various languages and communication lines.
Cost(s):	Staff time, training, services, and materials. \$5,000-\$7,000
Benefit(s):	Set all stakeholders up for success to effectively communicate to the whole community.
Anticipated Funding:	Federal mitigation grants as well as general funds, donations, and In-Kind

Action 1.4: Improve coordination and collaboration for public health crises between cities, counties, health departments, service providers, hospitals/clinics/doctors, pharmacies, and the general public

High Priority:	Public Health
Primary Responsibility:	Public health , health systems, emergency management, non-profits, and local and state government.
Initiatives Needed:	Revise and align existing Emergency Operations Plans between Public Health, Emergency Management, Hospitals, and other key entities to ensure a coordinated response to public health crises. Expand public health preparedness program capacity to assist the community with compliance and mitigation efforts to reduce disease spread.
Implementation:	By 2027 or sooner, if funding is available. Convene a planning team to align existing plans. Provide education, training, and exercises in all public service areas based on these aligned plans. Explore funding mechanisms to increase staffing in public health preparedness and emergency management programs.
Cost(s):	Staff time, plan development, purchase of incident management tools \$45,000-\$60,000
Benefit(s):	Improves coordination and collaboration throughout all phases of emergency management. Consistent messaging to internal and external partners.
Anticipated Funding:	Federal mitigation grants as well as general funds and public health funding.

Action 1.5: Evaluate and improve early warning emergency notifications, emphasizing digital methods of outreach

Low Priority:	All Hazards
Primary Responsibility:	Emergency management , public safety, national weather service, MSP-EMHSD, emergency communications, and EAS partners.
Initiatives Needed:	Coordinate meetings with EAS partners. Develop a plan to perform consistent assessment of all emergency alerting systems.
Implementation:	By 2027 or sooner, if funding is available. Provide education on emergency notifications to community members, primarily focusing on strategies for communicating with non-English speakers and those with access and functional needs. Develop emergency alert and warning processes. Procure and maintain emergency alerting systems. Develop and utilize message templates.
Cost(s):	Staff time and emergency alerting systems. \$20,000-\$30,000
Benefit(s):	Early warning opportunities. Communication to the whole community.
Anticipated Funding:	Federal mitigation grants as well as general funds.

Goal #2- Structure and infrastructure: Reduce loss of life and property damage with disaster-resistant structures, equipment, and communication

Action 2.1: Ensure communication systems are resilient, interoperable, and employ redundancies

Medium Priority:	Infrastructure Failure
Primary Responsibility:	All communication infrastructure owners and carriers , including local government public safety agencies.
Initiatives Needed:	Work with carriers/suppliers to plan for contingencies. Utilize interoperable and redundant communication pathways and equipment.
Implementation:	By 2027 or sooner, if funding is available. Promote carrier diversity and redundant types of communication opportunities. Develop regional mutual aid agreements and relationships with potential communication carriers/suppliers . Develop regional communication assets that are deployable.
Cost(s):	Staff time, communication cache and supplies, and communication backhaul pathways. \$120,000
Benefit(s):	Redundancy and continuity of communications and operations. Cache of resources.
Anticipated Funding:	Federal mitigation grants as well as general funds.

Action 2.2: Identify critical infrastructure vulnerabilities and ensure security is adequate

Medium Priority:	Infrastructure Failure and Cyber Security
Primary Responsibility:	Emergency Management, Utility Organizations , IT Departments, and Public Safety.
Initiatives Needed:	Establish a vulnerability assessment team.
Implementation:	By 2027 or sooner, if funding is available. Advocate for all departments, agencies, and organizations to perform continuous cyber and security assessments.
Cost(s):	Staff time, and consultants. \$50,000
Benefit(s):	Provide a thorough understanding of gaps and areas of improvement. Target future funding opportunities towards gaps identified.
Anticipated Funding:	Federal mitigation grants as well as general funds.

Action 2.3: Maintain power infrastructure, backup systems, and generators for critical infrastructures

Medium Priority:	Infrastructure Failure and severe weather
Primary Responsibility:	Critical infrastructures and utility organizations .
Initiatives Needed:	Invest in backup resources appropriate for each critical infrastructure. Develop mutual aid and other contractual agreements.
Implementation:	By 2027 or sooner, if funding is available. Purchase appropriate resources. Establish contracts with appropriate vendors. Develop connections for temporary resources.
Cost(s):	Staff time, generator investment and installation, and maintenance and fuel supply. \$40,000 per generator
Benefit(s):	Redundancy in power supply and continuity of operations.
Anticipated Funding:	Federal mitigation grants as well as general funds.

Action 2.4: Develop engineering controls to promote flood water diversion

Low Priority:	Severe weather, flooding, and erosion
Primary Responsibility:	Engineering , water, environmental services, zoning, Municipal/City/County Administration, and EGLE.
Initiatives Needed:	Identify and invest budgetary needs to support this initiative.
Implementation:	By 2027 or sooner, if funding is available. Assess future predictions and impact on lakeshore to determine engineering needs. Enhance floodwall capability along major rivers. Invest in upgrading drain systems. Enhance all water, wastewater, and other necessary lines/pathways. Minimize structures in floodplains, build reservoirs to catch/contain floodwaters, install permeable pavement, remove obstacles to natural drainage/water flow, widen floodways, and install storm water check valves to prevent backflow into the storm water pipes.
Cost(s):	Approximately \$130,000-180,000 each (based on actual property value) to purchase properties to mitigate flood damage and reduce vulnerability to existing structures. \$40,000 per wooden flood vulnerability structure
Benefit(s):	Decrease flood and erosion impacts.
Anticipated Funding:	Federal mitigation grants as well as general funds and capital funds.

Goal #3- Natural systems protection: Minimize damage and losses by preserving or restoring the functions of natural systems.

Action 3.1: Develop ecological controls to promote flood water diversion

Medium Priority:	Flooding and erosion
Primary Responsibility:	Engineering , water, environmental services, zoning, Municipal/City/County Administration, and non-profits.
Initiatives Needed:	Identify and invest budgetary needs to support this initiative. Perform ice jam study and other impact studies on the Grand River to understand holistic impacts. Partner with appropriate organizations to educate residents on developing resilient floodwater diversion actions on private property.
Implementation:	By 2027 or sooner, if funding is available. Identify areas in need of floodwater diversion. Hire a consultant to assess and perform diversion work. Minimize the number of residential properties located in repetitive flood areas. Implement ice jam mitigation measures. Prioritize stormwater system components and budget for repairs and upgrades based on watershed/floodplain data. Encourage or require neighborhood- and site-scale nature-based solutions like bioretention systems. Rebuild/add wetlands.
Cost(s):	Staff time and consultants. \$50,000-\$100,000
Benefit(s):	Decrease flood impacts.
Anticipated Funding:	Federal mitigation grants as well as general funds and capital funds

Action 3.2: Prioritize green spaces in areas that are most vulnerable to heat island effect and severe weather impacts

Low Priority:	Severe Weather
Primary Responsibility:	Parks and Recreation, Forestry, Municipal/City/County Administration, Engineering, Community Development, Emergency Management, Zoning, and non-profits.
Initiatives Needed:	Promote the use of green space to address severe temperature and weather impacts. Work with zoning departments to address high risk areas and the ability to become green space. Identify and invest budgetary needs to support this initiative. Encourage and support increased tree canopy, safe waterfront access, and cooling stations. Complete an urban heat risk assessment to identify which areas are most vulnerable to urban heat island effect.
Implementation:	By 2027 or sooner, if funding is available. Identify areas most vulnerable to urban heat island effect and which of those areas are available to become green space. Partner with appropriate departments and agencies to develop affordable and useful green space and to expand tree canopy. Invest in water features in public spaces (splash pads, parks, fountains, etc.). Provide opportunities to change repetitive loss or impacted areas into green space.
Cost(s):	Approximately \$130,000-180,000 each (based on actual property value) to purchase properties to mitigate heat island effects.
Benefit(s):	Lower impact of severe temperatures and weather.
Anticipated Funding:	Federal mitigation grants as well as general funds and capital funds.

Goal #4- Local plans and regulations: Incorporate hazard mitigation considerations into land use planning, resource management, and land development processes.

Action 4.1: Develop policies regarding at-risk properties for flooding and erosion

Low Priority:	Flooding and erosion
Primary Responsibility:	Emergency Management, Engineering, Water and Wastewater, Community Development, and Municipal/County/City Administration.
Initiatives Needed:	Develop a process to identify repetitive loss or at-risk properties. Delegate authority to local governments to adopt and enforce restrictive zoning and land use ordinances in designated dam inundation zones. Identify and invest budgetary needs to support this initiative. Ensure repetitive loss and eminent domain policies don't disproportionately displace those with access and functional needs in the region. Partner with appropriate public and private organizations to identify ways to better coordinate on policy development.
Implementation:	By 2027 or sooner if funding is available. Identify vulnerable properties Develop policies to ensure community members are consistently educated on flood and erosion issues. Develop building policies that provide information on past flooding events on the property/floodplain information at point of sale. Acquire and/or elevate repetitive loss properties and structures both up and downstream of High Hazard Potential Dams. Ensure facilities are not built on floodplains. Develop mitigation strategies to protect the loss of life and minimize property damage.
Cost(s):	Approximately \$130,000-180,000 each (based on actual property value) to purchase properties to mitigate flood damage and reduce vulnerability to existing structures.)
Benefit(s):	Improve education of personal and community members.
Anticipated Funding:	Federal mitigation grants as well as general fund

6.3 Jurisdictional Action Plans

The jurisdictional communities have expressed specific concerns or ideas/needs for hazard-related actions. Each jurisdiction identified potential mitigation strategies to address hazards within the community in the original 2006 Plan. Representatives from each of the 59 Kent and Ottawa County communities discussed in this 2022 Regional HMP were asked to review their section(s) of the 2017 Plan and revise their individual hazard priorities and mitigation Action Plans as appropriate. If comments were not received from individual communities through the survey instruments or during one of the workshops, community emergency managers were asked to update community-specific hazard and mitigation strategy priorities. None of the jurisdictions changed their overall priorities for this update. Jurisdictional Action Plans are summarized in Appendix H.

Priorities have been assigned to those projects that are most ready for implementation (or have already started to be implemented). However, many such projects require additional funding and preparation before work may begin (or be completed). Those projects that are most ready for implementation (or funding applications) and have been identified as relevant for one or more of the community's hazard mitigation concerns have been marked as "High Priority". These priorities are for each community so that various communities do not have undue or inappropriate comparisons between their needs. Cooperation between communities, especially between each community and the corresponding county emergency management office, is expected for the majority of the high-priority projects listed. Since the status of activities identified in previous versions of this plan have already been reported in updated versions, projects that have already been completed will be grayed out so that new strategies can be emphasized.

Projects that address a community's significant hazards, but do not have enough specific detail to allow them to be considered immediately ready for implementation or for a grant application process, have been marked as "Medium Priority" (for that individual community). Actions that have been labeled as medium priority (or as lower priority) may be implemented within the next five years where coordinated activities or ease of implementation makes such a process convenient, even if higher priority projects are still awaiting funds or other preparatory work. In other words, the priorities assigned here do not necessarily limit or predict a specific implementation sequence, which will vary according to each community's (sometimes unpredictable) circumstances over the next five years.

Projects that are considered preliminary ideas, or that address only lower-priority hazards in an area, are marked as "Low Priority" —not because they are considered unimportant but rather to encourage efforts toward higher priority hazard mitigation and preparedness strategies. In cases where communities do not have any higher-priority strategies, the community can coordinate with the priorities of the county's emergency management office (and the county's prioritized actions), since it is not uncommon for rural areas within the region to have minimal staff time and resources to plan for and implement the strategies under consideration.

The lists of hazard mitigation strategies, concerns, and input in the following community subsections have all been listed in prioritized order, although many listings with the same classification (High, Medium, Low) may be considered to be of equal priority with each other. Some lower priority concepts may address important concerns but are often not yet developed into the form of an implementable hazard mitigation action and have temporarily been assigned a lower priority due to their undeveloped, conceptual state. Jurisdictional Action Plans can be found in Appendix H.

7. Plan Monitoring and Revision

Kent County, Ottawa County, and the City of Rapids Emergency Management has the responsibility for development coordination and maintenance of the 2022 Regional HMP and overseeing its implementation through coordination and interaction with local departments and agencies and the community governments within and adjacent to Kent and Ottawa County. Each community is required to adopt their particular sections of the HMP, or the HMP as a whole, every five years. The HMP will be evaluated annually to determine the effectiveness of the programs, to measure if goals are being reached and to reflect changes that may affect mitigation priorities or available funding. The status of the HMP will be discussed and documented at an annual plan review meeting. Beginning one year after the plan's development, county and local representatives will contact, collect, and process information from the persons, departments, agencies, and organizations involved in overseeing and implementing mitigation projects or activities. The plan will also be evaluated and revised following any major disasters to determine if the recommended actions remain relevant and appropriate. Both Kent and Ottawa County provide ongoing news, updates, and contact information for the 2022 Regional HMP on their County websites. Social media may also be used to connect with the public.

7.1 Coordination with Other Plans and Programs

A Hazard Mitigation Plan is only a part of the emergency planning, mitigation, preparedness, response, and recovery process. The Advisory Committee will conduct future coordination of this Plan with other activities in the Counties. Individual members of the Advisory Committee are to identify opportunities within their respective departments or organizations to incorporate this 2022 Hazard Mitigation Plan into other County plans, programs, and in the jurisdictional annual budgeting process, as well as any opportunities for FEMA grants that become available. Any identified opportunities will be referred back to the Advisory Committee as a whole for consideration. By including representatives from many jurisdictions and inter-jurisdictional agencies who are well-connected throughout the Counties, coordination with other plans will be enhanced. Incorporating this 2022 Regional HMP into other plans and programs will ultimately be at the discretion of the departments or organizations which administer these plans or programs.

The Action Plans listed in the 2022 Regional HMP do not directly limit future development in hazard-prone areas. Enabling legislation in Michigan has established a system of "Home Rule," wherein land use planning and zoning power is given to local cities, villages, and townships. These municipalities will be encouraged to incorporate the findings and recommendations in this HMP into their individual land-use master plans and zoning practices. Action Item 4.1, which focuses on reducing flood-related damages, will likely need to include the purchase of repetitive loss structures within floodplains and subsequent land use controls for those properties. The Emergency Management departments will work with local jurisdictions to plan and implement floodplain management actions consistent with this Plan and to incorporate the findings and recommendations of specific on-going flood mitigation planning into future revisions of this HMP.

By promoting the benefits of a collaborative planning process and utilizing digital resources to foster connections whenever possible, the Advisory Committee will continue to play a vital role in creating opportunities for plan coordination.

References

- (PIPA), P. a. (2015). Hazard Mitigation Planning: Practices for Land Use Planning and Development near Pipelines. Retrieved from fema.gov: https://www.fema.gov/sites/default/files/2020-06/pipi-hazard-mitigation-primer_1-26-2015.pdf
- About Harbor Transit. (2021, December). Retrieved from <https://www.harbortransit.org/about/>
- Administration, U. F. (2001). Topical Fire Research. Retrieved from <https://nfa.usfa.fema.gov/downloads/pdf/statistics/v1i8-508.pdf>
- Ellison, G. (2019). Great Flood of 1904 revisited: The Grand River has a long history of overflowing its banks. MLive.
- Environmental and societal risk assessment. (2021, December 13). Retrieved from [augurisk.com: https://www.augurisk.com/risk/state/michigan/kent-county/26081](https://www.augurisk.com/risk/state/michigan/kent-county/26081)
- FEMA. (2021). Community Status Book Report.
- FEMA. (2021). National Risk Index. Retrieved from fema.gov: <https://www.fema.gov/flood-maps/products-tools/national-risk-index>
- Gmiter, T. (2018, February 23). Remembering West Michigan's \$12M flood as area preps for repeat. Retrieved from [mlive.com: https://www.mlive.com/weather/2018/02/remembering_west_michigans_12m.html](https://www.mlive.com/weather/2018/02/remembering_west_michigans_12m.html)
- (2017). Hazard Mitigation Plan for Kent and Ottawa Counties.
- Human Related Hazards. (2014). Retrieved from [michigan.gov: https://www.michigan.gov/documents/msp/MHMP_2014_UPDATE_PART_3_III_Human_Related_Hazards_449713_7.pdf](https://www.michigan.gov/documents/msp/MHMP_2014_UPDATE_PART_3_III_Human_Related_Hazards_449713_7.pdf)
- HUMAN-RELATED HAZARDS . (n.d.). Retrieved from [Michigan.gov: https://www.michigan.gov/documents/msp/MHMP_2014_UPDATE_PART_3_III_Human_Related_Hazards_449713_7.pdf](https://www.michigan.gov/documents/msp/MHMP_2014_UPDATE_PART_3_III_Human_Related_Hazards_449713_7.pdf)
- Kent County, MI Vandalism Rates and Vandalism Maps. (2021, December 9). Retrieved from [Crimegrade: https://crimegrade.org/vandalism-kent-county-mi/](https://crimegrade.org/vandalism-kent-county-mi/)
- Macatawa Area Express. (2021, December). Retrieved from <https://catchamax.org/>
- Mack, J. (2017, September 12). Michigan's most notable natural disasters. Retrieved from [mlive.com: https://www.mlive.com/news/2017/09/michigans_worst_natural_disast.html](https://www.mlive.com/news/2017/09/michigans_worst_natural_disast.html)
- Mack, W. (2018, January 13). Grand Rapids Uprising (1967). Retrieved from [BlackPast.org: https://www.blackpast.org/african-american-history/1967-grand-rapids-uprising-1967/](https://www.blackpast.org/african-american-history/1967-grand-rapids-uprising-1967/)
- Michigan Department of State Police, Emergency Management and Homeland Security Division. (2019). Michigan Hazard Analysis. MSP/EMHSD Publication 103.
- Michigan Public Health Institute . (2011). Mapping Heat Vulnerability in Michigan.

- Mike. (2018, April 15). History of Earthquakes in Michigan. Retrieved from aroundmichigan.com:
<https://aroundmichigan.com/2018/04/15/history-earthquakes-michigan/>
- National Weather Service. (2021, December 17). Grand River at Grand Rapids. Retrieved from
water.weather.gov:
<https://water.weather.gov/ahps2/hydrograph.php?wfo=grr&gage=gdrm4>
- National Weather Service. (n.d.). July 20th, 2019, Severe Weather, Flooding, and Record
Rainfall. Retrieved from weather.gov:
https://www.weather.gov/grr/07202019_SevereWeatherFlooding
- NOAA. (2021). Storm Events Database. Retrieved from ncdc.noaa.gov:
<https://www.ncdc.noaa.gov/stormevents/>
- Ottawa County, MI Vandalism Rates and Vandalism Maps. (2021, December 9). Retrieved from
Crimegrade: <https://crimegrade.org/vandalism-ottawa-county-mi/>
- Schuitema, E. (2021, May 20). Drought continues, now considered severe in parts of West
Michigan. Retrieved from WOOD TV8: <https://www.woodtv.com/weather/weather-news/drought-continues-now-considered-severe-in-parts-of-west-michigan/>
- sobocinskim. (2014, March 25). Human-Related Hazards. Retrieved from michigan.gov:
[https://www.michigan.gov/documents/msp/MHMP_2014_UPDATE_PART_3_III_Human
Related_Hazards_449713_7.pdf](https://www.michigan.gov/documents/msp/MHMP_2014_UPDATE_PART_3_III_Human_Related_Hazards_449713_7.pdf)
- The Associated Press. (2013, July 7). Arson destroys 144-year-old covered wooden bridge in
west Michigan. Retrieved from michiganradio.org:
[https://www.michiganradio.org/law/2013-07-07/arson-destroys-144-year-old-covered-
wooden-bridge-in-west-michigan](https://www.michiganradio.org/law/2013-07-07/arson-destroys-144-year-old-covered-wooden-bridge-in-west-michigan)
- The Rapid. (2021, December). Retrieved from The Rapid: <https://www.ridetherapid.org/>
- Tunison, J. (2021, October 6). Reward offered to identify suspects in \$300,000 fire, vandalism at
Ottawa County park. Retrieved from mlive.com: [https://www.mlive.com/news/grand-
rapids/2021/10/reward-offered-to-identify-suspects-in-300000-fire-vandalism-at-ottawa-
county-park.html](https://www.mlive.com/news/grand-rapids/2021/10/reward-offered-to-identify-suspects-in-300000-fire-vandalism-at-ottawa-county-park.html)
- U, S. F. (n.d.). Securing vacant and abandoned buildings: What communities can do. Retrieved
from U.S. Fire Administration:
[https://www.usfa.fema.gov/prevention/outreach/arson_prevention_abandoned_bldgs/co
mmunity_actions.html](https://www.usfa.fema.gov/prevention/outreach/arson_prevention_abandoned_bldgs_community_actions.html)
- USDA, N. A. (2017). 2017 Census of Agriculture - County Data.
- WOODTV.com. (2020, June 1). GRPD: 12 arrested for violating curfew in downtown protest.
WOODTV8. Grand Rapids.
- wpadmin. (2013, August 27). Michigan Data Center Earthquake Risks. Retrieved from
Otava.com: <https://www.otava.com/blog/michigan-data-center-earthquake-risks/>
- Wuebbles, D. D. (2017). Climate Science Special Report: Fourth National Climate Assessment,
Volume I. Washington, DC: USGCRP.

APPENDIX A

Public Meeting and Outreach Materials

Marketing Plan

Public Newsletter

Project Website

Public Meeting Outreach

Public Meeting Presentation

Adjoining County Outreach

Event Name: Public Meeting on the 2022 Regional Hazard Mitigation Plan

Event Date/s: Ottawa- February 9, Kent- February 16, Grand Rapids- February 23

Event Times: 6:30pm

Event Venue/s: Zoom

Event Details:

1. A public meeting to present an overview of the 2022 Regional Hazard Mitigation Plan for Kent County, Ottawa County, and the City of Grand Rapids to be held virtually on Zoom. Additional information about the plan and a link to the meeting will be available at: www.kentottawahmp.com or by contacting Kera Sharpe, Project Manager, 800.395.ASTI or ksharpe@asti-env.com.

We will set a timeframe of four weeks for the community to review and comment online, starting one week prior to the first public meeting.

2. Marketing Goals

- Generate public interest;
- Solicit community input; and
- Engage additional partners in the planning process

3. Public Outreach Opportunities

The following specific public outreach opportunities and methods have been identified for community members to participate in the mitigation planning process, and are presented in more detail on the following pages:

1. Public information website
2. Draft 2022 Regional Hazard Mitigation Plan and Flyer
3. Email and Social Media
4. News release
5. Comment form/survey to collect feedback on the Draft HMP

1. Public Information Website

A project information website hosted by ASTI will be available to the general public and members of the Hazard Mitigation Planning Team for the duration of the project at the following web address: www.kentottawahmp.com. The primary purpose of this site is to share information relevant to the 2022 Regional Hazard Mitigation Plan planning process.

Resources included on this are:

- Public Meeting Information
- Project information newsletter
- Draft of 2022 Regional Hazard Mitigation Plan
- PDF of existing local hazard mitigation plan (2017) for reference
- Public Participation Survey

2. Draft 2022 Regional Hazard Mitigation Plan and Flyer

The client will provide PDF copies of the draft plan and information flyer to local libraries, city halls, or community centers (to print). ASTI will upload a copy of the HMP and promotional flyer on the project website. A copy of an example email and flyer is provided.

Flyers- sent out and uploaded January 12

Draft HMP- sent out and uploaded on January 26

3. Email and Social Media

Provide outreach, via the following, in the weeks prior to the public meeting.

- Jurisdictional communications departments email list
- Jurisdictional social media (facebook, twitter, etc)

4. News Release

The project team will develop a press release and newspaper announcement for submission to local media outlets for the public meetings. The announcement will inform the public of the public meeting, when/where a draft is available for review, and how they may provide comment.

Press release- week of public meeting

5. Comment form/survey to collect feedback

A comment form will be provided on the project website along with the draft plan on January 26. ASTI will provide guidance on the type of feedback and reviews we are seeking. For example, feedback on the prioritization of the mitigation actions, recent events, and recognition of community assets in the hazard mitigation plan.

Outreach Summary:

Activity	Who	January 12	January 26	Week of
Website	ASTI	Post public meeting date and link	Post Draft and feedback link	
Email	Client	Send out flyers	Send out draft and reminder	
Facebook	Client / ASTI		Announcement – meeting and draft	Announcement- reminder
Twitter	Client / ASTI	Announcement- public meeting	Announcement- draft available	Announcement - reminder
Instagram	Client / ASTI		Announcement – meeting and draft	Announcement- reminder
Media sponsors	ASTI	Approach	(Option) Announcement- draft	Announcement- meeting



Kent/Ottawa/GR Hazard Mitigation Newsletter

April 2021

Issue 1

Special points of interest:

- 35 Kent County communities are included in the Plan, including the City of Grand Rapids.
- 24 Ottawa County communities are included in the Plan.
- To maintain eligibility for FEMA grant dollars, communities must participate in developing, and adopt their portion of, the Plan.
- The Hazard Mitigation Plan must be updated every 5 years to maintain eligibility for FEMA grant dollars.

In this issue:

Core Planning Committee	2
Community Participation	3
Input Needed	2
Plan Progress	3
Keeping Informed	2
Project Information	2

Updating the multi-jurisdictional Plan

Kent County, Ottawa County, and City of Grand Rapids Emergency Management Departments are updating their 2017 Hazard Mitigation Plan (HMP). The HMP will cover all communities in Kent and Ottawa Counties, including the City of Grand Rapids, and will provide a basis for identifying and managing hazards while complying with the requirements of the Disaster Mitigation Act of 2000, the Emergency Management Act, and the Federal Emergency Management Agency (FEMA).

The HMP is only a part of the emergency planning, mitigation, preparedness, response, and recovery process, so it will be coordinated with existing emergency plans, programs, and procedures used by the various communities in both Kent and Ottawa County.

An HMP is a tool for reducing the loss of life or property from natural, technological, or human related hazards. In addition, an updated HMP will provide a basis for technical assistance from the State of Michigan and for prioritizing funding. Having an approved HMP is necessary to receive Hazard Mitigation Grant Program (HMGP) project grants from FEMA.

The objectives of this Plan are to:

- Identify and describe significant natural, technological, and human related hazards in the Counties and their communities
- Identify and describe hazard mitigation strategies that can be implemented within a reasonable time frame
- Obtain public and community input on hazards and mitigation options
- Preserve the ability of the Counties and each of the communities that adopt the Plan to obtain FEMA grants

(Continued on page 4)

Wind Damage to a House



Public Participation

Receiving input from the public is a vital element of the Plan. Because of the diverse nature of the communities in Kent and Ottawa County, this input is critical to make sure that the Plan adequately identifies both community-specific and county-wide concerns and that county residents and agencies feel that their issues have been addressed.

To facilitate public communication, a project web site has been established (see page 2, “Keeping Informed”). This site provides information about the process and Plan, methods for communicating with the project team, and opportunities to provide input to specific questions being considered as the Plan is prepared. For those that do not have access to the internet, phone and mail contact information is also provided in this newsletter.





Advisory Committee

In order to provide input on hazard recognition and mitigation options, a Hazard Mitigation Core Planning Committee (HMC) is being formed. Many of these individuals are members of the County Local Emergency Planning Committee. They were joined by other representatives from industry, adjacent communities, schools, and local police, fire, and public works departments.

The first task is to have HMC members and community representatives complete a survey to rank hazard priorities. Information from this survey will be used in the first planning workshop on April 19th, where overall risks will be reviewed, updated, and reassessed.

The HMC will assist Kent and Ottawa County to identify and prioritize hazards and mitigation strategies. This will be accomplished using surveys and workshops that focus the Plan on those hazards and programs that will most benefit Kent and Ottawa County.

When completed, the committee will be asked to review the draft Plan prior to submittal to the public. In addition, their expertise will be used to obtain information about County operations, vulnerable areas, and existing hazard mitigation programs.

Public Input Requested

What: 1st Public Meeting

When: TBD

Time: TBD

Where: TBD

Keeping Informed Made EASY!

- Periodically review the project web site for announcements and current information. A form for providing comments on the Plan or for requesting a newsletter is available on the website. Copies of project materials, and other issues of the newsletter are also available there.
- Contact project staff to request information or provide input listed.
- Receive your own copy of this newsletter.
- Contact your community representative for information on hazards and programs specific to your community

Project Information Available at:

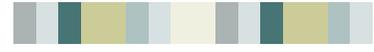
- www.kentottawahmp.com
- 800.395.ASTI
- ksharpe@asti-env.com
- 2311 East Beltline Ave SE, Suite 104, Grand Rapids, MI

Public Participation (continued)

More importantly, a public meetings will be conducted to obtain input from County citizens and other stakeholders. The public meeting will be held in **TBD** and will include an overview of the process and a summary of the draft Plan.

Attendees at that meeting will have an opportunity to discuss the draft Plan and provide input to the plan. The draft Plan will be posted to the project web site approximately two weeks prior to the meeting. feedback on the Plan.

Communication will also be provided via this periodic newsletter. The newsletter will be provided free to all interested parties and is available on the project web site. Community leaders are encouraged to make the newsletter available at their offices.



Plan Progress

Updating the Kent and Ottawa County HMP began when they contracted with ASTI Environmental of Brighton, Michigan. The project kicked-off on February 10, 2021.

Four groups will assist with creating the plan. County Emergency Management coordinators are leading the project, communicating with and collecting information from Kent and Ottawa County communities.

The second group is the Hazard Mitigation Core Planning Committee (HMC), made up of representatives of both Counties, including the City of Grand Rapids, and municipal agencies, area schools representatives, emergency response organizations, and other stakeholders from adjacent communities.

Elected officials, emergency response personnel, planners, and other staff from individual municipalities make up the third group. Key stakeholders in each municipality are providing specific information regarding hazards and programs in their communities. Each community will be kept informed on the progress of the Plan and will be asked to provide additional outreach to the public.

The last group consists of other stakeholders and interested parties. These individuals and organizations will be asked to comment at public meetings and review the draft Plan prior to its final publishing.

The first project planning workshop will be held April 19, 2021. There, representatives from 35 Kent County communities, including the City of Grand Rapids, 24 Ottawa County communities, and other agencies, will review priorities identified in the 2017 Plan, discuss survey results from community representatives, review the frequency and impact of various hazards in Kent and Ottawa County history, assess risks, and prioritize hazards.

Results of the first workshop will provide the basis for finalizing county-wide mitigation strategies at the second workshop.

Clearing Debris from a Tornado



The project website provides a single point of contact for information about the HMP and ways in which individuals may provide input. The draft plan will be made available on the website to facilitate public review and comment.

Community Participation

This multi-jurisdictional HMP is a tool to focus resources on critical regional hazards. Because it coordinates numerous communities with unique hazards and mitigation needs, the Plan provides an additional set of challenges for communication and consensus building. Obtaining input from communities, facilitating decision making, and maintaining focus are some of those challenges.

To meet these challenges, representatives from each of the communities are being contacted to assist with updating the HMP. Local emergency management coordinators, mayors, township supervisors, village presidents, and/or city managers, and

others in each community are asked to contribute to various surveys, meet with the project team, comment on the draft plan, and keep their community informed.



The Kent and Ottawa County Plan (continued)

(Continued from page 1)

Updating the Hazard Mitigation Plan will include :

- Updating a hazard analysis for both counties, emphasizing key hazards in each community
- Obtaining input from the communities and the public concerning specific hazards, and identifying strategies to mitigate the effects of those hazards
- Assessing risk and vulnerabilities for the top hazards in each county and the City of Grand Rapids
- Updating community profiles, emphasizing how growth and change will effect hazard mitigation
- Updating previously identified mitigation goals and objectives
- Evaluating previously identified and new strategies achieve mitigation goals and objectives
- Reviewing progress on action plans described in the 2017 HMP and developing new action plans
- Preparing a draft plan
- Obtaining input on the draft plan from the Counties, participating communities, adjacent communities and the public
- Preparing the final plan
- Maintaining the Plan as necessary to address changing hazards and mitigation plans

Hazards included in the Plan are listed below. Definitions for the various hazards may be found on the project web site.

Civil Disturbance
Criminal Acts
Dam Failures
Drought
Earthquakes

Extreme Temperatures
Fires (Structural, Wildfire, Scrap Tire)
Flooding (Urban or Dam Failure)
Fog
Invasive Species
Oil and Gas Well Accidents
Hazmat Incidents
Infrastructure Failures
Nuclear Power Plant Accidents
Petroleum & Natural Gas Pipeline Accidents
Public Health Emergencies
Subsidence (Sink Holes or Mining)
Terrorism
Thunderstorms
Tornadoes
Transportation Accidents
Weapons of Mass Destruction
Winter Hazards

Evaluation of each hazard will include discussion of the historic frequency, estimates of impacts to population and area, and estimates of impact costs. Areas that are vulnerable to each of the hazards will be identified and included in the Plan.

In order to make sure that the Plan addresses the needs of the individual communities, the HMP must include ongoing hazard mitigation programs, future programs, and those programs on community wish lists. To accomplish this, community representatives will be asked to identify local mitigation strategies. The general public and other interested parties will also have opportunities to provide mitigation suggestions on the project web site or during two public meetings.

High priority mitigation strategies will be selected from the list and action plans will be developed for each. However, all hazards and mitigation alternatives will be included in the Plan to assist with future planning.

We're on the web.
www.achmp.com

Published By:
ASTI Environmental
P.O. Box 2160
Brighton, MI 48116
Phone: 800.395.ASTI
Fax:810.225.3800
www.asti-env.com





KENT & OTTAWA COUNTIES CITY OF GRAND RAPIDS HAZARD MITIGATION PLAN UPDATE

WELCOME

Kent and Ottawa Counties, and the City of Grand Rapids are updating their Hazard Mitigation Plan that was last updated in 2017. During the update, this web site will provide information and tools to assist with input from the local units of government and the community.

[ZOOM Townhall Meeting Links](#)



Ottawa County: February 9th • 6:30pm

Join Zoom Meeting

<https://us06web.zoom.us/j/84314960250?pwd=RjZKYy8yaktTWU5LanFrN1Bna0tiQT09>

Kent County: February 16th • 6:30pm

Join Zoom Meeting

<https://us06web.zoom.us/j/84732134538?pwd=WDI3MIUyYkIjSE9vUjBxTGlrQlhnUT09>

City of Grand Rapids: February 23rd • 6:30pm

Join Zoom Meeting

<https://us06web.zoom.us/j/84988062876?pwd=Kzk3NUZHdktvKzEvMkdIZFRURTdaUT09>

1. DOWNLOAD & REVIEW THE DRAFT

Download the Draft Hazard Mitigation Plan for review by **clicking the file link below.**



2. SUBMIT FEEDBACK

Once you have been able to review the DRAFT 2022 Hazard Mitigation Plan, please submit your feedback by filling out the form below.

Name

Email*

Message

SEND

This site is protected by reCAPTCHA and the Google Privacy Policy and Terms of Service apply.

*** Denotes the field is required to submit the form**

SUMMARY

As part of their overall emergency management and response initiatives, Kent County, Ottawa County and the City of Grand Rapids is preparing an update to the current Hazard Mitigation Plan (HMP). The objective of the Plan is to reduce risks from natural, human, and technological hazards by identifying and evaluating those hazards. The Plan will provide guidance when committing resources that will reduce the effects of hazards, and will provide a basis for technical assistance and funding from the State of Michigan and the Federal Emergency Management Agency (FEMA).

The process of developing the HMP involves the following steps:

- First, develop a risk assessment which includes identifying the characteristics and potential consequences of hazards.
- Second, develop mitigation strategies that contain prioritized mitigation goals, objectives, and actions to help avoid or minimize undesired hazard effects.
- Finally, develop a method of implementing the plan and monitoring its progress.



ASTI Environmental (ASTI) is assisting Kent & Ottawa Counties and The City of Grand Rapids with modifications to the HMP by facilitating the planning process and preparing the HMP document.

This web site provides additional information about the HMP, a method for providing input, and a source of information about the hazard mitigation planning process. If you have any questions about this web site, please contact Kera Sharpe of ASTI Environmental at 1.800.395.ASTI or ksharpe@asti-env.com



Copyright © 2021 Kent & Ottawa Counties HMP Update - All Rights Reserved.
Website Managed by ASTI Environmental // www.asti-env.com

Powered by GoDaddy



1. DOWNLOAD & REVIEW THE DRAFT

Download the Draft Hazard Mitigation Plan for review by **clicking the file link below.**

Kent-Ottawa-GR HMP 2-2-22 DRAFT REPORT_Redacted (pdf)

DOWNLOAD

2. SUBMIT FEEDBACK

Once you have been able to review the DRAFT 2022 Hazard Mitigation Plan, please submit your feedback by filling out the form below.

Name

Email*

Message

SEND

This site is protected by reCAPTCHA and the Google [Privacy Policy](#) and [Terms of Service](#) apply.

*** Denotes the field is required to submit the form**



CONTACT FORM

Should you have any questions or concerns, please fill out the form below and someone will respond to you as soon as possible.

Name*

Email*

Message*

SEND

This site is protected by reCAPTCHA and the Google [Privacy Policy](#) and [Terms of Service](#) apply.

ASTI ENVIRONMENTAL

ASTI Environmental

ASTI Environmental (ASTI) is assisting Kent and Ottawa Counties and the City of Grand Rapids with modifications to the Hazard Mitigation Plan (HMP) by facilitating the planning process and preparing the HMP document.

This web site provides additional information about the HMP, a method for providing input, and a source of information about the hazard mitigation planning process.

If you have any questions about this web site, please contact Kera Sharpe of ASTI Environmental at 1.800.395.ASTI or ksharpe@asti-env.com

Copyright © 2021 Kent & Ottawa Counties HMP Update - All Rights Reserved.

Website Managed by ASTI Environmental // www.asti-env.com

Powered by [GoDaddy](#)



DOWNLOADS

Kent-Ottawa-GR HMP 2-2-22 DRAFT REPORT_Redacted (pdf)



Kent Ottawa GR April Newsletter (pdf)



2017 GGR Hazard Mitigation Plan (pdf)



Copyright © 2021 Kent & Ottawa Counties HMP Update - All Rights Reserved.
Website Managed by ASTI Environmental // www.asti-env.com

Powered by GoDaddy



Workshop Questionnaire

The primary purpose of the Regional Hazard Mitigation Plan is to set forth a list of strategies the jurisdiction or region should utilize to develop a more resilient community. Additional sections and information in the Hazard Mitigation Plan contribute to and provide the basis to the mitigation strategy. A hazard mitigation strategy provides focus and direction for the community's efforts to reduce the impact from the identified hazards. As a stakeholder, we are asking you to use your subject matter expertise and role to help develop flexible strategies for the 2022 Regional Hazard Mitigation Plan.

The following is a general overview of what mitigation strategies can accomplish:

- Protect lives and reduce injuries
- Protect infrastructure investments
- Protect future development, reduce damage to structures and agriculture and thereby protect the local economy
- Ensure the continuity of operations and fostering effective community development
- Foster collaboration across governmental agencies, departments, and economic sectors
- Support all areas of emergency management including the preparedness, response, and recovery of a community post-event

You will need to refer to the previous hazard priorities and actions for your specific community in order to answer questions 2-14 of this survey.

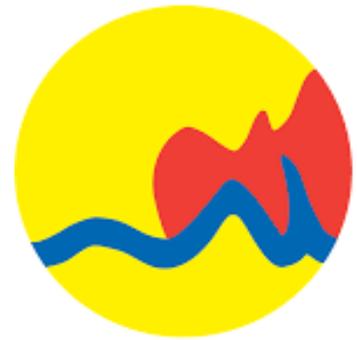
The community subsections portion of the 2017 Kent and Ottawa County Hazard Mitigation Plan is available by following this link: [2017 Kent and Ottawa County Hazard Mitigation Plan: Community Subsections](#)

TAKE THE SURVEY



HAZARD MITIGATION PLAN PUBLIC MEETING

Kent County, Ottawa County
City of Grand Rapids



5`di V`]Ma YYh]b[`k]`VY`YX`j]fhi U`micb`NC CA `cb: YVfi Ufm- hž%* hžUbX`
&` fXž&\$&&`Uh*.` \$da `hc`dfYgYbhiUb`cj Yfj]Yk `cZ`hY`&\$&&`FY[]cbU` <UnUfX`
A]h[Uh]cb`D`Ub`A Ya VYfgjcZ`hY`di V`]WU`gc`Uj Y`Ub`cddcfhi b]mihc`fyj]Yk `hY`
XfUZhd`Ub`UbX`dfcj]XY`ZYXVUW`j]U`hY`dfc`YmK YVg]hY.

www.KentOttawaHMP.com

Date: K YXbYgXUm: YVfi Ufm- hž%* h, `UbX`&` fXž&\$&&
Time: * " \$ PM
Location: ZOOM (links located on project website)

Additional information about the Plan is available at:

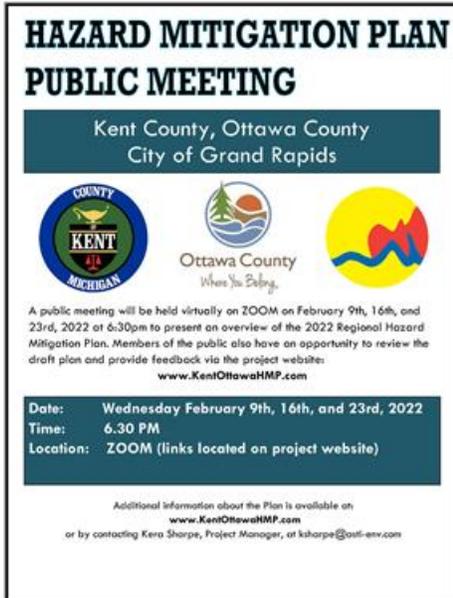
www.KentOttawaHMP.com

or by contacting Kera Sharpe, Project Manager, at ksharpe@asti-env.com

2022 Regional Hazard Mitigation Plan Public Meetings

Category: [MLive.com Online Only](#) - [Community](#) - [Local Activities](#)
Views: 4

Start Date: 2/7/2022



No caption

Meet the Advertiser [HELP!](#)

[Ask Advertiser a Question](#)
Feedback: [KentOttawaHMP](#)

Other Options

[Watch This Ad](#)
[Clip This Ad / View Clip List](#)
[Email to a Friend](#)
[Report As Inappropriate](#)
[ShareThis](#)

Description

A public meeting will be held virtually on **ZOOM** on **February 9th, 16th, and 23rd, 2022 at 6:30pm** to present an overview of the 2022 Regional Hazard Mitigation Plan for Kent County, Ottawa County and the City of Grand Rapids. During the meeting, the public is invited to make comments or suggestions. City, County, and emergency management officials will be on hand to answer any questions.

This plan provides a basis for identifying and managing hazards among the communities in the Grand Rapids region, while complying with the requirements of the Disaster Mitigation Act of 2000, the Emergency Management Act, the Federal Emergency Management Agency (FEMA) and applicable federal, state, and local regulations.

A draft copy of the 2022 Regional Hazard Mitigation Plan will also be available for review on the project website starting February 2nd through May 2nd (four weeks). The public is invited to make comments or suggestions via the feedback link. All comments received from the public will be documented and considered for inclusion in this plan.

Additional information about the Plan and a link to the meeting are available at: www.kentottawahmp.com or by contacting Kera Sharpe, Project Manager, 800.395.ASTI or ksharpe@asti-env.com.

Close



Ottawa County

Where You Belong®

Ottawa County, Michigan (image courtesy government of Ottawa County, Michigan)

Series of Virtual Townhalls on Regional Hazard Mitigation Plan to Begin on Wednesday

By Gary Stevens

Feb 7, 2022 | 6:00 AM

WEST OLIVE, MI (WHTC-AM/FM, Feb. 7, 2022) – The first of three virtual town hall sessions to discuss a Regional Hazard Mitigation Plan involving Ottawa and Kent counties, as well as the city of Grand Rapids, is coming up on Wednesday.

According to officials of those three entities, “This plan is a comprehensive analysis of our regional hazards and vulnerabilities, and potential ways to decrease the effects of those hazards. These virtual meetings are a great opportunity for residents to learn about the plan, ask questions and provide input, and to meet the emergency managers from Grand Rapids, Kent County and Ottawa County.”

Those officials added that, “The regional plan is a requirement to be eligible for FEMA Hazard Mitigation Grant Funds for pre and post disasters.”

The first session involves Ottawa County on February 9th, with Kent County (February 16th) and Grand Rapids (February 23rd) on the following two Wednesdays. Each of the three hour-long discussions begin at 6:30 PM. More information on the plan and ZOOM links to each online presentation is [here](#).

Like 2

Tweet

Comments

Leave a Reply

You must be [logged in](#) to post a comment.

You May Like

Sponsored Links by Taboola

Doctor Tells: Do You Have Too Much Belly Fat? (Eat This Before Bed)

Gundry MD

Doctor Tells: Do You Have Too Much Belly Fat? (Eat This Before Bed)

Gundry MD | Sponsored

[Read Next Story >](#)



By Press release submission

Feb 5, 2022

County of Ottawa issued the following announcement on Feb 4.

Kent and Ottawa Counties and the City of Grand Rapids are holding virtual townhalls to gather input on the Regional Hazard Mitigation Plan. This plan is an analysis of regional hazards and vulnerabilities and ways to decrease their effects. Each of the regional partners have a designated townhall; however, the public is welcome to participate in any of the meetings.

- Ottawa County · Feb 9 · 6:30 p.m.

- Kent County · Feb 16 · 6:30 p.m.

- City of Grand Rapids · Feb 23 · 6:30 p.m.

The meeting links and draft of the plan can be found at <https://kentottawahmp.com>.

This is an opportunity for residents to learn about emergency planning, ask questions and provide input. A Spanish translator will be available at the February 23 meeting.

Kent County, Michigan The City of Grand Rapids

Original source can be found [here](#).

Saint Leo University continued its Courageous Conversations Series on Oct. 15 with an online discussion about social justice and advocacy. | Christina @ wocintechchat.com / Unsplash



ORGANIZATIONS IN THIS STORY

[County of Ottawa](#)

! RECEIVE ALERTS

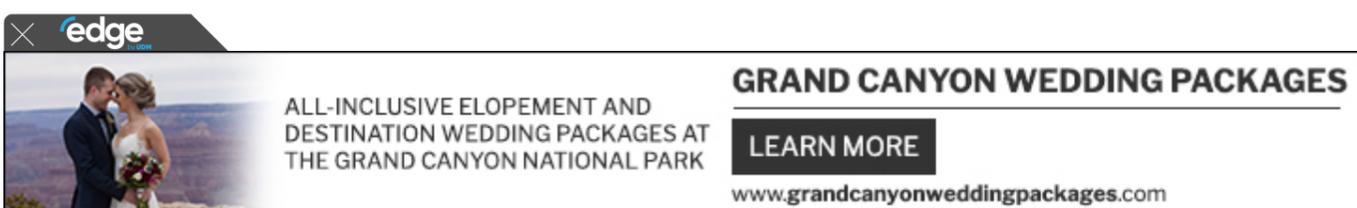
The next time we write about any of these orgs, we'll email you a link to the story. You may edit your settings or unsubscribe at any time.

[Sign-up](#)

DONATE

Help support the Metric Media Foundation's mission to restore community based news.

[Donate](#)



edge

ALL-INCLUSIVE ELOPEMENT AND DESTINATION WEDDING PACKAGES AT THE GRAND CANYON NATIONAL PARK

GRAND CANYON WEDDING PACKAGES

LEARN MORE

www.grandcanyonweddingpackages.com

Ottawa County

Emergency managers hosting virtual town hall meetings

Contributed
Feb 3, 2022

Kent and Ottawa counties and the city of Grand Rapids have arranged for three virtual town hall meetings to gather stakeholder input on the Regional Hazard Mitigation Plan.

This plan is a comprehensive analysis of regional hazards and vulnerabilities, and potential ways to decrease the effects of those hazards. The regional plan is a requirement to be eligible for FEMA Hazard Mitigation Grant Funds for pre- and post-disasters.

Thank you for reading!

Please log in, or sign up for a new account and purchase a subscription to continue reading.

[Sign Up](#)

[Log In](#)



**Phase 1 ESA Site Assessments - Lic
Professional Engineer**



Sign Up

keranoe

Revision Date: December 9, 2022

English (US) · Español ·

Publication Date:

Português (Brasil) · Français (France) ·

Deutsch



Ottawa County

February 4 at 5:00 AM ·

Kent and Ottawa Counties and the City of Grand Rapids are holding virtual townhalls to gather input on the Regional Hazard Mitigation Plan. This plan is an analysis of regional hazards and vulnerabilities and ways to decrease their effects. Each of the regional partners have a designated townhall; however, the public is welcome to participate in any of the meetings.

- Ottawa County · Feb 9 · 6:30 p.m.
- Kent County · Feb 16 · 6:30 p.m.
- City of Grand Rapids · Feb 23 · 6:30 p.m.

The meeting links and draft of the plan can be found at <https://kentottawahmp.com>.

This is an opportunity for residents to learn about emergency planning, ask questions and provide input. A Spanish translator will be available at the February 23 meeting.

[Kent County, Michigan](#) [The City of Grand Rapids](#)



KENTOTTAWAHMP.COM

Kent & Ottawa Counties City of Grand Rapids hazard mitigation plan update

7

1 Share

Share

Privacy · Terms · Advertising · Ad Choices

· Cookies · More

Meta © 2022



The City of Grand Rapids

1 hr ·

The City of Grand Rapids and Kent and Ottawa Counties are holding virtual townhalls to gather input on the Regional Hazard Mitigation Plan. This plan is an analysis of regional hazards and vulnerabilities and ways to decrease their effects. Each of the regional partners have a designated time but the public is welcome to participate in any of the meetings.

- Ottawa County · Feb 9 · 6:30 p.m.
- Kent County · Feb 16 · 6:30 p.m.
- City of Grand Rapids · Feb 23 · 6:30 p.m.

The meeting links and draft of the plan can be found at <https://kentottawahmp.com>.

This is an opportunity for residents to learn about emergency planning, ask questions and provide input. A Spanish interpreter will be available at the February 23 meeting. [See less](#)

3

Like

Comment

Share

See more of The City of Grand Rapids on Facebook

Log In

or

Create new account

**Kent County, Michigan**

Yesterday at 12:21 PM · 🌐



What goes into planning for emergencies in Kent County? This is your opportunity to learn more about how West Michigan responds and plans for hazards such as severe weather, cyber security, and large scale incidents to name a few. Kent and Ottawa Counties and the City of Grand Rapids are holding three virtual townhall meetings to gather stakeholder input on the Regional Hazard Mitigation Plan. This plan is a comprehensive analysis of our regional hazards and vulnerabilities and potential ways to decrease the effects of those hazards. The regional plan is a requirement to be eligible for FEMA Hazard Mitigation Grant Funds for pre and post disasters. |

When: February 16th • 6:30pm

Find more information and how to join here:

KENTOTTAWAHMP.COM

Kent & Ottawa Counties City of Grand Rapids hazard mitigation plan update

198



2

1 Comment 3 Shares

KENT COUNTY

Emergency teams eye river for ice jams amid melt, rain



by: Joe LaFurgey
Posted: Feb 16, 2022 / 04:35 PM EST / Updated: Feb 16, 2022 / 06:15 PM EST



The 7 Biggest Flu Vaccine Myths: Debunked.
By MDHHS

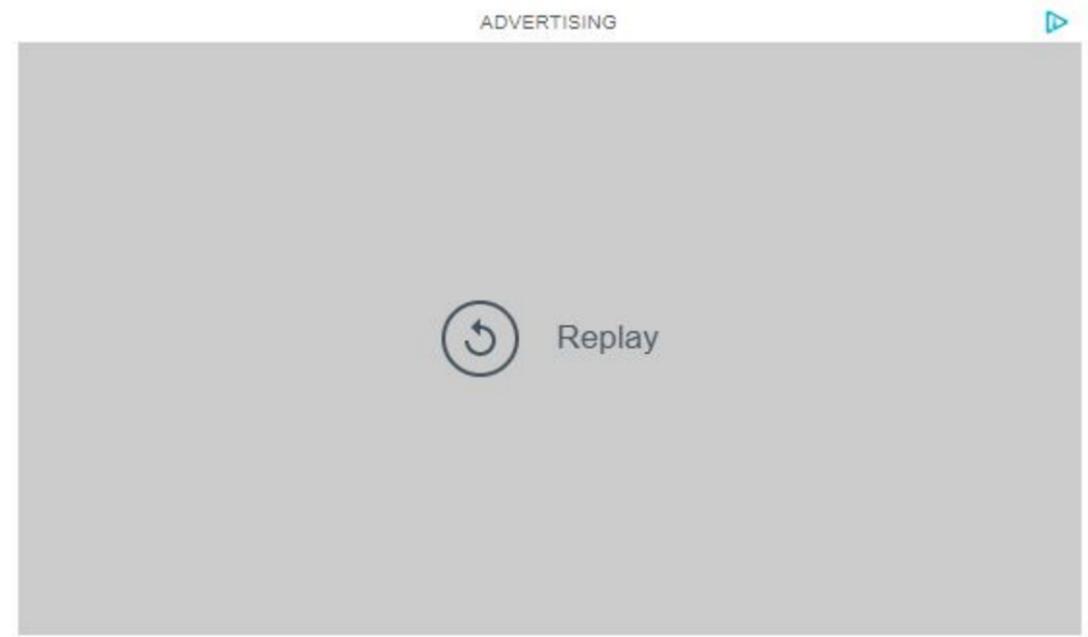


Download the free WOOD

GRAND RAPIDS, Mich. (WOOD) – The rain is coming, the snow is melting and the rivers are rising. Those three things have the people in charge of managing local emergencies putting out the word to hope for the best but prepare for the worst.

Fast rising waters can be more than a nuisance; they can also create dangers you’ve never thought of. In January 2020, heavy rain and ice jams flooded Willow Drive in Comstock Park, trapping an ambulance crew trying to get to a patient who needed to get to the hospital. Firefighters and Kent County sheriff’s deputies improvised, calling out the department’s high-bodied armored personnel carrier. Everybody made it out OK.

It serves as a reminder of what could happen if people ignore flooding and ice jam warnings.



“These conditions can change quickly. We want to make sure people have a plan if they need to evacuate their residence or place of business,” Kent County Emergency Management Coordinator Matt Groesser said.

Especially with what’s predicted over the next few days: warm temperatures and rain, then snow, then a

TOP STORIES ON WOODTV.COM

- 1 Storm Team 8 Forecast
- 2 Michigan health department updates mask guidance
- 3 Messy wintry system headed to West Michigan
- 4 MSP searching for cabin stolen in northern Michigan
- 5 MSP: 1 dead, 4 injured in crash near Muskegon



Know something newsworthy? Report It!

NEWS 8 LINKS

- Download the WOOD TV8 news app
- News Links
- Meet the Team
- To The Point
- Stream News 8 newscasts
- Gas Prices for Grand Rapids & Kent Co.

Especially with what's predicted over the next few days: warm temperatures and rain, then snow, then a refreeze that could make for a messy situation.

Messy wintry system headed to West Michigan →

Groesser and his staff are working with the National Weather Service to monitor the rain, the runoff and the river. He said it will likely be the weekend before they know if flooding will be serious.

"It's very difficult to predict exactly where (ice jams are) going to form and what impact they're going to have. But what we do know is that they can be very dangerous," Groesser said.

Of least concern is the portion of the Grand River that flows through Grand Rapids. So far, the ice seems to be flowing well.

With warmer temps coming, experts watch for ice jams →

That doesn't eliminate flooding concerns brought on by covered storm drain basins.

"Even one small layer of leaves ... you can be up to your knees in water on those. Then add ice and snow on top of that and it's just a big ol' mess," Grand Rapids Wastewater and Stormwater Maintenance Superintendent Carrie Rivette said.

There are more than 17,000 storm drain catch basins throughout the city. Right now, you can't see many of them. City plow crews have been hitting streets, trying to peel back a layer of snow covering the drains so water can run off, but they can't get to all of them. So they're asking residents for some help.



Gas Prices for Grand Rapids & Kent Co.

30+ nonstop routes.
GERALD R. FORD International Airport
Where the going gets good.
BOOK A FLIGHT

SPONSORED CONTENT



The 7 Biggest Flu Vaccine Myths: Debunked.
By MDHHS

WOOD TV8
287,713 likes
Like Page Share

“If they can do it safely, if they can get that uncovered, that will help everybody out,” Rivette said. “If you can’t get to it safely and it’s causing issues, let us know. We will get there as soon as we can.”



A snow- and slush-covered catch basin grate in Grand Rapids on Feb. 16, 2022.

Kent and Ottawa counties and the city of Grand Rapids continue a series of virtual town hall meetings to find out what the public believes are the biggest disaster risks and how to handle them. For more on town halls and the Regional Hazard Mitigation Plan, go to kentottawahmp.com.

Copyright 2022 Nexstar Media Inc. All rights reserved. This material may not be published, broadcast, rewritten, or redistributed.

SHARE THIS STORY

Facebook, Twitter, WhatsApp, SMS, Email, Share icon

AROUND THE WEB



20 High Blood Pressure Foods You Should Avoid

HealthyGem



The Shoddiest Planes Ever Made

BleacherBreaker



Historic Figures Who Were Actually Photographed

Past Factory

revcontent.

18 minutes ago

When the Perseverance Rover launched in 2020, NASA opened an opportunity to carry the names of citizens aboard the shuttle to Mars. If you missed out on the last opportunity, another one awaits.

WOODTV.COM

Watching the Skies: Your...

Tweets by @WOODTV

WOOD TV8 @WOODTV

Celebration Cinema is launching public showtimes that have open captioning. [woodtv.com/news/michigan/...](http://woodtv.com/news/michigan/)

Celebration Cinema adding open capti...
Celebration Cinema theaters are taking ex...
woodtv.com

2m

Grand Rapids Kent County



February 2, 2022
FOR IMMEDIATE RELEASE

Area Emergency Managers Are Hosting Virtual Townhall Meetings on Regional Mitigation Plan

Grand Rapids, Michigan - February 2, 2022 - Kent and Ottawa Counties and the City of Grand Rapids are holding three virtual townhall meetings to gather stakeholder input on the Regional Hazard Mitigation Plan. This plan is a comprehensive analysis of our regional hazards and vulnerabilities and potential ways to decrease the effects of those hazards. The regional plan is a requirement to be eligible for FEMA Hazard Mitigation Grant Funds for pre and post disasters.

Each of the three regional partners have a designated virtual townhall; however, the public is welcome to participate in any of the meetings.

- Ottawa County · February 9, 2022 · 6:30 p.m. - 7:30 p.m.
- Kent County · February 16, 2022 · 6:30 p.m. - 7:30 p.m.
- City of Grand Rapids · February 23, 2022 · 6:30 p.m. - 7:30 p.m.

These virtual meetings are a great opportunity for residents to learn about the Regional Hazard Mitigation Plan, ask questions and provide input, and to meet the emergency managers from Kent County, Ottawa County, and the City of Grand Rapids.

The meeting links and the Regional Hazard Mitigation Plan can be found at <https://kentottawahmp.com/>. A Spanish translator will be available at the February 23 meeting.

[Download a copy of this press release.](#)

Media Contacts

Jennifer Kalczuk, Public Safety Communications, City of Grand Rapids

(616) 456-4269, jkalczuk@grand-rapids.mi.us

Lori Latham, Communication Director, Kent County
(616) 401-1743, lori.latham@kentcountymi.gov

Shannon Felgner, Communications Manager, Ottawa County
(616) 738-4672, sfelgner@miottawa.org

Having trouble viewing this email? [View it as a Web page.](#)

Images included with press releases may be reproduced for editorial use. For high resolution images, email the media contact in the press release.



Ottawa County is located on Lake Michigan's spectacular freshwater coastline where nature is cherished and protected. More than the lakeshore, you'll find the people of Ottawa County friendly yet driven, working hard to succeed in charming downtown small businesses, at manufacturing hubs with global impact and on acres passed down from generations. We embrace creativity and believe that diversity makes us stronger. We resolve that our public services must be high-quality and cost-effective. We are innovative and never wait for someone to solve our problems for us. We are friendly neighbors chipping in, lending a hand and making sure you know Ottawa County is where you belong.

The Ottawa County Board of Commissioners: Chairman Matt Fenske | Vice-Chairman Al Dannenberg | Joe Baumann | Roger Bergman | Greg DeJong | Frank Garcia | Jim Holtvluwer | Phil Kuyers | Randy Meppelink | Kyle Terpstra | Doug Zylstra

The Ottawa County Board of Commissioners meets the second and fourth Tuesdays each month at 1:30PM. The public is welcome and encouraged to participate. Meetings are held in the Board Room located at 12220 Fillmore Street, West Olive, Michigan. Contact information and district information for the Ottawa County Board of Commissioners is available at miOttawa.org.

Ottawa County | 12220 Fillmore Street | West Olive | Michigan | 49460 | 616-738-4000 | [Contact Us](#)



[Receive Fewer Messages](#) | [Unsubscribe](#)

This email was sent to lori.latham@kentcountymi.gov using GovDelivery Communications Cloud on behalf of: Ottawa County, Michigan · 12220 Fillmore Street · West Olive, MI 49460

GovDelivery logo





Matt Groesser

Emergency Management Coordinator
Kent County Sheriff's Office
701 Ball Ave NE
Grand Rapids, MI 49503
Desk: (616)632-6255 (forwards to cell)
Matt.Groesser@KentCountyMI.gov

From: Groesser,Matthew

Sent: Friday, January 28, 2022 11:07 AM

Subject: 2022 Hazard Mitigation Plan - Executive Summary

Hello Everyone,

As you may know, Kent County, Ottawa County, and the City of Grand Rapids have partnered to complete the 2022 Regional Hazard Mitigation Plan. Please take a moment to peruse the executive summary (attached). It does a nice job of explaining why we are working on this and what we hope to achieve as well as some details about what we've already determined our top hazards are.

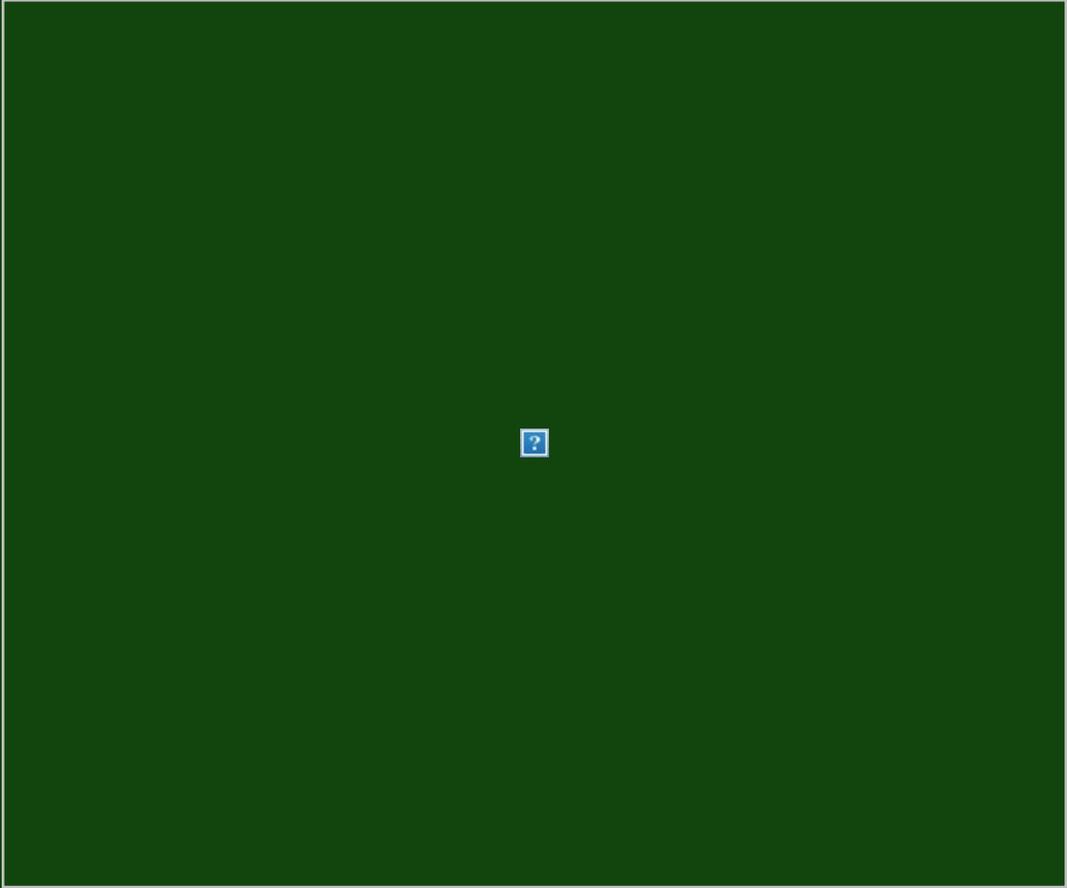
Our process is still on-track to complete this update on time as long as the FEMA review does not slow us down. You should see the complete draft coming out very soon. Also, the **Kent County Virtual Town Hall** meeting to seek public input on the draft of the full plan will be on **February 16th at 6:30PM**. We will be sure to send you all the link in case you would like to share it within your communities. The communications departments of both counties and Grand Rapids are finalizing the look and feel of the infographics that will be used as announcements and invitations for this right now.

Please reach out with any questions you have.

Thanks,
-Matt

Matt Groesser

Emergency Management Coordinator
Kent County Sheriff's Office
701 Ball Ave NE
Grand Rapids, MI 49503
Desk: 616-632-6255 (forwards to cell)
Matt.Groesser@KentCountyMI.gov



What do you think of our plan?

Wednesday, Feb. 23 at 6:30 pm, is the last opportunity to participate in a virtual town hall meeting to gather input on the Regional Hazard Mitigation Plan. This plan is an analysis of regional hazards and vulnerabilities and ways to decrease their effects. It is also an opportunity for residents to learn about emergency planning, ask questions, and provide input. A Spanish interpreter will be available.

The meeting link and draft of the plan can be found [HERE](#).

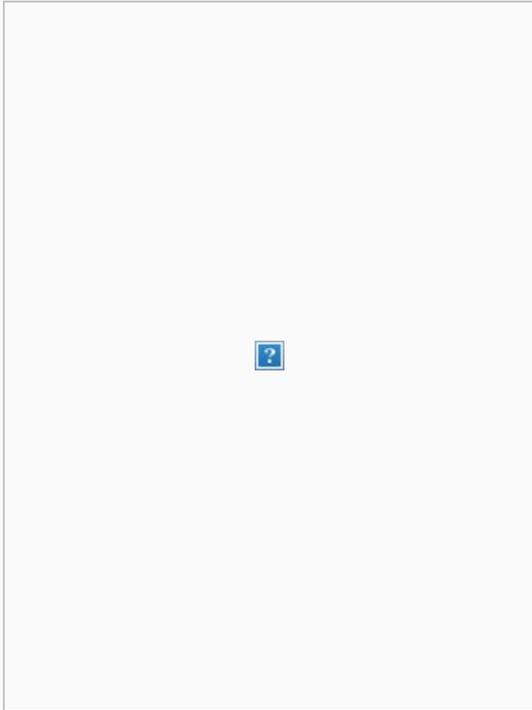
We're welcoming a long-time advocate to help reduce lead in homes

A long-time community advocate of healthy homes will now help advance the our efforts to reduce childhood lead poisoning. Paul Haan, the founding executive director at Healthy Homes Coalition of West Michigan, is the new lead programs specialist with the Community

Check out these other fantastic winter events happening across GR!

[Modelo Meltdown](#)

Saturday, February 19 · Noon to 5 p.m.
GR Chicks Way
Sponsored by Lions and Rabbits



[St. Patrick's Day Parade](#)

Saturday, March 12 – 11 a.m. to Noon
Parade Route on Ottawa + Lyon + Division
Sponsored by The Irish Cultural Committee

[Cesar E. Chavez Social Justice March](#)

Thursday, March 31 – 11 to 11:45 a.m.
Grandville Ave (Hughart St – High St)
Sponsored by The Committee to Honor Cesar E. Chavez

Stay connected to your elected officials

Mayor

[Rosalynn Bliss](#)
616.456.3168
rbliss@grcity.us

First Ward Commissioners

[Jon O'Connor](#)
616.456.3856
joconnor@grcity.us

[Kurt Reppart](#)

616.456.3578
kreppart@grcity.us

Second Ward Commissioners

[Joseph D. Jones](#)
616.456.3858
jdjones@grcity.us

[Milinda Ysasi](#)

616.456.3859
mysasi@grcity.us

Third Ward Commissioners

[Senita Lenear](#)
616.456.3860
slenear@grcity.us

[Nathaniel Moody](#)
616.456.3857
nmoody@grcity.us



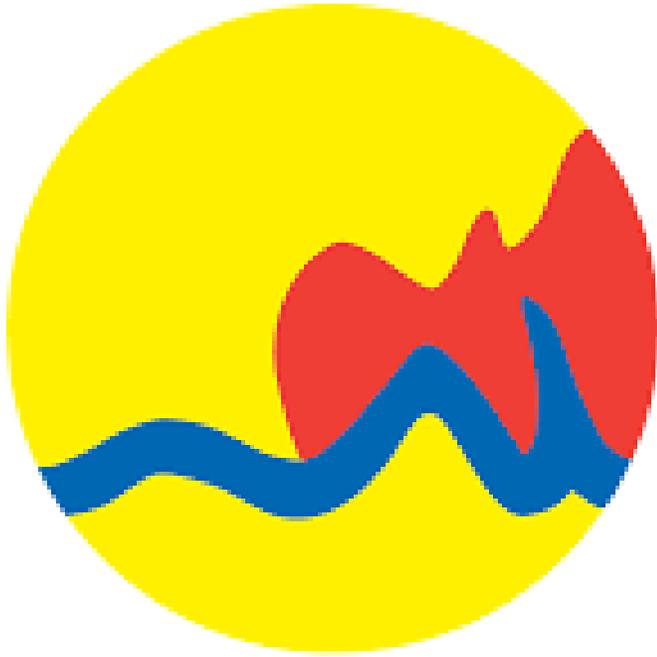
Copyright © 2022 – All rights reserved.



Contact us at:

City of Grand Rapids Communications Department
300 Monroe Ave. NW, Suite 911, Grand Rapids, MI 49503
communications@grcity.us

Want to change how you receive these emails?
You can [update your preferences](#) or [unsubscribe from this list](#).



2022 Regional Hazard Mitigation Plan Virtual Public Meeting February 23, 2022

A copy of the Draft 2022 Regional Hazard Mitigation Plan can
be found on the project website:

www.KentOttawaHMP.com

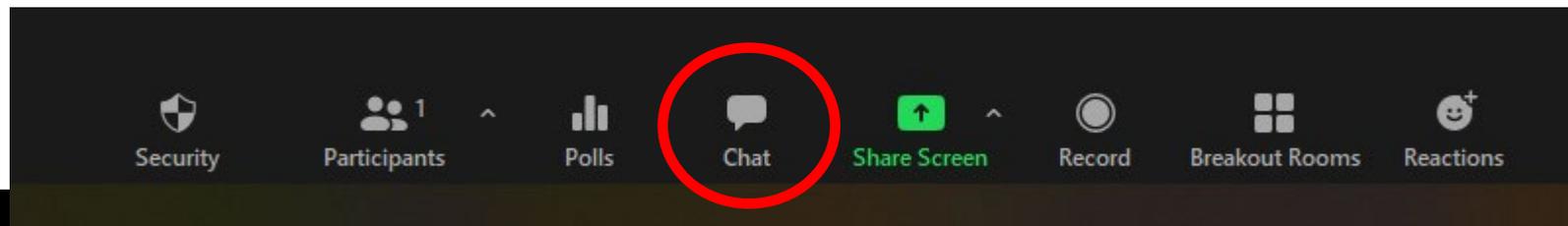
Feedback may be provided via the project website until
March 2, 2022

Agenda

- Introductions
- The Function of a Hazard Mitigation Plan (HMP)
- Review of Regional Hazards
- Overview of the 2022 Regional HMP
- Overview of Action Plans
- Questions

Please Note

Questions can be submitted at anytime during the presentation using the Zoom “Chat” at the bottom of your screen. Please send questions to Megan Salazar only. We will pause periodically to answer questions. There will also be time for questions at the end of the presentation.



Friendly Reminder

Please mute your microphone until the open discussion at the end of the presentation.

This presentation is being recorded.

Introduction

Executive Planning Team

Project Staff

- **Allison Farole, Emergency Management Administrator, City of Grand Rapids**
- Lou Hunt, Emergency Management Director, Ottawa County
- Matt Groesser, Emergency Management Coordinator, Kent County
- Kera Sharpe, ASTI Environmental

Hazard Mitigation Advisory Committee

- Key stakeholders from each jurisdiction



Contact Information

Kera Sharpe

Project Manager

2311 E. Beltline Ave., SE, Suite 104

Grand Rapids, Michigan 49546

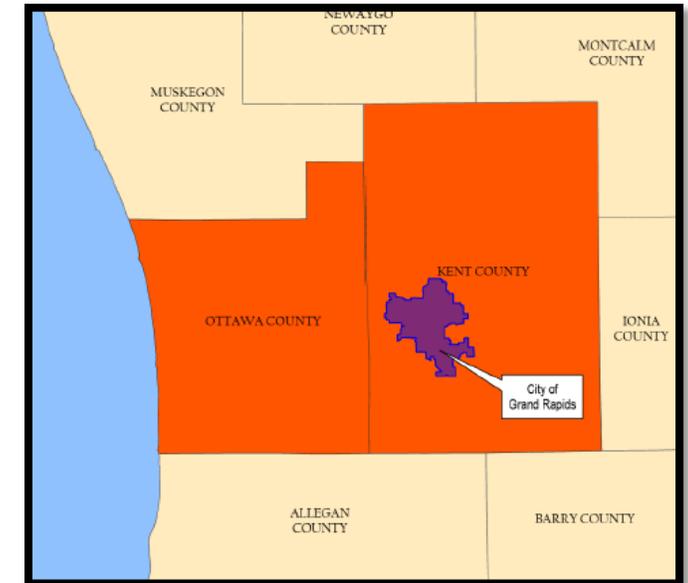
Phone 800.395.ASTI

ksharpe@asti-env.com

Community Representatives

Kent County, Ottawa County, and the City of Grand Rapids

- All 59 Jurisdictions
- Emergency Management Coordinators
- Community, Industry, and Business Leaders
- State and Federal Agency Representatives
- Adjacent Communities
- Non-governmental Organizations
- Interested Individuals



The Function of a Hazard Mitigation Plan (HMP)

Some Definitions

Mitigation

- A means for reducing the impacts of hazard events
- “A sustained action to reduce or eliminate risk to people and property from hazards and their effects”
- Differs from the other emergency management disciplines because it looks at long-term solutions to reducing risk as opposed to preparedness for hazards, the immediate response to a hazard or the short-term recovery from a hazard event

What is a Hazard Mitigation Plan?

A Hazard Mitigation Plan (HMP):

- Identifies hazards in the community
- Evaluates and prioritizes identified hazards
- Identifies and develops mitigation strategies and actions

A Hazard Mitigation Plan is NOT:

- A Response Plan
- A Recovery Plan

Hazard Mitigation Plan Objectives

- Reduce risks from natural, human-made, and technological hazards
- Provide guidance to help reduce the impact of the identified hazards
- Meet FEMA requirements to be eligible for Hazard Mitigation Grant funding

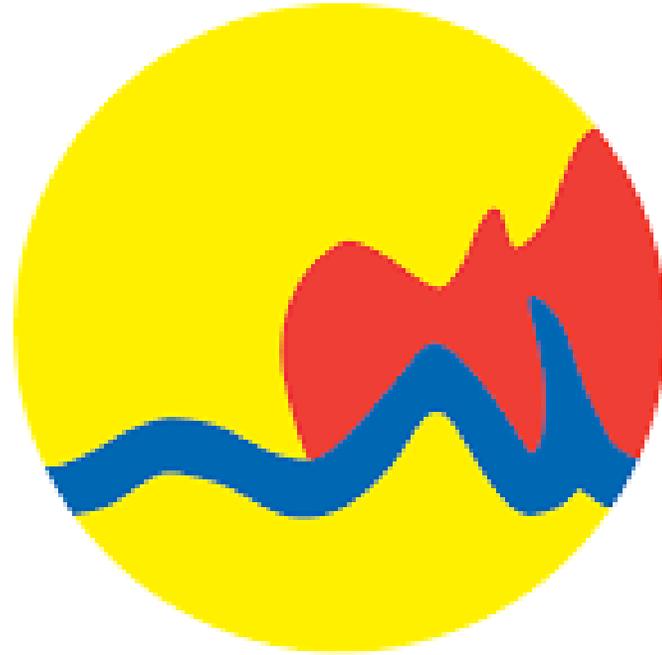
Guidance for HMP Development

- [Disaster Mitigation Act of 2000](#)
- [Michigan Emergency Management Act 390 of 1976](#)

Hazard Mitigation Plan Development

Grant Programs that require an approved and adopted Hazard Mitigation Plan:

- Hazard Mitigation Grant Program
- Building Resilient Infrastructure and Communities
- Fire Management Assistance Grant Program
- Public Assistance Grant Program
- Pre-Disaster Mitigation Grant Program
- Rehabilitation of High Hazard Potential Dam Grant Program



Questions

Type questions in the chat box to Megan Salazar

Overview of the Development Process

Evaluate hazard history and community profiles

Identify top hazards and risks

Identify vulnerabilities within the community

Identify and develop hazard mitigation goals and objectives

Development of the Advisory Committee

Each Executive Team Member appointed 10 representatives to participate on the Advisory Committee.

- Participated in two virtual workshops and three surveys
- Provided guidance and direction for the plan development
- Engaged in developing Action Plans
- Provided feedback on draft Regional Hazard Mitigation Plan

The Process

Propose specific actions that will achieve desired objectives



Prepare Action Plans and HMP



Adopt the HMP (all Jurisdictions)



Implement the plan



Monitor the plan



Update the plan every 5 years

Identified Hazards Impacting the Region

Natural Hazards

- Celestial Impact
- Drought
- Earthquakes
- Extreme Temperatures
- Fires
- Fog
- Invasive Species
- Flooding
- Subsidence
- Severe Thunderstorms
- Tornadoes
- Winter Weather

Technological Hazards

- Fires: Scrap Tire
- Fires: Structural
- Flooding: Dam Failure
- Flooding: Urban
- Hazmat Incidents: Fixed Site
- Hazmat Incidents: Transportation

Technological Hazards (Continued)

- Infrastructure Failure: Buildings, Roads, Overpasses, and Structures
- Infrastructure Failure: Communications
- Infrastructure Failure: Electrical Systems
- Infrastructure Failure: Sanitary/ Storm Sewers
- Infrastructure Failure: Water Systems
- Nuclear Power Plant Accidents
- Sinkholes/ Subsidence (Mining and Technical)

Human-Made Hazards

- Public Health Emergencies
- Terrorism and Sabotage
- Criminal Acts
- Transportation Accidents: Air
- Transportation Accidents: Surface Roads / Highways
- Transportation Accidents: Marine
- Transportation Accidents: Rail
- Weapons of Mass Destruction

Prioritizing the Hazards

- Focusing on frequency and consequences
 - life and safety
 - number of individuals impacted
- Reviewing hazard data for the last five years (ex. flooding, erosion, pandemic)
- Estimating hazards for the next five years (FEMA Risk Index)
- Surveys and Workshop discussions
- State of Michigan top priority hazards

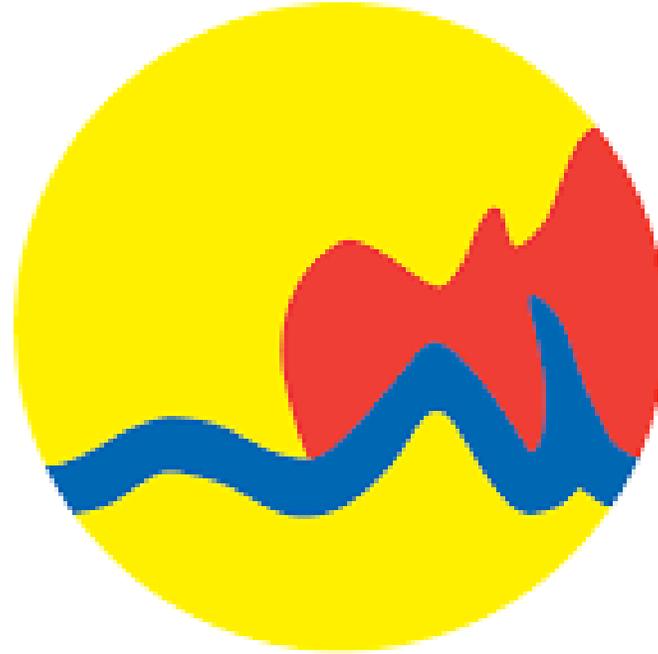
2022 Regional HMP Hazard Priorities

Public Health Emergencies

Infrastructure Failure

Flooding & Erosion

Severe Weather



Questions

Type questions in the chat box to Megan Salazar

The 2022 Regional Hazard Mitigation Plan



Overview

- Joint effort between Kent County, Ottawa County, and the City of Grand Rapids
 - Lead by each Office of Emergency Management
- The Region adopted their first Hazard Mitigation Plan in 2006
- The Regional Hazard Mitigation Plan was updated in 2012 and 2017
- The 2017 Regional Hazard Mitigation Plan (current) expires June 27, 2022
 - Mandated by FEMA and MSP-EMHSD to update the plan every 5 years

Overview

- This is the third update of the 2006 HMP
 - Updates hazards over last 5 years
 - Predicts hazards for next 5 years
 - Reviews performance for previous HMP

Goals and Objectives

The goal of the 2022 Regional HMP is to reduce the impact of hazards on life, health, and economic well-being based on a continuing hazard risk and vulnerability analysis through the following four general objectives.

Goals and Objectives

1. **Education and awareness:** Promote life and safety through public education, hazard analysis, and early warning.
2. **Structure and infrastructure:** Reduce property damage and loss of life with disaster-resistant structures, equipment, and communication
3. **Natural systems protection:** Minimize damage and losses by preserving or restoring the functions of natural systems.
4. **Local plans and regulations:** Incorporate hazard mitigation considerations into land-use planning, resource management, and land development processes.

2022 Regional Action Plans

Action Plans

- Action Plans describe the steps recommended to implement the Goals and Objectives to mitigate the priority hazards
 - Provide Direction and Focus
 - Are Necessary for Grant Funding for Projects
- For each goal and objective create at least one Action Plan

Action Plans

- Each Action Plan must provide flexibility for implementation and to align with feasible and necessary projects
 - Therefore, some Action Plans will be general and flexible
- Each of the 59 jurisdictions will/may develop additional Action Plans
 - Many already have – see the Jurisdictional Action Plan, Appendix H of the 2022 Regional HMP

Action Plan Criteria

The Advisory Committee used the following criteria to develop the Regional Action Plans:

- The action addresses more than one hazard
- The action is cost-effective based on the prevention of physical damages
- The action completely or substantially reduces the risk of future damage, hardship, loss, or suffering
- The action is technically feasible and demonstrates sound hazard mitigation techniques
- The action promotes nature-based solutions and will not create adverse environmental effects
- The action takes a Whole Community and an All-Hazard approach to hazard mitigation, which involves and supports historically underserved populations in the mitigation process

Objective 1: Education and Awareness

Promote life and safety through public education, hazard analysis, and early warning

- **Action 1.1:** Utilize various mechanisms to communicate credible and actionable information to the public
- **Action 1.2:** Educate and train local businesses, community organizations, and the general public mitigation, preparedness, response, and recovery actions
- **Action 1.3:** Develop education and notification strategies for communicating with non-English speakers and people with disabilities, access and functional needs
- **Action 1.4:** Improve coordination and collaboration for public health crises between cities, counties, health departments, service providers, hospitals/clinics/doctors, pharmacies, and the general public
- **Action 1.5:** Evaluate and improve early warning emergency notifications, emphasizing digital methods of outreach

Objective 2: Structure and Infrastructure

Reduce loss of life and property damage with disaster-resistant structures, equipment and communication

- **Action 2.1:** Ensure communication systems are resilient, interoperable, and employ redundancies
- **Action 2.2:** Identify critical infrastructure vulnerabilities and ensure security is adequate
- **Action 2.3:** Maintain power infrastructure, backup systems, and generators for critical infrastructures
- **Action 2.4:** Develop engineering controls to promote flood water diversion

Objective 3: Natural System Protection

Minimize damage and losses by preserving or restoring the functions of natural systems

- **Action 3.1:** Develop ecological controls to promote flood water diversion
- **Action 3.2:** Prioritize green spaces in areas that are most vulnerable to heat island effect and severe weather impacts

Objective 4: Local Plans and Regulations

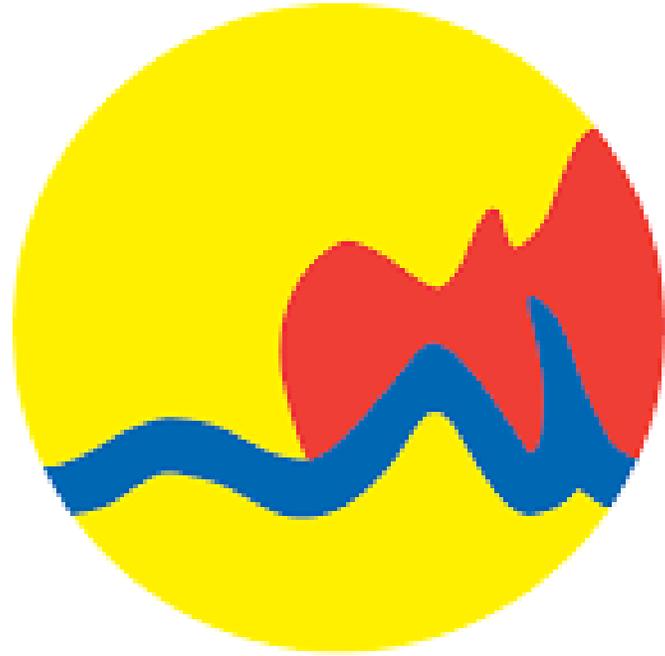
Incorporate hazard mitigation considerations into land use planning, resource management, and land development processes

- **Action 4.1:** Develop policies regarding at-risk properties for flooding and erosion

Next Steps

If you are interested in providing feedback, please review the Draft 2022 Regional Hazard Mitigation Plan and respond via the project website on or before
March 2, 2022

2022 Draft HMP available at
www.KentOttawaHMP.com



Questions and Discussion

From: [Lou Hunt](#)
To: [Scott Corbin](#); [WarnerRi](#)
Cc: [Lou Hunt](#); [Kera Sharpe](#)
Subject: Ottawa/Kent/City of GR hazard mitigation plan
Date: Wednesday, June 29, 2022 2:09:54 PM

Rich/Scott,

FEMA wants to see that the two of you (as my north and south neighbors) had a chance to review our combined HMP (Ottawa/Kent/GR City and all our included jurisdictions) and offer comment.

It is:

<https://astienv.sharefile.com/d-s524f490ca7434ec0a38b9df33aa6312e>

Thanks guys, Lou

APPENDIX B

Survey and Workshop Materials

First Survey
First Workshop
Follow-up Survey
Third Survey
Second Workshop

Q1 Respondent Information

Answered: 130 Skipped: 0

ANSWER CHOICES	RESPONSES	
Name	100.00%	130
Title	100.00%	130
Community Representing/ Servicing	100.00%	130
Department/ Organization	100.00%	130
Email Address	100.00%	130

#	NAME	DATE
1	Robert Roon	4/3/2021 3:23 PM
2	Nick Roush	4/3/2021 1:40 AM
3	Michael Walsh	4/3/2021 12:00 AM
4	Sebastian Swae	4/2/2021 11:33 PM
5	Yasemin	4/2/2021 4:14 PM
6	Karla Black	4/2/2021 1:17 PM
7	Melissa Linderman	4/2/2021 11:51 AM
8	St. Paul's United Church of Christ	4/2/2021 10:26 AM
9	Jim Koetje	4/2/2021 8:50 AM
10	Don Groeneveld	4/1/2021 4:58 PM
11	Philip Van Huis	4/1/2021 3:58 PM
12	Laura Dykstra	4/1/2021 3:11 PM
13	Peter Elam	4/1/2021 2:20 PM
14	Kimberly Wojahn	4/1/2021 11:52 AM
15	Gail Olbrich	4/1/2021 11:50 AM
16	Lynette Kemme	4/1/2021 10:43 AM
17	Kim Triplett	4/1/2021 10:24 AM
18	Sarah Juist	4/1/2021 10:20 AM
19	Steve Grose	4/1/2021 10:03 AM
20	Marie Anderson	4/1/2021 9:17 AM
21	Brennan Woell	4/1/2021 9:14 AM
22	Ronald Doll	4/1/2021 9:10 AM
23	Jason Shamblin	4/1/2021 8:33 AM
24	Paul Klimas	4/1/2021 7:55 AM
25	Thomas Haveman	3/31/2021 9:36 PM
26	Valerie Guttowsky	3/31/2021 8:25 PM

Kent County, Ottawa County, and the City of Grand Rapids Regional Hazard Mitigation Plan
 Kent & Ottawa County Hazard Mitigation Plan Update - Review Date: December 9, 2022
 Publication Date:

27	Cort Beard	3/31/2021 6:55 PM
28	Oren j.londo	3/31/2021 6:48 PM
29	Amy Lunn	3/31/2021 6:39 PM
30	David Lamer	3/31/2021 6:34 PM
31	Jim Simmons	3/31/2021 5:55 PM
32	Fitz Fitzgerald	3/31/2021 5:45 PM
33	Sandra Oudemolen	3/31/2021 4:58 PM
34	Fred Greal	3/31/2021 4:43 PM
35	tom ricksgers	3/31/2021 4:35 PM
36	Tyler Wagenmaker	3/31/2021 3:57 PM
37	Ed Wirth	3/31/2021 3:57 PM
38	Sheri Boon	3/31/2021 3:49 PM
39	Frank Johnson	3/31/2021 3:42 PM
40	Windy Warren	3/31/2021 3:40 PM
41	Tom VandenBerg	3/31/2021 3:39 PM
42	Aaron Schut	3/31/2021 3:39 PM
43	Tedd Van Solkema	3/31/2021 3:28 PM
44	Stephanie Welch	3/31/2021 3:25 PM
45	Ken Krombeen	3/31/2021 3:14 PM
46	Justin Roebuck	3/31/2021 2:56 PM
47	Stacy Stout	3/31/2021 1:43 PM
48	Becky Lehman	3/31/2021 1:39 PM
49	Lynne Doyle	3/31/2021 1:04 PM
50	Marcie Ver Beek	3/31/2021 12:27 PM
51	Tim Klunder	3/31/2021 12:13 PM
52	Tammy Smith	3/31/2021 11:39 AM
53	Dave Datema	3/31/2021 11:37 AM
54	Tim Jungel	3/31/2021 11:32 AM
55	Susan Trainer	3/31/2021 11:05 AM
56	David Wierzbicki	3/31/2021 11:02 AM
57	Bill Hordyk	3/31/2021 10:59 AM
58	Greg Madura	3/31/2021 10:53 AM
59	Samuel Peterson	3/31/2021 10:53 AM
60	Heather Miller	3/31/2021 10:45 AM
61	Steve Devlaemicnk	3/31/2021 10:43 AM
62	Stacy Madden	3/31/2021 10:42 AM
63	Mike Grenier	3/31/2021 10:41 AM
64	Kurt Reppart	3/31/2021 10:36 AM

Kent County, Ottawa County, and the City of Grand Rapids Regional Hazard Mitigation Plan
 Kent & Ottawa County Hazard Mitigation Plan Update - Service Date: December 9, 2022
 Publication Date:

65	Andrew Boatright	3/31/2021 10:09 AM
66	Milinda Ysasi	3/29/2021 9:22 PM
67	Julius Suchy	3/29/2021 9:12 PM
68	Michael Morrow II	3/29/2021 12:25 PM
69	Efrain Lazaro	3/29/2021 11:00 AM
70	Kevin Peters	3/29/2021 10:16 AM
71	Al Vanderberg	3/28/2021 3:34 PM
72	Steve Bulthuis	3/28/2021 11:40 AM
73	Amanda Cooper	3/28/2021 11:25 AM
74	John Shay	3/26/2021 4:36 PM
75	Lisa M Carr	3/26/2021 8:36 AM
76	mike lehnertz	3/25/2021 11:02 PM
77	Dale Bergman	3/25/2021 12:16 PM
78	Deborah Alderink, CIH	3/25/2021 11:43 AM
79	Darwin Baas	3/25/2021 11:23 AM
80	Michael Rohwer	3/25/2021 11:20 AM
81	Scott Siler	3/25/2021 7:43 AM
82	Sara Johnson	3/24/2021 8:29 PM
83	Rebecca Hopp	3/24/2021 5:14 PM
84	Jeffrey	3/24/2021 3:44 PM
85	Pat Staskiewicz	3/24/2021 3:20 PM
86	Matt Woolford	3/24/2021 2:58 PM
87	Scott Gamby	3/24/2021 2:31 PM
88	Sherri Vainavicz	3/24/2021 2:06 PM
89	Paul Sachs	3/24/2021 1:24 PM
90	Erin Moore	3/24/2021 1:04 PM
91	Amy Irish-Brown	3/24/2021 12:55 PM
92	Annabelle Wilkinson	3/24/2021 12:08 PM
93	Earle Bares	3/24/2021 11:02 AM
94	Allison Farole	3/24/2021 9:50 AM
95	David Kiddle	3/23/2021 5:21 PM
96	David Walters	3/23/2021 3:47 PM
97	Ken Yonker	3/23/2021 2:45 PM
98	Jason Kelley	3/23/2021 1:22 PM
99	Adam Magers	3/23/2021 11:33 AM
100	Billy O'Donnell	3/23/2021 11:27 AM
101	Laurie VanHaitsma	3/23/2021 11:18 AM
102	Jake Sparks	3/23/2021 11:10 AM

103	Benjamin Swayze	3/23/2021 11:02 AM
104	Gary Reimer	3/23/2021 11:01 AM
105	Brian Sipe	3/23/2021 10:53 AM
106	Wayne Jernberg	3/23/2021 10:46 AM
107	Robyn Afrik	3/23/2021 10:36 AM
108	Jon Kuyten	3/23/2021 10:26 AM
109	Howard Baumann	3/23/2021 10:20 AM
110	Tom Oonk	3/23/2021 10:19 AM
111	Keith Van Beek	3/23/2021 9:23 AM
112	Michael DeVries	3/23/2021 9:18 AM
113	Amanda Price	3/23/2021 9:15 AM
114	Franklin Force	3/23/2021 9:14 AM
115	Roger Bergman	3/23/2021 8:57 AM
116	Scott Karcher	3/23/2021 7:36 AM
117	Thomas Byle	3/23/2021 7:18 AM
118	Leah DeLano	3/22/2021 7:55 PM
119	Sean Burns	3/22/2021 7:23 PM
120	Helen	3/22/2021 6:44 PM
121	Gary Meerman	3/22/2021 6:29 PM
122	Wende Randall	3/22/2021 5:22 PM
123	Aaron Boos	3/22/2021 4:39 PM
124	Mark Fleet	3/22/2021 4:31 PM
125	Lee Fisher	3/22/2021 4:29 PM
126	Alek Mizikar	3/22/2021 4:13 PM
127	Dan Carlton	3/22/2021 4:00 PM
128	Rich Szczepanek	3/22/2021 3:59 PM
129	Jonathan Seyferth	3/22/2021 3:51 PM
130	Gary Secor	3/22/2021 2:05 PM
#	TITLE	DATE
1	Ottawa County emergency Management Volunteer	4/3/2021 3:23 PM
2	Maintenance Manager	4/3/2021 1:40 AM
3	Volunteer	4/3/2021 12:00 AM
4	Volunteer	4/2/2021 11:33 PM
5	Tulu	4/2/2021 4:14 PM
6	Emergency Preparedness Coordinator	4/2/2021 1:17 PM
7	Director of Administration	4/2/2021 11:51 AM
8	Church Office	4/2/2021 10:26 AM
9	Security coordinator	4/2/2021 8:50 AM

10	Custodian	4/1/2021 4:58 PM
11	Emergency Coordinator (OCEC)	4/1/2021 3:58 PM
12	Volunteer	4/1/2021 3:11 PM
13	Flood Plain Manager/Senior Planner	4/1/2021 2:20 PM
14	Owner Dune Dogz	4/1/2021 11:52 AM
15	Volunteer	4/1/2021 11:50 AM
16	Emergency Preparedness Specialist	4/1/2021 10:43 AM
17	Executive Secretary, Supervisors Office	4/1/2021 10:24 AM
18	Pastor	4/1/2021 10:20 AM
19	Executive Director	4/1/2021 10:03 AM
20	Unit Coordinator Ottawa County Medical Reserve Corps	4/1/2021 9:17 AM
21	Pastor	4/1/2021 9:14 AM
22	Volunteer	4/1/2021 9:10 AM
23	Director	4/1/2021 8:33 AM
24	IT Director	4/1/2021 7:55 AM
25	Mr	3/31/2021 9:36 PM
26	Volunteer	3/31/2021 8:25 PM
27	Training Officer/SARTECH	3/31/2021 6:55 PM
28	Staff member	3/31/2021 6:48 PM
29	Church Administrator	3/31/2021 6:39 PM
30	Ham Radio	3/31/2021 6:34 PM
31	Volunteer	3/31/2021 5:55 PM
32	Erosion Control Engineer	3/31/2021 5:45 PM
33	Canteen Task Force Leader	3/31/2021 4:58 PM
34	Retired Program Manager	3/31/2021 4:43 PM
35	OC volunteer	3/31/2021 4:35 PM
36	Reverend	3/31/2021 3:57 PM
37	Volunteer to	3/31/2021 3:57 PM
38	Nurse	3/31/2021 3:49 PM
39	Supervisor Robinson Twp	3/31/2021 3:42 PM
40	CERT Coordinator	3/31/2021 3:40 PM
41	Executive Pastor	3/31/2021 3:39 PM
42	Deputy Director of Central Operations	3/31/2021 3:39 PM
43	Director of Operations	3/31/2021 3:28 PM
44	PA-C	3/31/2021 3:25 PM
45	City Manager	3/31/2021 3:14 PM
46	Ottawa County Clerk	3/31/2021 2:56 PM
47	Director of Equity and Engagment	3/31/2021 1:43 PM

48	Business Services Director	3/31/2021 1:39 PM
49	Executive Director	3/31/2021 1:04 PM
50	HR Director	3/31/2021 12:27 PM
51	City Manager	3/31/2021 12:13 PM
52	Deputy Directory	3/31/2021 11:39 AM
53	Supervisor	3/31/2021 11:37 AM
54	Chief of Police	3/31/2021 11:32 AM
55	Township Clerk	3/31/2021 11:05 AM
56	Incident Management Specialist	3/31/2021 11:02 AM
57	Plans Examiner	3/31/2021 10:59 AM
58	Supervisor	3/31/2021 10:53 AM
59	Fire Chief	3/31/2021 10:53 AM
60	Safety Officer	3/31/2021 10:45 AM
61	Assistant Building Official	3/31/2021 10:43 AM
62	Emergency Preparedness Program Specialist	3/31/2021 10:42 AM
63	Environmental Services Department Manager	3/31/2021 10:41 AM
64	1st Ward City Commissioner	3/31/2021 10:36 AM
65	General Manager	3/31/2021 10:09 AM
66	City Commissioner	3/29/2021 9:22 PM
67	Township Manager	3/29/2021 9:12 PM
68	Technical Infrastructure Manager	3/29/2021 12:25 PM
69	Wolverine Pipe Line - Niles Area Supervisor	3/29/2021 11:00 AM
70	Supervisor	3/29/2021 10:16 AM
71	County Administrator	3/28/2021 3:34 PM
72	Manager	3/28/2021 11:40 AM
73	Director of Strategic Initiatives	3/28/2021 11:25 AM
74	Deputy County Administrator	3/26/2021 4:36 PM
75	Public Safety & Operations Director	3/26/2021 8:36 AM
76	Foreman	3/25/2021 11:02 PM
77	Township Supervisor	3/25/2021 12:16 PM
78	Chair	3/25/2021 11:43 AM
79	Director	3/25/2021 11:23 AM
80	Asst. Superintendent, Ottawa Area ISD	3/25/2021 11:20 AM
81	Fire Chief	3/25/2021 7:43 AM
82	Resource Manager	3/24/2021 8:29 PM
83	Mayor	3/24/2021 5:14 PM
84	Preparedness Specialist	3/24/2021 3:44 PM
85	Public Utilities Director	3/24/2021 3:20 PM

86	Equalization Director	3/24/2021 2:58 PM
87	Fire Chief	3/24/2021 2:31 PM
88	Director of Programs & Services	3/24/2021 2:06 PM
89	Director	3/24/2021 1:24 PM
90	District Director	3/24/2021 1:04 PM
91	Senior Extension Educator	3/24/2021 12:55 PM
92	Sustainability Specialist	3/24/2021 12:08 PM
93	Airport Manger	3/24/2021 11:02 AM
94	Emergency Management Administrator	3/24/2021 9:50 AM
95	Director of Security and Emergency Preparedness	3/23/2021 5:21 PM
96	General Manager	3/23/2021 3:47 PM
97	Kent County Drain Commissioner	3/23/2021 2:45 PM
98	Lieutenant	3/23/2021 1:22 PM
99	Fire Chief	3/23/2021 11:33 AM
100	Emergency Manager	3/23/2021 11:27 AM
101	Supervisor	3/23/2021 11:18 AM
102	Captain	3/23/2021 11:10 AM
103	Township Manager	3/23/2021 11:02 AM
104	Director	3/23/2021 11:01 AM
105	Fire Chief	3/23/2021 10:53 AM
106	Water System Manager	3/23/2021 10:46 AM
107	DEI Director	3/23/2021 10:36 AM
108	Safety ? Regulatory Affairs Supervising Coordinator	3/23/2021 10:26 AM
109	Supervisor	3/23/2021 10:20 AM
110	Supervisor	3/23/2021 10:19 AM
111	City Manager	3/23/2021 9:23 AM
112	Supervisor	3/23/2021 9:18 AM
113	Treasurer	3/23/2021 9:15 AM
114	Supervisor	3/23/2021 9:14 AM
115	county commissioner	3/23/2021 8:57 AM
116	Manager of Hazardous Materials/CSX Police	3/23/2021 7:36 AM
117	Ass't. Director of Engineering	3/23/2021 7:18 AM
118	Homeland Security Regional Planner	3/22/2021 7:55 PM
119	Kent ISD Safety/Security Coordinator	3/22/2021 7:23 PM
120	Clerk	3/22/2021 6:44 PM
121	Supervisor	3/22/2021 6:29 PM
122	Director	3/22/2021 5:22 PM
123	Applied Technology Manger	3/22/2021 4:39 PM

124	Building Official	3/22/2021 4:31 PM
125	Prosecuting Attorney	3/22/2021 4:29 PM
126	Deputy City Manager	3/22/2021 4:13 PM
127	Superintendent	3/22/2021 4:00 PM
128	EMS Systems Administrator	3/22/2021 3:59 PM
129	City Manager	3/22/2021 3:51 PM
130	Court Administrator	3/22/2021 2:05 PM
#	COMMUNITY REPRESENTING/ SERVICING	DATE
1	Ottawa County	4/3/2021 3:23 PM
2	Holland Twp	4/3/2021 1:40 AM
3	Ottawa County	4/3/2021 12:00 AM
4	Ottawa County; MI Region 6	4/2/2021 11:33 PM
5	Ottawa	4/2/2021 4:14 PM
6	Kent County	4/2/2021 1:17 PM
7	Holland	4/2/2021 11:51 AM
8	City of Grand Haven? Ottawa County?	4/2/2021 10:26 AM
9	South side of Holland/Park township	4/2/2021 8:50 AM
10	Ferrysburg	4/1/2021 4:58 PM
11	Ottawa County Emergency Communications	4/1/2021 3:58 PM
12	Ottawa County	4/1/2021 3:11 PM
13	Plainfield Charter Township	4/1/2021 2:20 PM
14	citizen/volunteer	4/1/2021 11:52 AM
15	Ottawa County	4/1/2021 11:50 AM
16	Spectrum Health Zeeland Community Hospital	4/1/2021 10:43 AM
17	Gaines Charter Township	4/1/2021 10:24 AM
18	Jenison	4/1/2021 10:20 AM
19	Greater Holland Zeeland	4/1/2021 10:03 AM
20	Ottawa County	4/1/2021 9:17 AM
21	Nunica	4/1/2021 9:14 AM
22	Ottawa County	4/1/2021 9:10 AM
23	Ottawa County	4/1/2021 8:33 AM
24	Ottawa County	4/1/2021 7:55 AM
25	Ottawa Co	3/31/2021 9:36 PM
26	Ottawa County	3/31/2021 8:25 PM
27	Ottawa County	3/31/2021 6:55 PM
28	City of hudsonville	3/31/2021 6:48 PM
29	Third Reformed Church	3/31/2021 6:39 PM
30	Ottawa	3/31/2021 6:34 PM

Kent County, Ottawa County, and the City of Grand Rapids Regional Hazard Mitigation Plan
 Kent & Ottawa County Hazard Mitigation Plan Update - Service Date: December 9, 2022
 Publication Date:

31	Ottawa County	3/31/2021 5:55 PM
32	Ottawa County	3/31/2021 5:45 PM
33	Ottawa	3/31/2021 4:58 PM
34	Park Township / Ottawa County	3/31/2021 4:43 PM
35	OCcSAR OC CERT	3/31/2021 4:35 PM
36	Hudsonville	3/31/2021 3:57 PM
37	Ottawa County	3/31/2021 3:57 PM
38	Ottawa	3/31/2021 3:49 PM
39	Robinson Twp	3/31/2021 3:42 PM
40	Ottawa County	3/31/2021 3:40 PM
41	Zeeland	3/31/2021 3:39 PM
42	Multiple Kent/Ottawa	3/31/2021 3:39 PM
43	Kent County, Ottawa County	3/31/2021 3:28 PM
44	Ottawa county	3/31/2021 3:25 PM
45	City of Grandville	3/31/2021 3:14 PM
46	Ottawa County	3/31/2021 2:56 PM
47	Grand Rapids	3/31/2021 1:43 PM
48	Holland / Ottawa County	3/31/2021 1:39 PM
49	Ottawa County	3/31/2021 1:04 PM
50	County of Ottawa	3/31/2021 12:27 PM
51	City of Zeeland	3/31/2021 12:13 PM
52	Ottawa County	3/31/2021 11:39 AM
53	Tallmadge Township	3/31/2021 11:37 AM
54	Zeeland	3/31/2021 11:32 AM
55	Oakfield Township	3/31/2021 11:05 AM
56	State-wide	3/31/2021 11:02 AM
57	City of Grand Rapids	3/31/2021 10:59 AM
58	Alpine Township	3/31/2021 10:53 AM
59	Oakfield Township	3/31/2021 10:53 AM
60	Kent County	3/31/2021 10:45 AM
61	City of Grand Rapids	3/31/2021 10:43 AM
62	Kent County	3/31/2021 10:42 AM
63	Grand Rapids	3/31/2021 10:41 AM
64	Grand Rapids	3/31/2021 10:36 AM
65	City of Zeeland	3/31/2021 10:09 AM
66	Grand Rapids	3/29/2021 9:22 PM
67	Ada Township	3/29/2021 9:12 PM
68	Ottawa County	3/29/2021 12:25 PM

Kent County, Ottawa County, and the City of Grand Rapids Regional Hazard Mitigation Plan
 Kent & Ottawa County Hazard Mitigation Plan Update - Service Date: December 9, 2022
 Publication Date:

69	Ottawa County	3/29/2021 11:00 AM
70	Blendon Township	3/29/2021 10:16 AM
71	Ottawa County	3/28/2021 3:34 PM
72	Holland Charter Township	3/28/2021 11:40 AM
73	Ottawa County - Economic Development	3/28/2021 11:25 AM
74	Ottawa County	3/26/2021 4:36 PM
75	Airport	3/26/2021 8:36 AM
76	Kent County	3/25/2021 11:02 PM
77	Sparta Township	3/25/2021 12:16 PM
78	Kent County	3/25/2021 11:43 AM
79	Kent County	3/25/2021 11:23 AM
80	Ottawa ISD schools	3/25/2021 11:20 AM
81	Charter Township of Caledonia	3/25/2021 7:43 AM
82	Ottawa County	3/24/2021 8:29 PM
83	City of Ferrysburg, Ottawa Co	3/24/2021 5:14 PM
84	Lake Michigan Ports	3/24/2021 3:44 PM
85	Ottawa County	3/24/2021 3:20 PM
86	Kent County	3/24/2021 2:58 PM
87	Park Township	3/24/2021 2:31 PM
88	Kent	3/24/2021 2:06 PM
89	Ottawa County	3/24/2021 1:24 PM
90	Ottawa/Kent/Allegan/Barry	3/24/2021 1:04 PM
91	Agriculture	3/24/2021 12:55 PM
92	Grand Rapids	3/24/2021 12:08 PM
93	North Ottawa County/Grand Haven	3/24/2021 11:02 AM
94	City of Grand Rapids	3/24/2021 9:50 AM
95	Health Care	3/23/2021 5:21 PM
96	Grand Haven	3/23/2021 3:47 PM
97	Kent County	3/23/2021 2:45 PM
98	Kent County	3/23/2021 1:22 PM
99	Cascade Township	3/23/2021 11:33 AM
100	Higher Ed - GVSU	3/23/2021 11:27 AM
101	Jamestown Charter Township	3/23/2021 11:18 AM
102	Ottawa County	3/23/2021 11:10 AM
103	Cascade Charter Township	3/23/2021 11:02 AM
104	City of Grand Rapids	3/23/2021 11:01 AM
105	Fire Service	3/23/2021 10:53 AM
106	City of Grand Rapids	3/23/2021 10:46 AM

Kent County, Ottawa County, and the City of Grand Rapids Regional Hazard Mitigation Plan
 Kent & Ottawa County Hazard Mitigation Plan Update - Service Date: December 9, 2022
 Publication Date:

107	Ottawa County	3/23/2021 10:36 AM
108	Holland Hospital	3/23/2021 10:26 AM
109	Port Sheldon Township	3/23/2021 10:20 AM
110	Zeeland Charter Township	3/23/2021 10:19 AM
111	Local Government	3/23/2021 9:23 AM
112	Grand Rapids Township	3/23/2021 9:18 AM
113	Ottawa County	3/23/2021 9:15 AM
114	Grattan Township	3/23/2021 9:14 AM
115	Ottawa county	3/23/2021 8:57 AM
116	CSX Transportation	3/23/2021 7:36 AM
117	Public Works	3/23/2021 7:18 AM
118	Ottawa County	3/22/2021 7:55 PM
119	Education	3/22/2021 7:23 PM
120	Conklin	3/22/2021 6:44 PM
121	Chester Township	3/22/2021 6:29 PM
122	Kent County	3/22/2021 5:22 PM
123	Ottawa County	3/22/2021 4:39 PM
124	City of Grand Rapids	3/22/2021 4:31 PM
125	Ottawa County	3/22/2021 4:29 PM
126	City of Coopersville, MI	3/22/2021 4:13 PM
127	Georgetown	3/22/2021 4:00 PM
128	EMS	3/22/2021 3:59 PM
129	City of Coopersville	3/22/2021 3:51 PM
130	Grand Rapids	3/22/2021 2:05 PM
#	DEPARTMENT/ ORGANIZATION	DATE
1	Emergency Management Skywarn and Communications Teams	4/3/2021 3:23 PM
2	Michigan Natural Storage	4/3/2021 1:40 AM
3	Ottawa county emergency management	4/3/2021 12:00 AM
4	Ottawa County Emergency Management Unit	4/2/2021 11:33 PM
5	CERT volunteer	4/2/2021 4:14 PM
6	Health Department	4/2/2021 1:17 PM
7	Our Lady of the Lake Catholic Church	4/2/2021 11:51 AM
8	Church	4/2/2021 10:26 AM
9	Park Christian Reformed Church	4/2/2021 8:50 AM
10	Ferrysburg Community Church	4/1/2021 4:58 PM
11	Ottawa County Emergency Management	4/1/2021 3:58 PM
12	MRC Medical Reserve Corps	4/1/2021 3:11 PM
13	Community Development Department	4/1/2021 2:20 PM

Kent County, Ottawa County, and the City of Grand Rapids Regional Hazard Mitigation Plan
 Kent & Ottawa County Hazard Mitigation Plan Update - Service Date: December 9, 2022
 Publication Date:

14	volunteer	4/1/2021 11:52 AM
15	Medical Reserve Corps	4/1/2021 11:50 AM
16	Business Assurance	4/1/2021 10:43 AM
17	Supervisors Office	4/1/2021 10:24 AM
18	Parkwood Presbyterian Church	4/1/2021 10:20 AM
19	Jubilee Ministries	4/1/2021 10:03 AM
20	Ottawa County Sheriff's Dept/Emergency Management	4/1/2021 9:17 AM
21	St. Luke Lutheran Church	4/1/2021 9:14 AM
22	Search and Rescue	4/1/2021 9:10 AM
23	Parks and Recreation Commission	4/1/2021 8:33 AM
24	Technology and Innovation	4/1/2021 7:55 AM
25	Ottawa County CERT	3/31/2021 9:36 PM
26	Medical Reserve Corp	3/31/2021 8:25 PM
27	Sheriff's Dept. Emergency Management SAR Team	3/31/2021 6:55 PM
28	Emergency managment	3/31/2021 6:48 PM
29	Administration	3/31/2021 6:39 PM
30	Eoc	3/31/2021 6:34 PM
31	Emergency Management	3/31/2021 5:55 PM
32	Ottawa Sheriff's Dept Emergency Management volunteer	3/31/2021 5:45 PM
33	Medical Reserve Corr	3/31/2021 4:58 PM
34	Medical Corp Volunteer	3/31/2021 4:43 PM
35	OC Emergency Management	3/31/2021 4:35 PM
36	Beaverdam Christian Reformed Church	3/31/2021 3:57 PM
37	MFR	3/31/2021 3:57 PM
38	Medical reserve core	3/31/2021 3:49 PM
39	no department	3/31/2021 3:42 PM
40	Emergency Management/CERT	3/31/2021 3:40 PM
41	First Baptist Church	3/31/2021 3:39 PM
42	Life EMS Ambulance	3/31/2021 3:39 PM
43	EMS	3/31/2021 3:28 PM
44	Ottawa county health department	3/31/2021 3:25 PM
45	City of Grandville	3/31/2021 3:14 PM
46	Ottawa County	3/31/2021 2:56 PM
47	City of Grand Rapids	3/31/2021 1:43 PM
48	Holland Board of Public Works	3/31/2021 1:39 PM
49	Community Mental Health	3/31/2021 1:04 PM
50	Human Resources	3/31/2021 12:27 PM
51	Administration	3/31/2021 12:13 PM

Kent County, Ottawa County, and the City of Grand Rapids Regional Hazard Mitigation Plan
 Kent & Ottawa County Hazard Mitigation Plan Update - Service 1
 Review Date: December 9, 2022
 Publication Date:

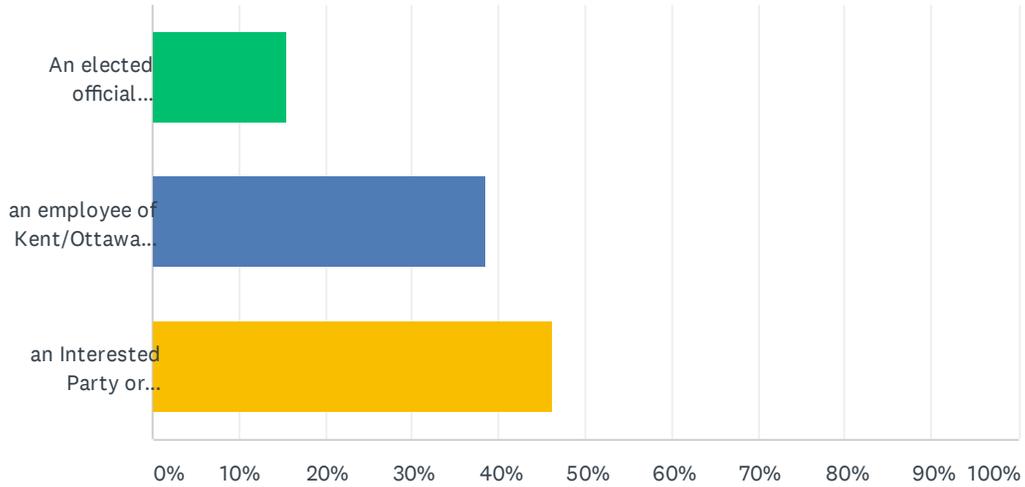
52	Ottawa County Central Dispatch	3/31/2021 11:39 AM
53	Tallmadge Township	3/31/2021 11:37 AM
54	Police department	3/31/2021 11:32 AM
55	Clerk	3/31/2021 11:05 AM
56	EGLE	3/31/2021 11:02 AM
57	Building	3/31/2021 10:59 AM
58	Administration	3/31/2021 10:53 AM
59	Oakfield Township Fire Department	3/31/2021 10:53 AM
60	Metro Health - University of Michigan Health	3/31/2021 10:45 AM
61	Design and development department	3/31/2021 10:43 AM
62	Kent County Sheriff's Office Emergency Management	3/31/2021 10:42 AM
63	City of Grand Rapids - Environmental Services	3/31/2021 10:41 AM
64	City of Grand Rapids	3/31/2021 10:36 AM
65	Zeeland Board of Public Works	3/31/2021 10:09 AM
66	Executive	3/29/2021 9:22 PM
67	Ada Township	3/29/2021 9:12 PM
68	Innovation & Technology (Ottawa County)	3/29/2021 12:25 PM
69	Wolverine Pipe Line	3/29/2021 11:00 AM
70	Blendon Township	3/29/2021 10:16 AM
71	County Administrator's Office	3/28/2021 3:34 PM
72	Holland Charter Township	3/28/2021 11:40 AM
73	Lakeshore Advantage	3/28/2021 11:25 AM
74	Administrator's Office	3/26/2021 4:36 PM
75	Gerald R Ford International Airport	3/26/2021 8:36 AM
76	Kent County Road Commission	3/25/2021 11:02 PM
77	Township Board	3/25/2021 12:16 PM
78	LEPC	3/25/2021 11:43 AM
79	Kent County DPW	3/25/2021 11:23 AM
80	K-12 schools	3/25/2021 11:20 AM
81	Fire Department	3/25/2021 7:43 AM
82	CALL 211 (Information and Referral Service)	3/24/2021 8:29 PM
83	Mayor/City Council	3/24/2021 5:14 PM
84	U.S. Coast Guard	3/24/2021 3:44 PM
85	Ottawa County Road Commission, Public Utilities Department	3/24/2021 3:20 PM
86	Equalization/Damage Assessment	3/24/2021 2:58 PM
87	Fire Department	3/24/2021 2:31 PM
88	United Way's 211	3/24/2021 2:06 PM
89	Planning and Performance Improvement	3/24/2021 1:24 PM

Kent County, Ottawa County, and the City of Grand Rapids Regional Hazard Mitigation Plan
 Kent & Ottawa County Hazard Mitigation Plan Update - Service 1
 Review Date: December 9, 2022
 Publication Date:

90	MSU Extension	3/24/2021 1:04 PM
91	Michigan State Univeristy Extension	3/24/2021 12:55 PM
92	Office of Sustainability and Performance Management/ City of Grand Rapids	3/24/2021 12:08 PM
93	Airport City of Grand Haven	3/24/2021 11:02 AM
94	City of Grand Rapids - Fire Department	3/24/2021 9:50 AM
95	Mercy Health Saint Mary's Hospital	3/23/2021 5:21 PM
96	Board of Light and Power	3/23/2021 3:47 PM
97	Drain Commission	3/23/2021 2:45 PM
98	Kent Count Sheriff's Office	3/23/2021 1:22 PM
99	Cascade Charter Township/Fire Department	3/23/2021 11:33 AM
100	Grand Valley State University	3/23/2021 11:27 AM
101	Jamestown Charter Township	3/23/2021 11:18 AM
102	Ottawa County Sheriff's Office	3/23/2021 11:10 AM
103	Cascade Charter Township	3/23/2021 11:02 AM
104	Facilities and Fleet Management	3/23/2021 11:01 AM
105	Ottawa County Fire Chief's	3/23/2021 10:53 AM
106	Water System	3/23/2021 10:46 AM
107	DEI/Administration OC	3/23/2021 10:36 AM
108	Holland Hospital / Quality /Emergency Preparedness	3/23/2021 10:26 AM
109	Supervisor, Port Sheldon Township	3/23/2021 10:20 AM
110	Township	3/23/2021 10:19 AM
111	City of Holland	3/23/2021 9:23 AM
112	Township	3/23/2021 9:18 AM
113	Ottawa County	3/23/2021 9:15 AM
114	Supervisor	3/23/2021 9:14 AM
115	board of commission	3/23/2021 8:57 AM
116	PHS&E	3/23/2021 7:36 AM
117	Kent County Road Commission	3/23/2021 7:18 AM
118	County of Ottawa / Sheriff's Office / Emergency Management Department	3/22/2021 7:55 PM
119	Kent Intermediate School District	3/22/2021 7:23 PM
120	township	3/22/2021 6:44 PM
121	Chester Township	3/22/2021 6:29 PM
122	Kent County Essential Needs Task Force	3/22/2021 5:22 PM
123	IT	3/22/2021 4:39 PM
124	Design, Development and Community Engagement - Building Division	3/22/2021 4:31 PM
125	Ottawa County Prosecutor's Office	3/22/2021 4:29 PM
126	Planning	3/22/2021 4:13 PM
127	Georgetown	3/22/2021 4:00 PM

Q2 I am....

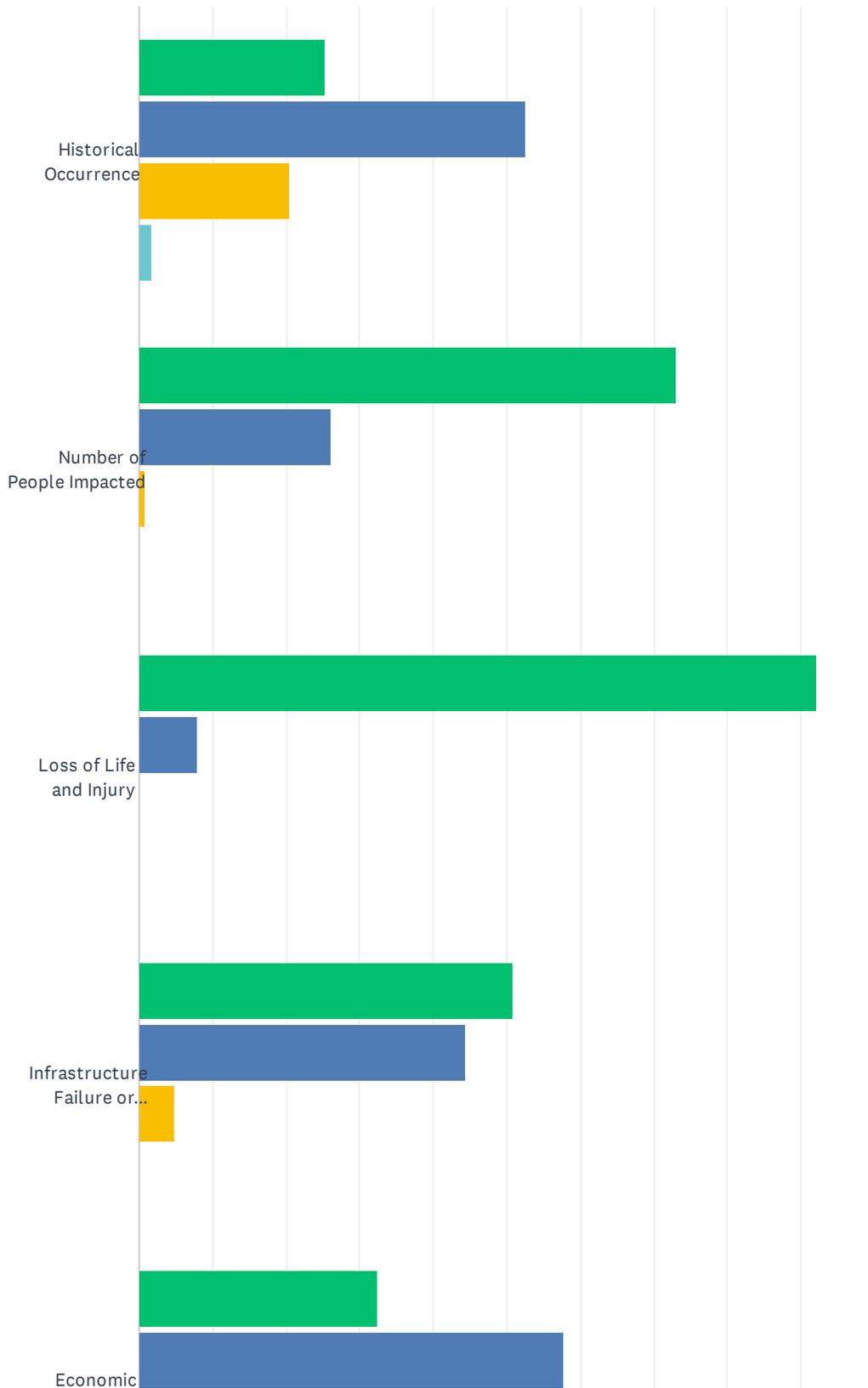
Answered: 130 Skipped: 0

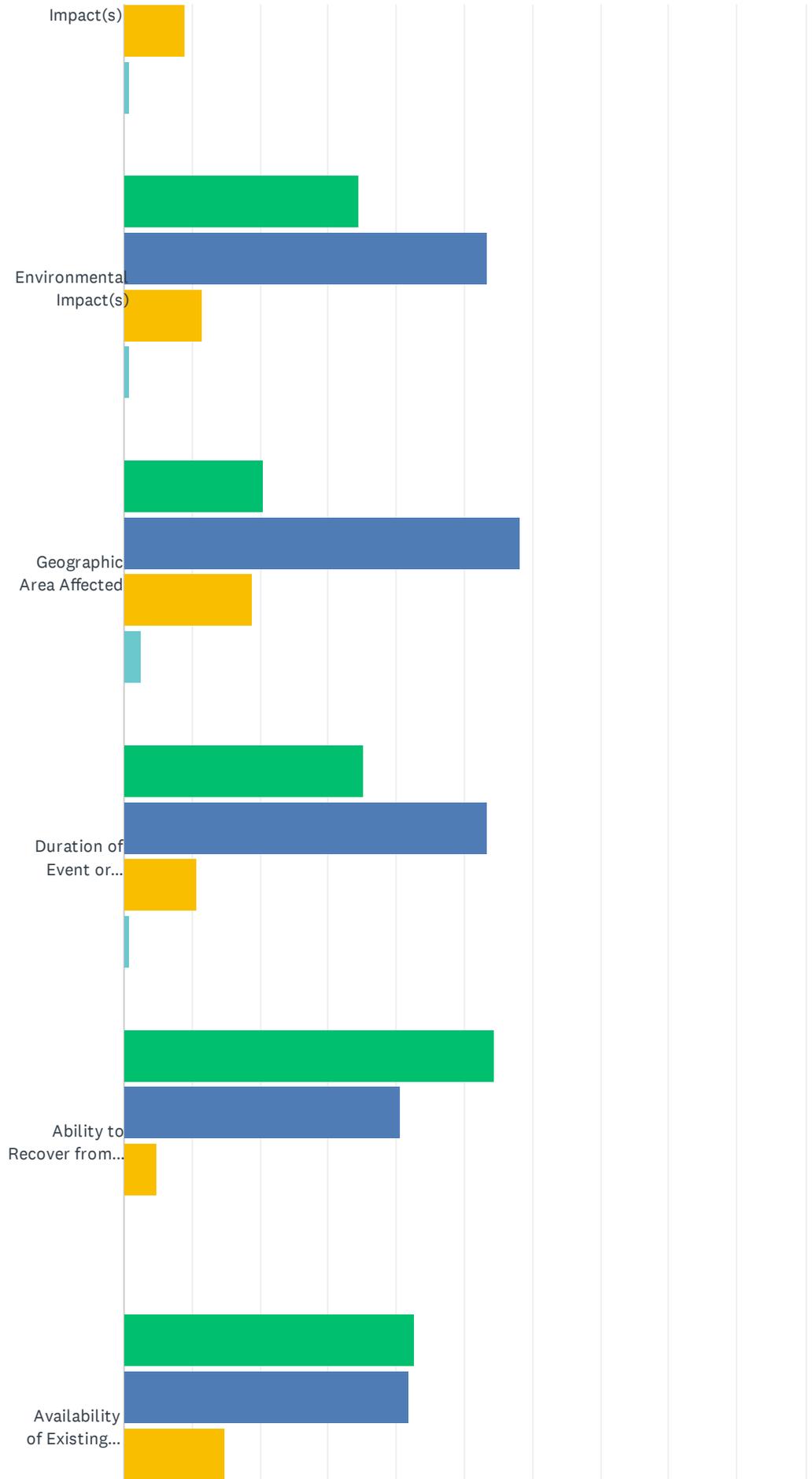


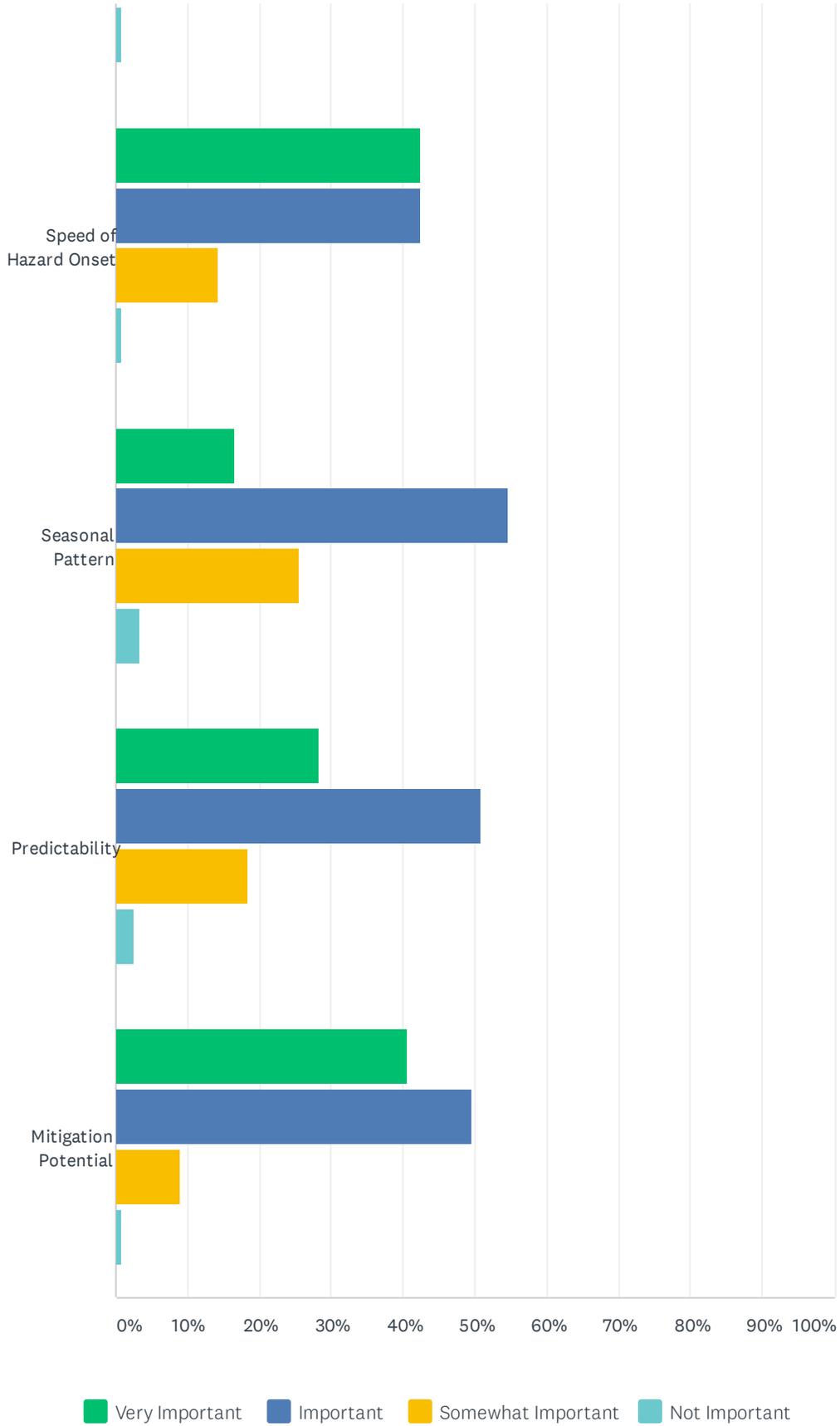
ANSWER CHOICES	RESPONSES	
An elected official representing Kent/Ottawa Counties or the City of Grand Rapids	15.38%	20
an employee of Kent/Ottawa Counties or the City of Grand Rapids, or a municipality	38.46%	50
an Interested Party or Stakeholder not described above	46.15%	60
TOTAL		130

Q3 Please rate the level of importance that best represents the following factors when prioritizing hazards:

Answered: 130 Skipped: 0





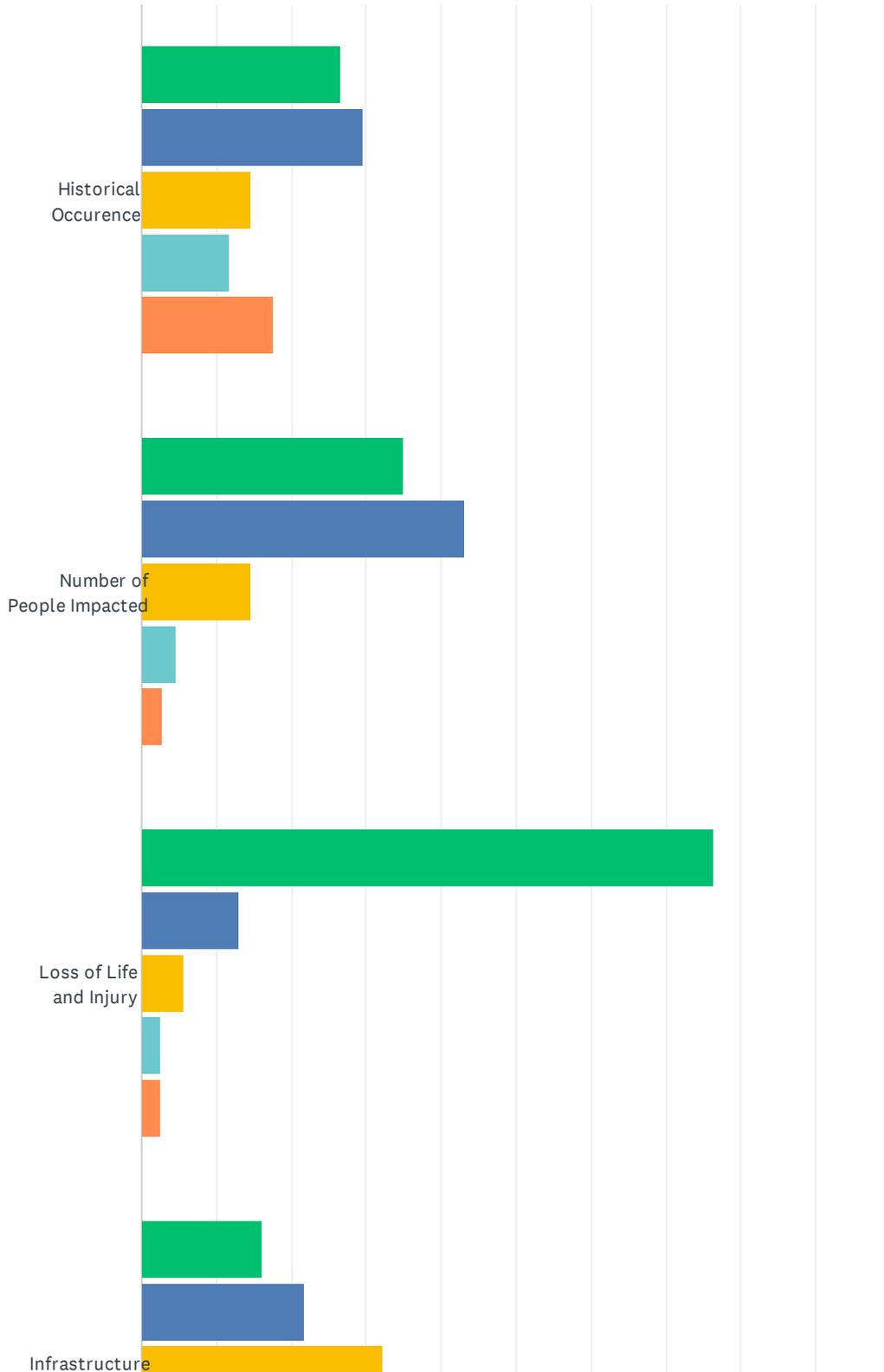


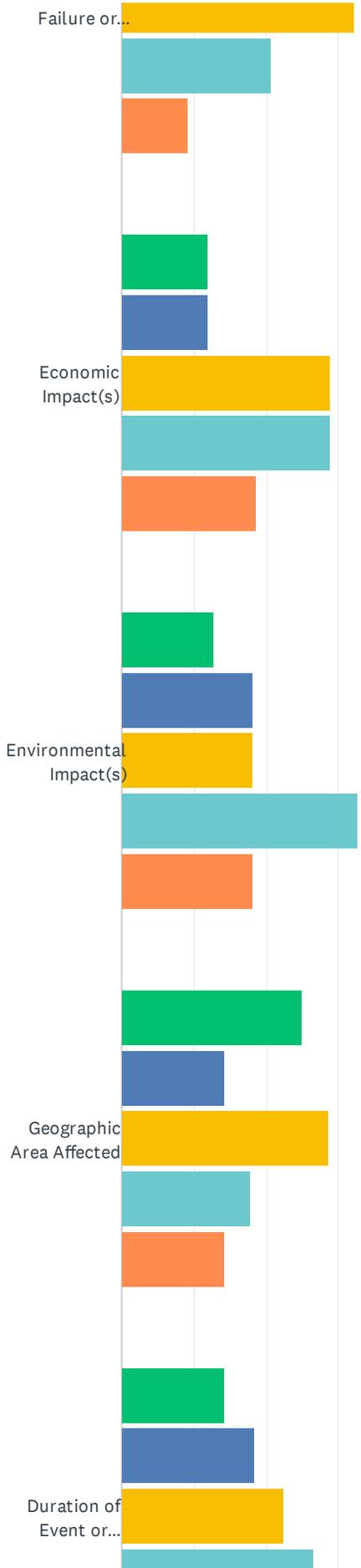
	VERY IMPORTANT	IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT	TOTAL	WEIGHTED AVERAGE
Historical Occurrence	25.41% 31	52.46% 64	20.49% 25	1.64% 2	122	3.02
Number of People Impacted	73.02% 92	26.19% 33	0.79% 1	0.00% 0	126	3.72
Loss of Life and Injury	92.13% 117	7.87% 10	0.00% 0	0.00% 0	127	3.92
Infrastructure Failure or Other Collateral Damage	50.81% 63	44.35% 55	4.84% 6	0.00% 0	124	3.46
Economic Impact(s)	32.52% 40	57.72% 71	8.94% 11	0.81% 1	123	3.22
Environmental Impact(s)	34.43% 42	53.28% 65	11.48% 14	0.82% 1	122	3.21
Geographic Area Affected	20.49% 25	58.20% 71	18.85% 23	2.46% 3	122	2.97
Duration of Event or Impacts on Productivity	35.25% 43	53.28% 65	10.66% 13	0.82% 1	122	3.23
Ability to Recover from Disaster/ Incident	54.47% 67	40.65% 50	4.88% 6	0.00% 0	123	3.50
Availability of Existing Warning Systems	42.62% 52	41.80% 51	14.75% 18	0.82% 1	122	3.26
Speed of Hazard Onset	42.50% 51	42.50% 51	14.17% 17	0.83% 1	120	3.27
Seasonal Pattern	16.53% 20	54.55% 66	25.62% 31	3.31% 4	121	2.84
Predictability	28.33% 34	50.83% 61	18.33% 22	2.50% 3	120	3.05
Mitigation Potential	40.50% 49	49.59% 60	9.09% 11	0.83% 1	121	3.30

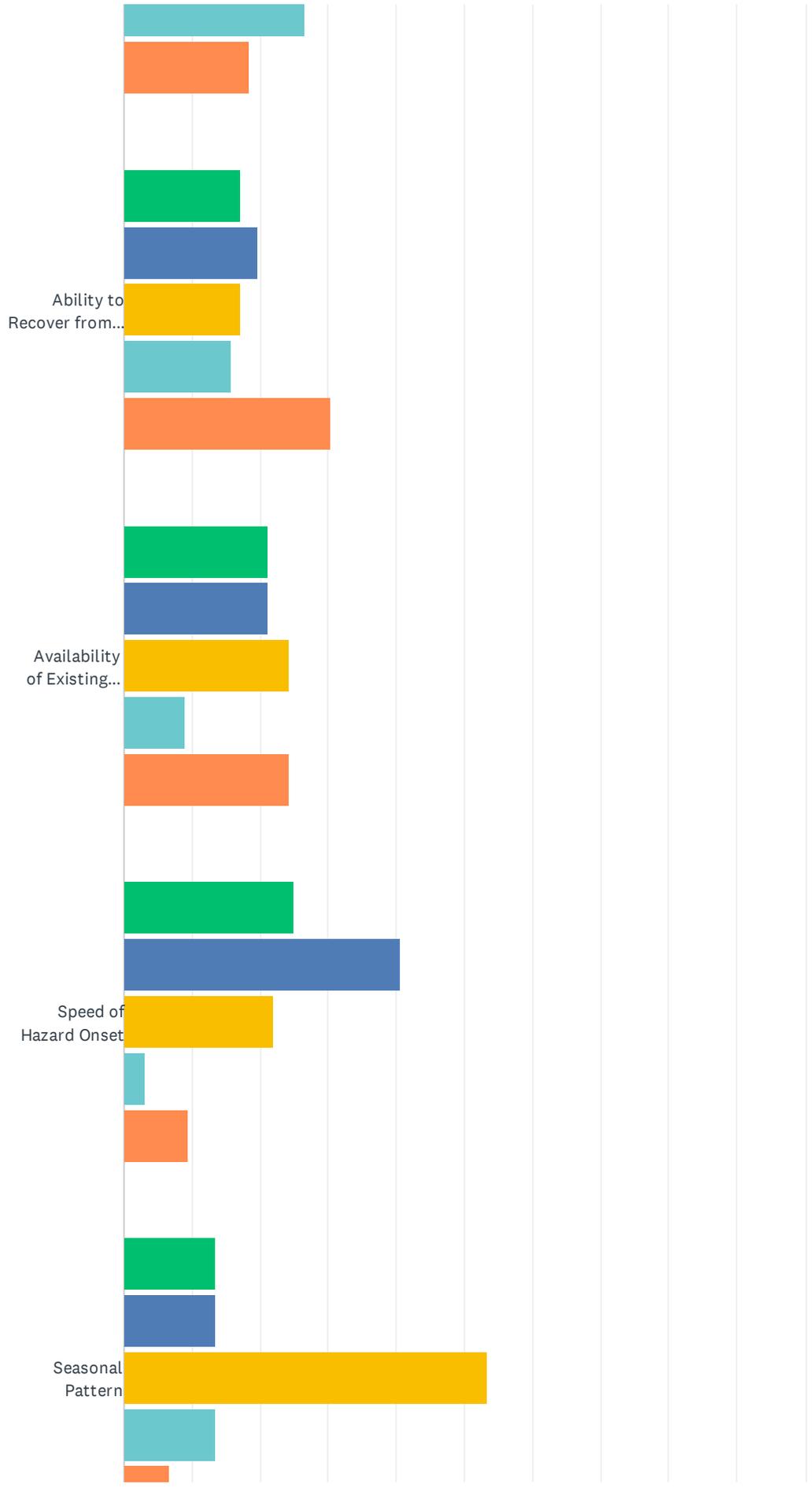
#	OTHER (PLEASE SPECIFY)	DATE
1	Other than the loss of life, there is not too much that can be done to mitigate the effects of a tornado or severe thunderstorm.	██████████
2	Racial Equity impacts and will it disproportionately impact BIPOC and low-income communities.	██████████
3	Ability to Assess through an equity lens	██████████
4	information availability communication	██████████
5	Survey doesn't work well with the question	██████████

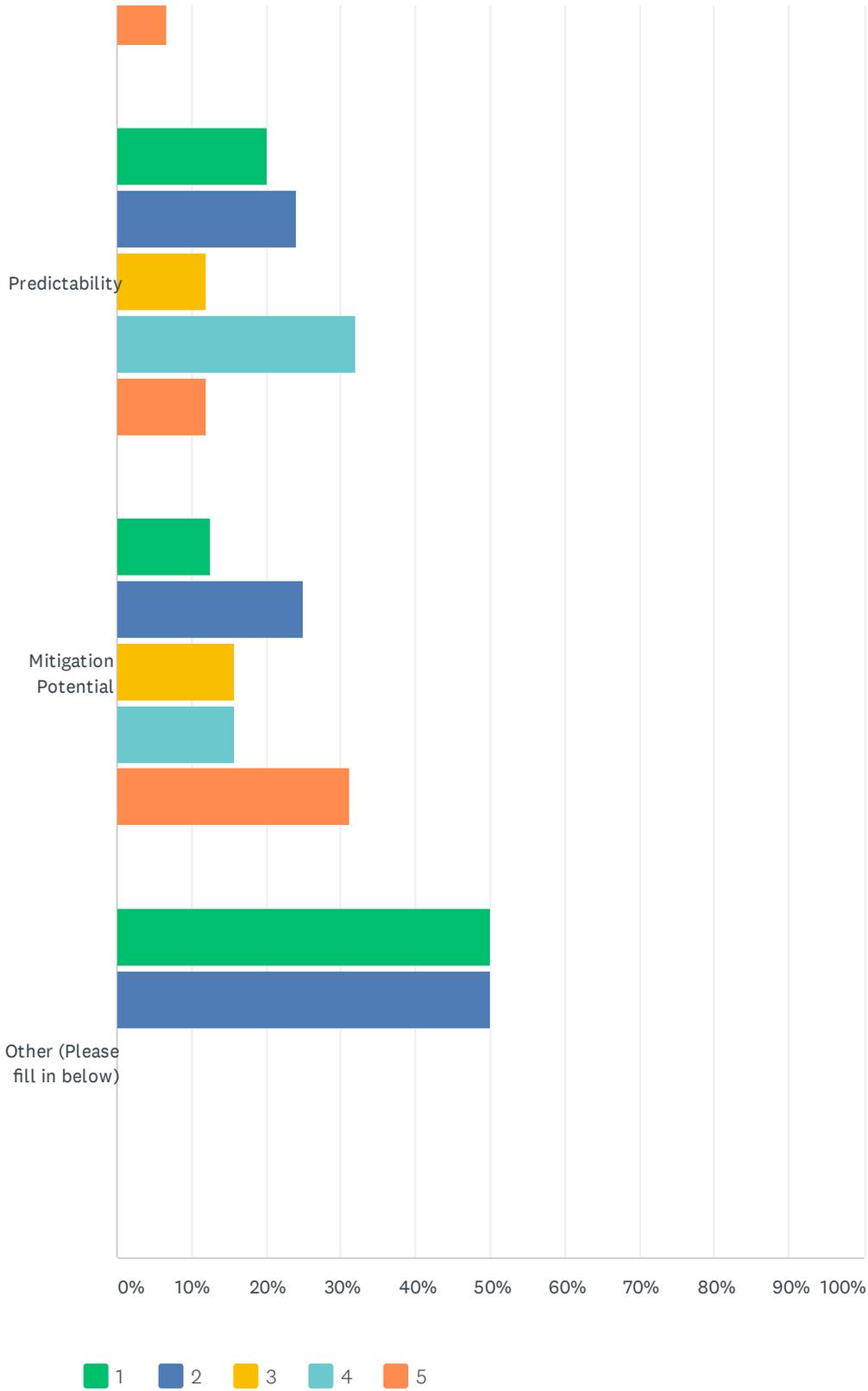
Q4 What Five (5) Factors do you feel are priority when analyzing hazards? Please select only 5 factors and number them from 1-5, with 1 being the most important factor to consider.

Answered: 130 Skipped: 0







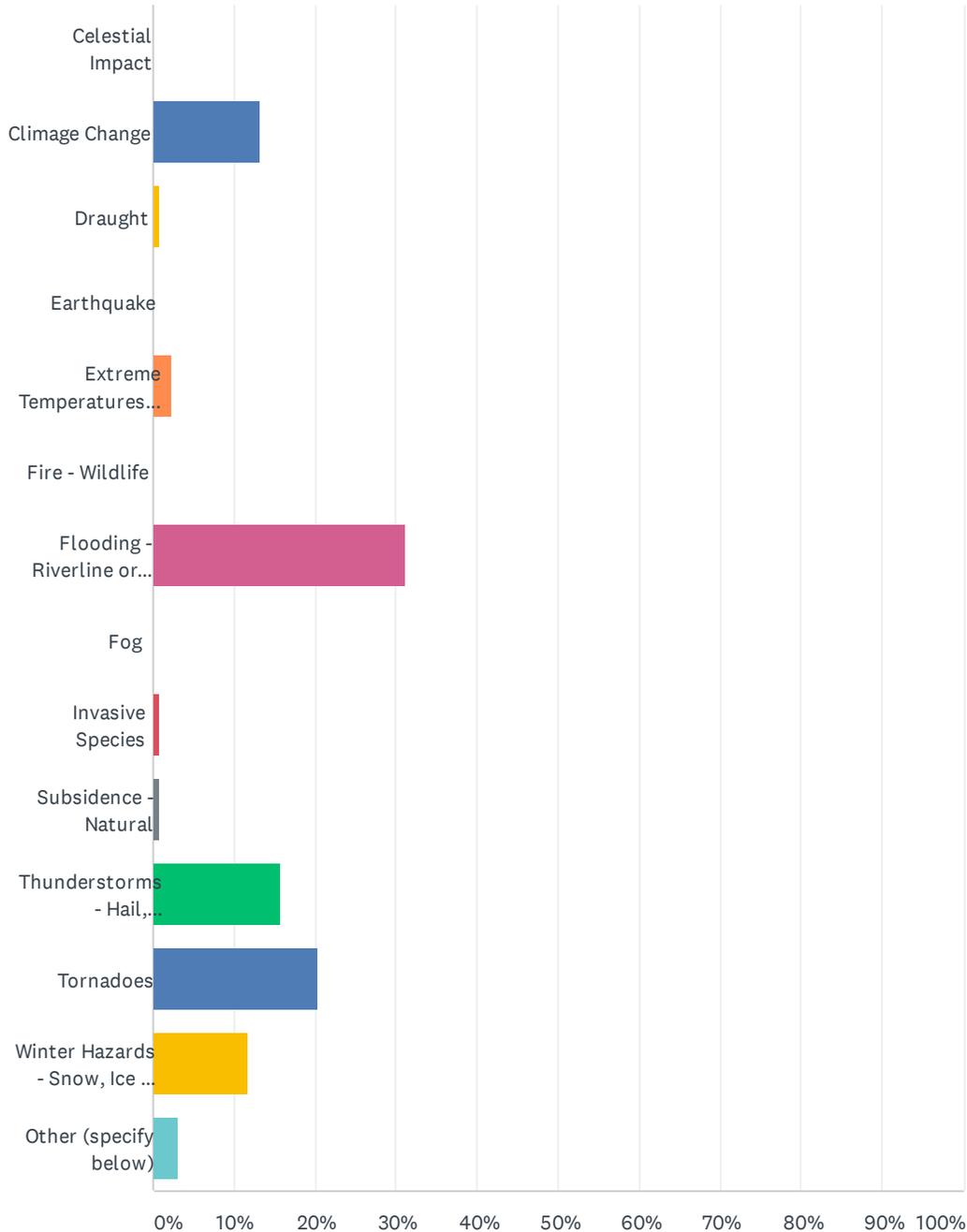


	1	2	3	4	5	TOTAL	WEIGHTED AVERAGE
Historical Occurrence	26.47% 9	29.41% 10	14.71% 5	11.76% 4	17.65% 6	34	3.35
Number of People Impacted	34.86% 38	43.12% 47	14.68% 16	4.59% 5	2.75% 3	109	4.03
Loss of Life and Injury	76.42% 94	13.01% 16	5.69% 7	2.44% 3	2.44% 3	123	4.59
Infrastructure Failure or Other Collateral Damage	16.09% 14	21.84% 19	32.18% 28	20.69% 18	9.20% 8	87	3.15
Economic Impact(s)	11.86% 7	11.86% 7	28.81% 17	28.81% 17	18.64% 11	59	2.69
Environmental Impact(s)	12.73% 7	18.18% 10	18.18% 10	32.73% 18	18.18% 10	55	2.75
Geographic Area Affected	25.00% 7	14.29% 4	28.57% 8	17.86% 5	14.29% 4	28	3.18
Duration of Event or Impacts on Productivity	14.29% 7	18.37% 9	22.45% 11	26.53% 13	18.37% 9	49	2.84
Ability to Recover from Disaster/ Incident	17.11% 13	19.74% 15	17.11% 13	15.79% 12	30.26% 23	76	2.78
Availability of Existing Warning Systems	21.21% 7	21.21% 7	24.24% 8	9.09% 3	24.24% 8	33	3.06
Speed of Hazard Onset	25.00% 8	40.63% 13	21.88% 7	3.13% 1	9.38% 3	32	3.69
Seasonal Pattern	13.33% 2	13.33% 2	53.33% 8	13.33% 2	6.67% 1	15	3.13
Predictability	20.00% 5	24.00% 6	12.00% 3	32.00% 8	12.00% 3	25	3.08
Mitigation Potential	12.50% 4	25.00% 8	15.63% 5	15.63% 5	31.25% 10	32	2.72
Other (Please fill in below)	50.00% 1	50.00% 1	0.00% 0	0.00% 0	0.00% 0	2	4.50

#	EXPLANATION IF YOU SELECTED "OTHER"	DATE
1	Depends on the hazard	
2	Racial Equity impacts and will the hazard disproportionately negatively impact BIPOC and low-income households.	

Q5 In your opinion what is the most impactful NATURAL HAZARD facing the community you represent (Kent or Ottawa County, or the City of Grand Rapids)

Answered: 128 Skipped: 2



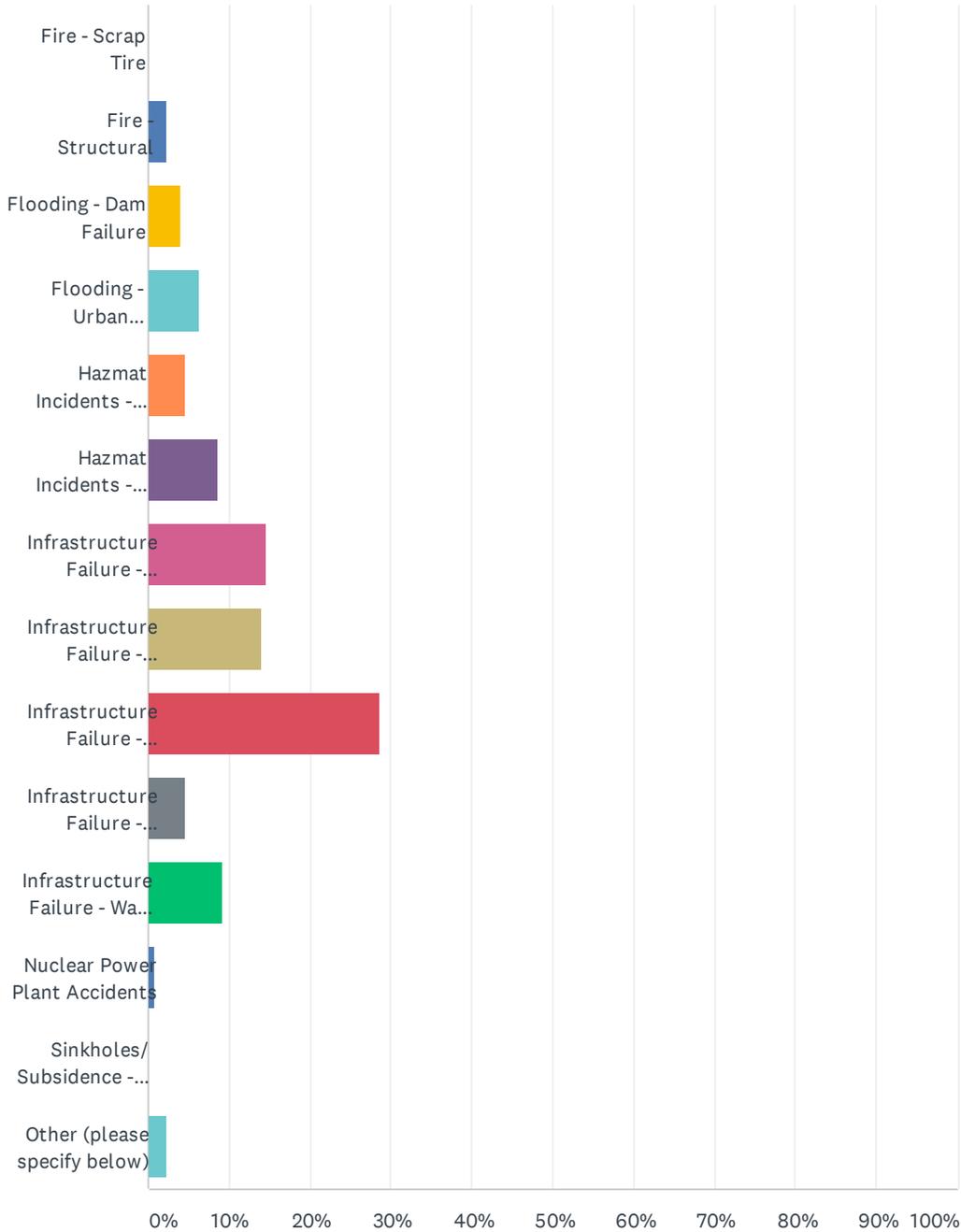
REDACTED FOR PUBLIC VIEW

ANSWER CHOICES	RESPONSES	
Celestial Impact	0.00%	0
Climage Change	13.28%	17
Draught	0.78%	1
Earthquake	0.00%	0
Extreme Temperatures - Extreme Hot or Cold	2.34%	3
Fire - Wildlife	0.00%	0
Flooding - Riverline or Shoreline	31.25%	40
Fog	0.00%	0
Invasive Species	0.78%	1
Subsidence - Natural	0.78%	1
Thunderstorms - Hail, Lightning, Severe Wind	15.63%	20
Tornadoes	20.31%	26
Winter Hazards - Snow, Ice & Sleet	11.72%	15
Other (specify below)	3.13%	4
TOTAL		128

#	PLEASE SPECIFY HERE IF YOU SELECTED "OTHER"	DATE
1	Clean safe drinking water would be a priority	[REDACTED]
2	Anything that would affect our building, land and congregation	[REDACTED]
3	Wind	[REDACTED]
4	High lake levels	[REDACTED]

Q6 In your opinion what is the most impactful TECHNOLOGICAL HAZARD facing the community you represent (Kent or Ottawa County, or the City of Grand Rapids)

Answered: 129 Skipped: 1



REDACTED FOR PUBLIC VIEW

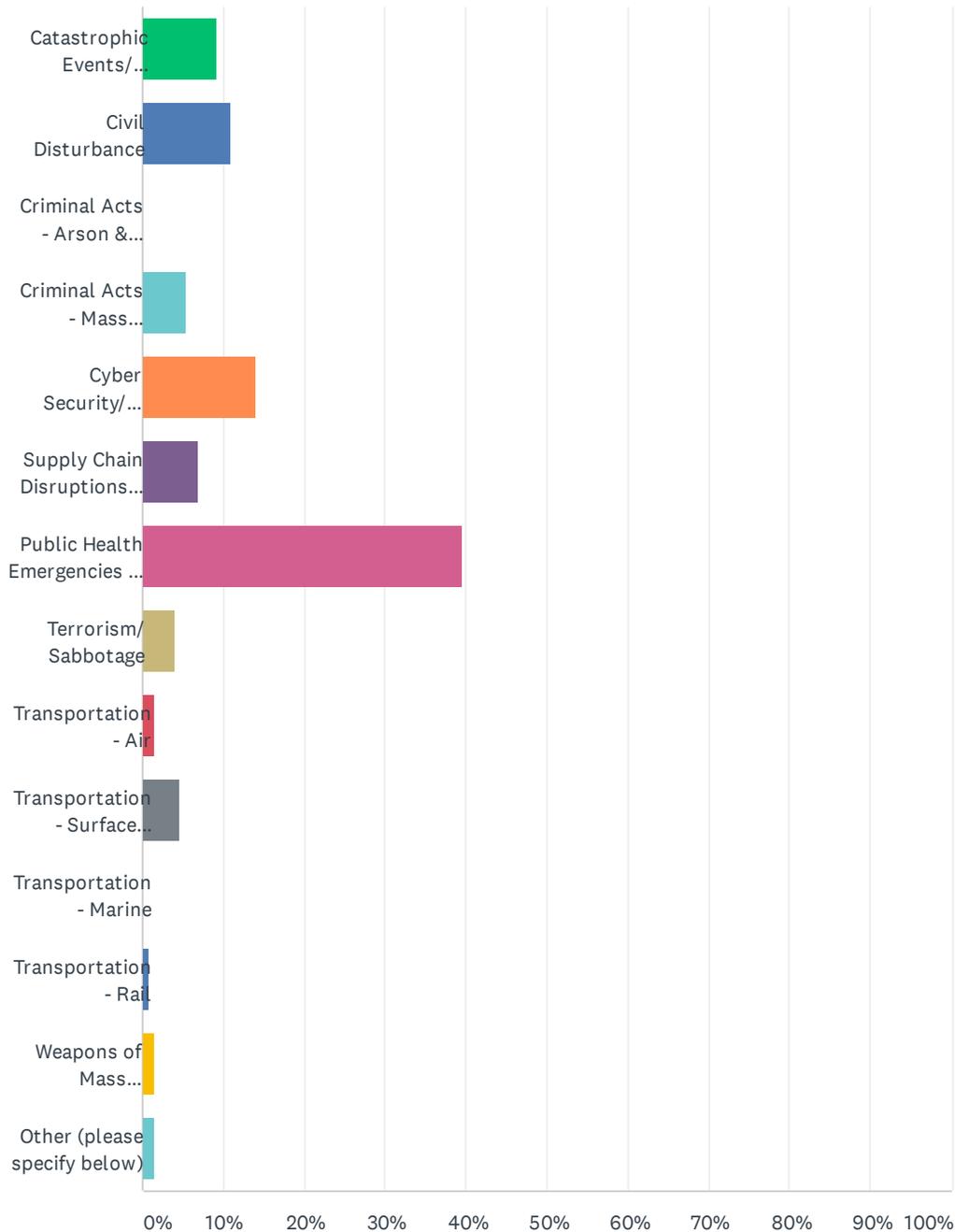
ANSWER CHOICES	RESPONSES
Fire - Scrap Tire	0.00% 0
Fire - Structural	2.33% 3
Flooding - Dam Failure	3.88% 5
Flooding - Urban (Stormwater)	6.20% 8
Hazmat Incidents - Fixed Site	4.65% 6
Hazmat Incidents - Transportation	8.53% 11
Infrastructure Failure - Buildings, Roads, Overpasses, Structures	14.73% 19
Infrastructure Failure - Communications	13.95% 18
Infrastructure Failure - Electrical Systems	28.68% 37
Infrastructure Failure - Sanitary/ Storm Sewers	4.65% 6
Infrastructure Failure - Water System	9.30% 12
Nuclear Power Plant Accidents	0.78% 1
Sinkholes/ Subsidence - Mining or Infrastructure	0.00% 0
Other (please specify below)	2.33% 3
TOTAL	129

#	PLEASE SPECIFY HERE IF YOU SELECTED "OTHER"	DATE
1	Large Scale IT Infrastructure Failure	[REDACTED]
2	Anything that would impact our church, land and congregation	[REDACTED]
3	Pollution	[REDACTED]
4	I don't feel equipped/knowledgeable enough to answer this one	[REDACTED]
5	Cyber attack	[REDACTED]

REDACTED FOR PUBLIC VIEW

Q7 In your opinion what is the most impactful HUMAN HAZARD facing the community you represent (Kent or Ottawa County, or the City of Grand Rapids)

Answered: 129 Skipped: 1



REDACTED FOR PUBLIC VIEW

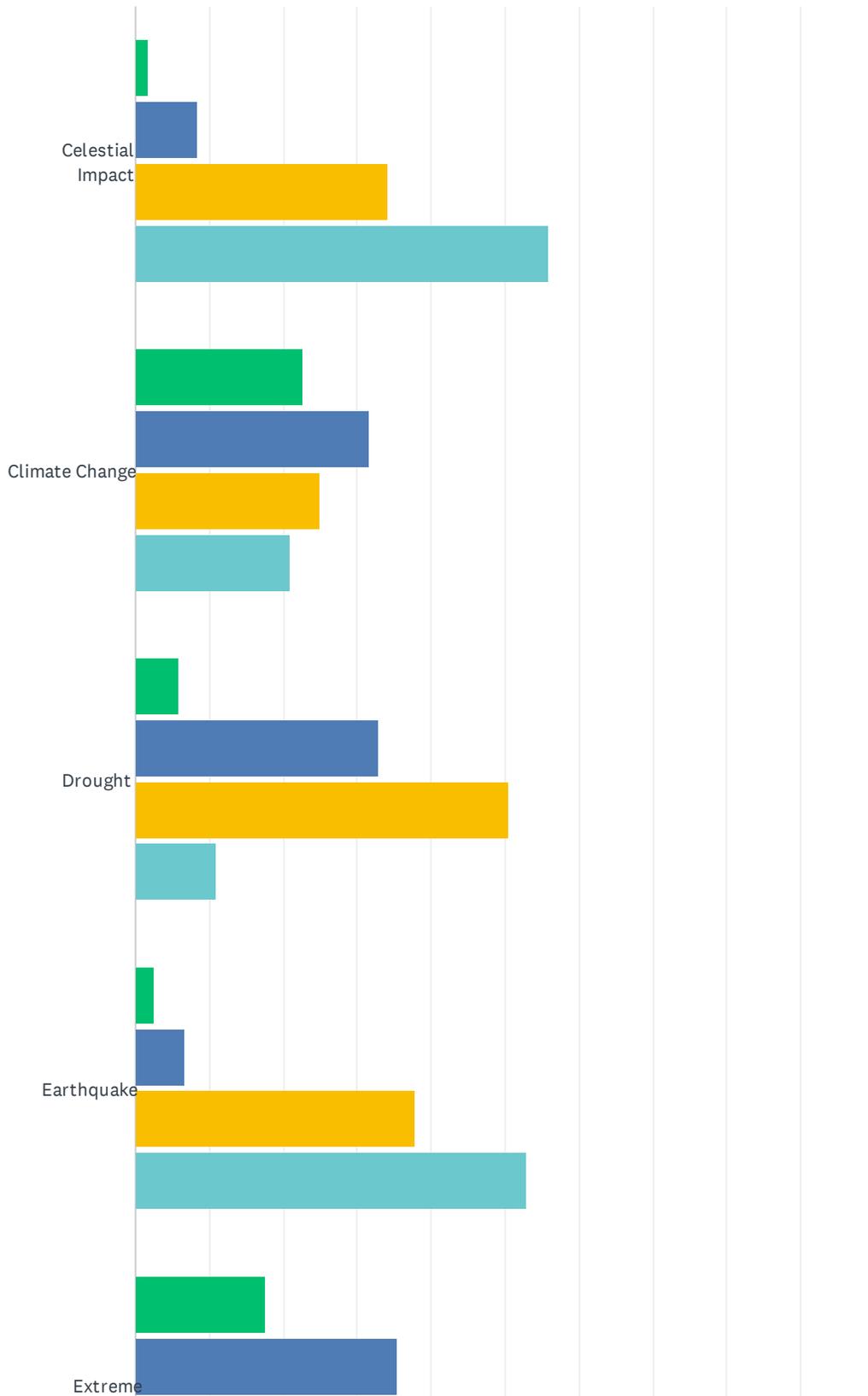
ANSWER CHOICES	RESPONSES	
Catastrophic Events/ National Emergencies	9.30%	12
Civil Disturbance	10.85%	14
Criminal Acts - Arson & Vandalism	0.00%	0
Criminal Acts - Mass Shootings/ Active Assailants	5.43%	7
Cyber Security/ Information Technology Intrusion	13.95%	18
Supply Chain Disruptions (gas/ oil shortages, PPE, etc.)	6.98%	9
Public Health Emergencies - Pandemics, Epidemics, Contaminated Food/Water	39.53%	51
Terrorism/ Sabbotage	3.88%	5
Transportation - Air	1.55%	2
Transportation - Surface Roads/ Highways	4.65%	6
Transportation - Marine	0.00%	0
Transportation - Rail	0.78%	1
Weapons of Mass Destruction	1.55%	2
Other (please specify below)	1.55%	2
TOTAL		129

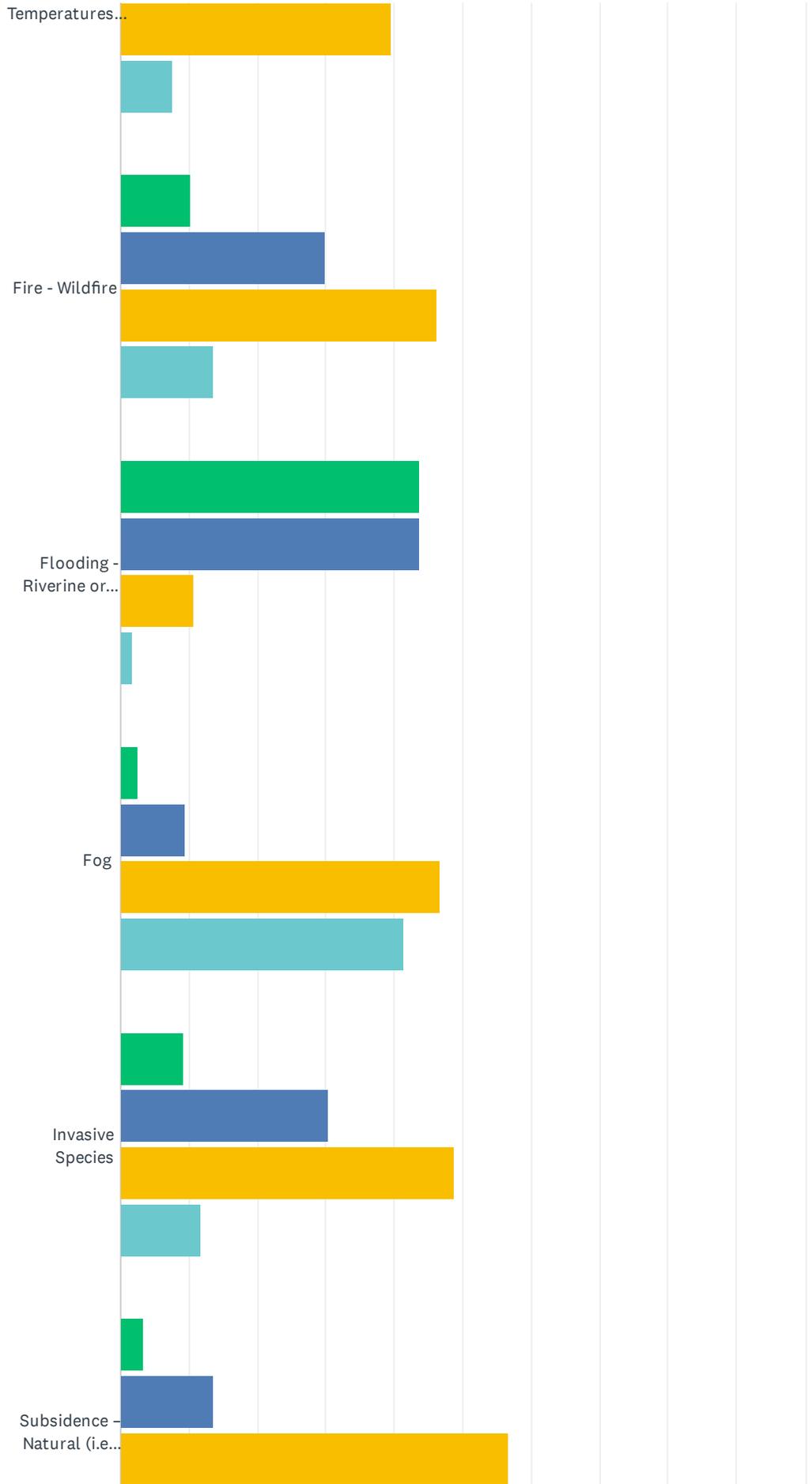
#	PLEASE SPECIFY HERE IF YOU SELECTED "OTHER"	DATE
1	Anything that would impact our building, land and congregation	██████████
2	People unable to meet their basic living needs.	██████████
3	aka - Systemic Racism	██████████
4	gas pipeline explosion	██████████

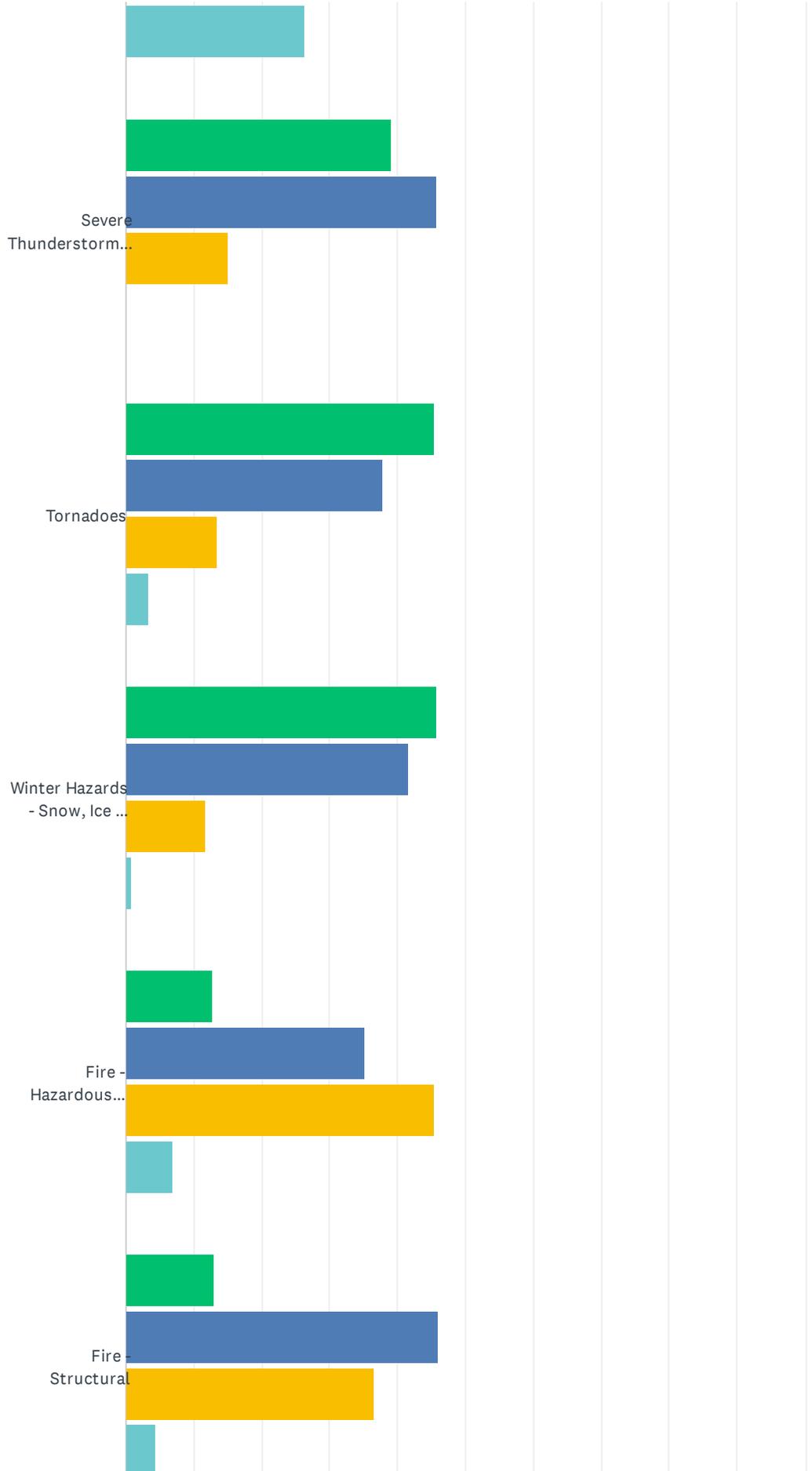
REDACTED FOR PUBLIC VIEW

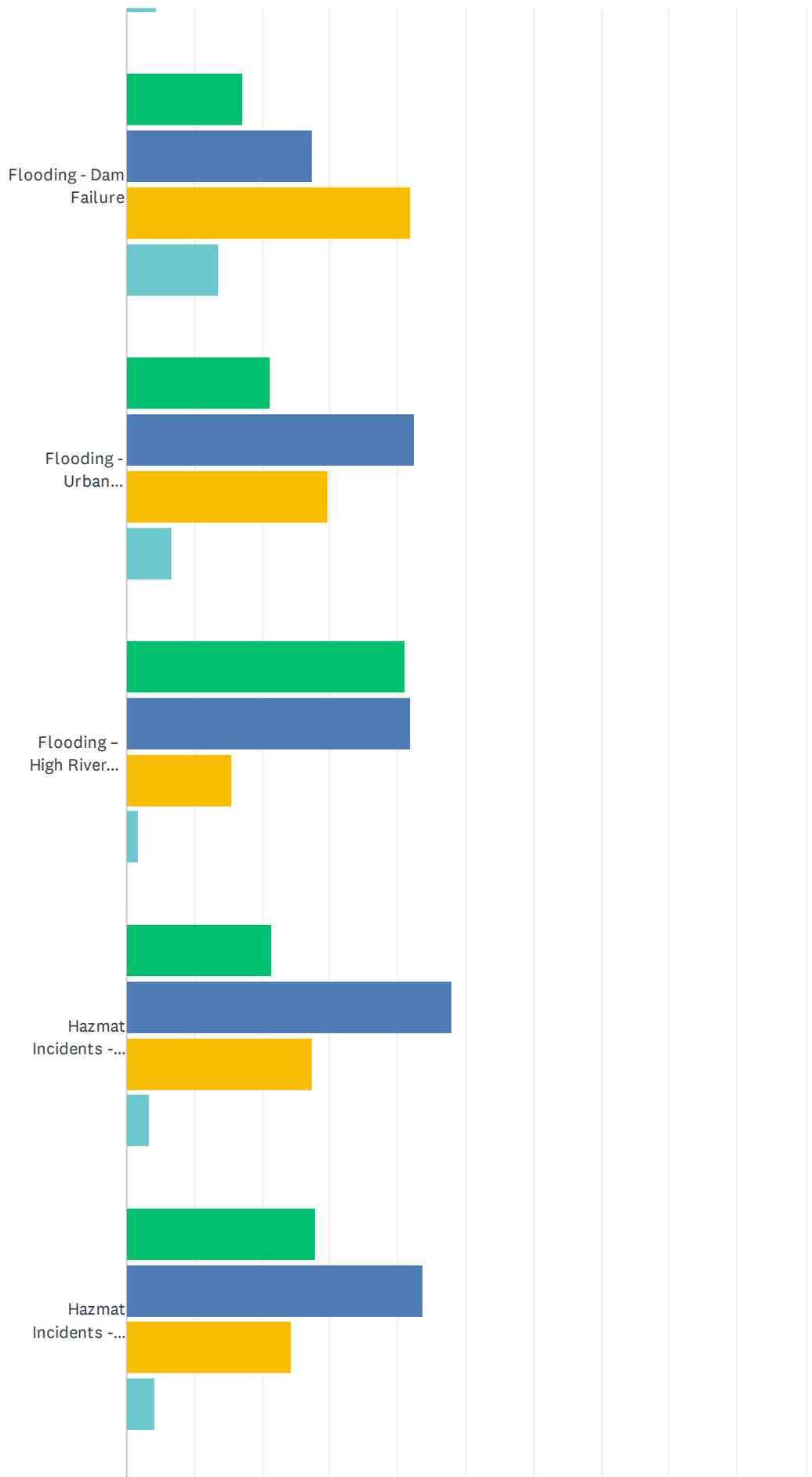
Q8 Please select the level of importance you feel best represents each of the following hazards

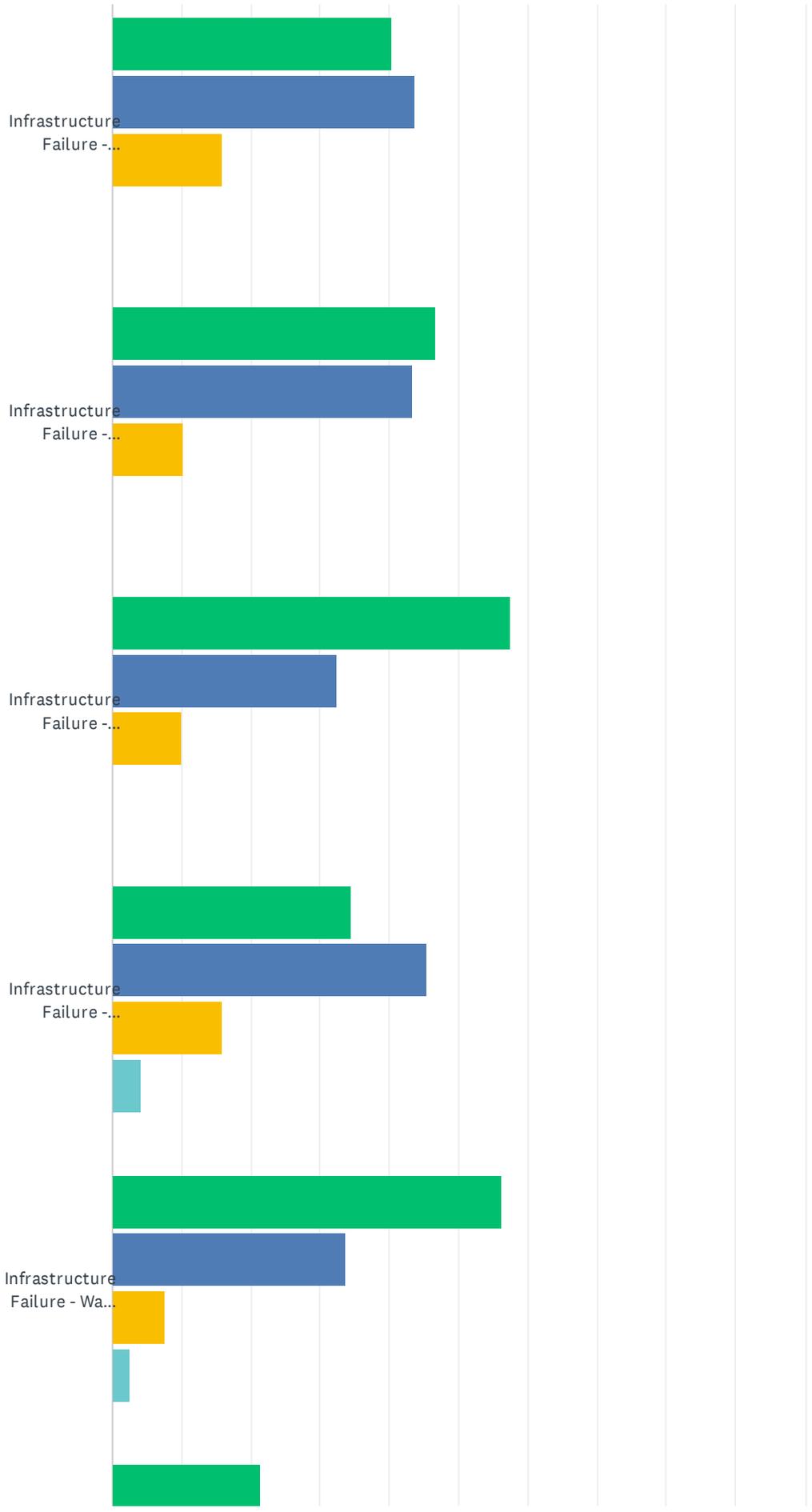
Answered: 129 Skipped: 1

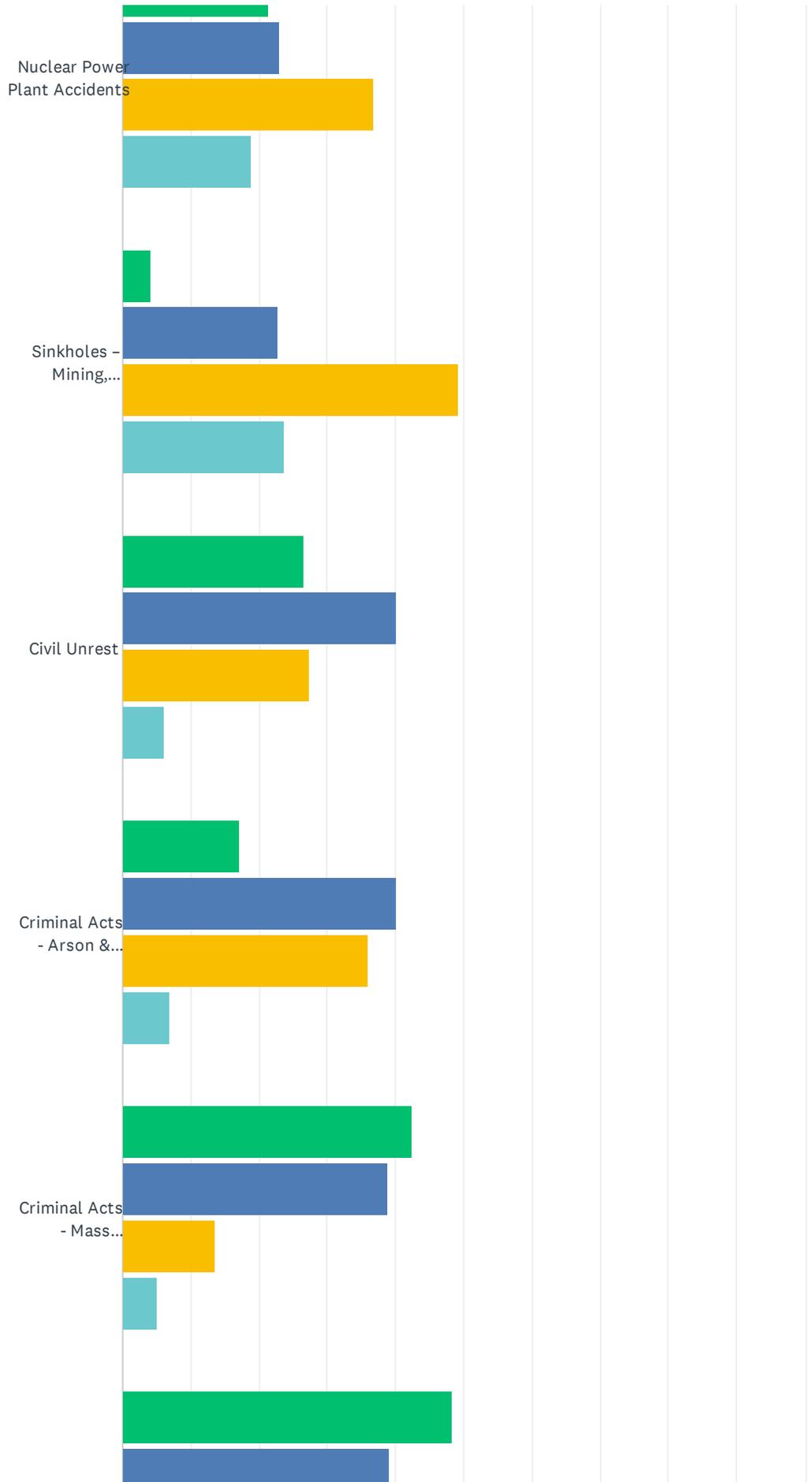


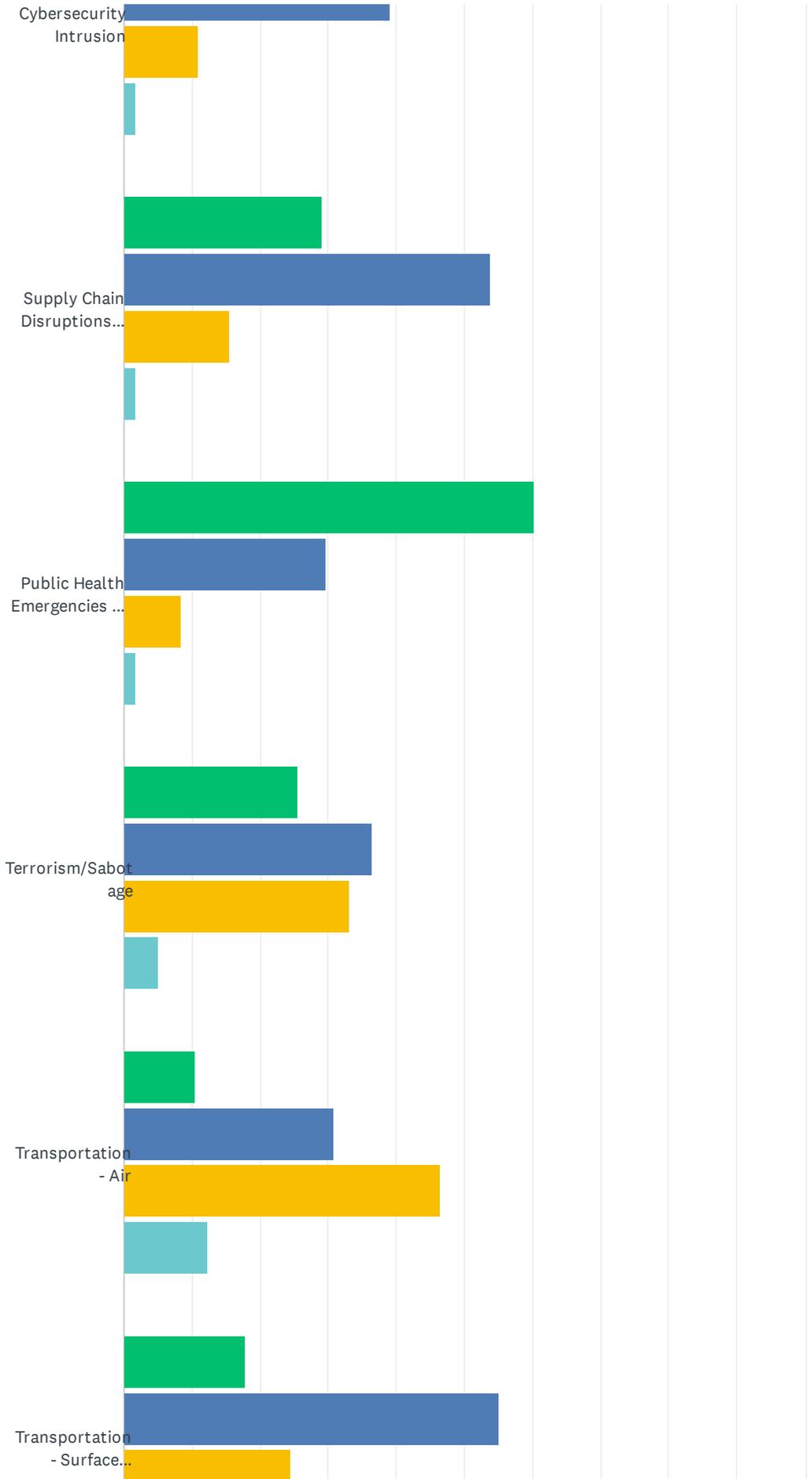


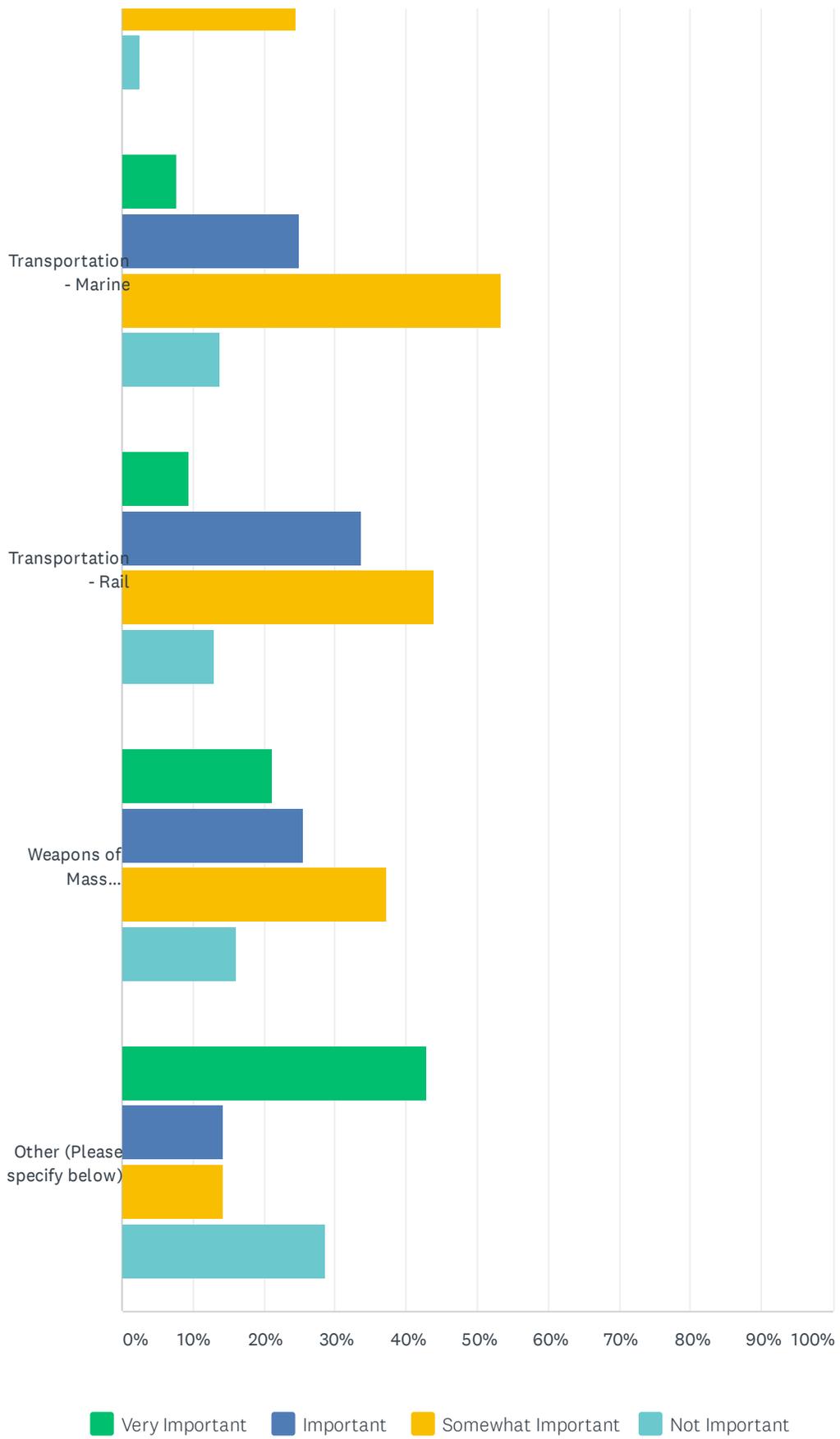












	VERY IMPORTANT	IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT	TOTAL	WEIGHTED AVERAGE
Celestial Impact	1.67% 2	8.33% 10	34.17% 41	55.83% 67	120	1.56
Climate Change	22.50% 27	31.67% 38	25.00% 30	20.83% 25	120	2.56
Drought	5.88% 7	32.77% 39	50.42% 60	10.92% 13	119	2.34
Earthquake	2.52% 3	6.72% 8	37.82% 45	52.94% 63	119	1.59
Extreme Temperatures - Hot or Cold	17.65% 21	35.29% 42	39.50% 47	7.56% 9	119	2.63
Fire - Wildfire	10.26% 12	29.91% 35	46.15% 54	13.68% 16	117	2.37
Flooding - Riverine or Shoreline	43.80% 53	43.80% 53	10.74% 13	1.65% 2	121	3.30
Fog	2.54% 3	9.32% 11	46.61% 55	41.53% 49	118	1.73
Invasive Species	9.24% 11	30.25% 36	48.74% 58	11.76% 14	119	2.37
Subsidence – Natural (i.e. sink hole)	3.39% 4	13.56% 16	56.78% 67	26.27% 31	118	1.94
Severe Thunderstorms - Hail, Lightning, High Wind	39.17% 47	45.83% 55	15.00% 18	0.00% 0	120	3.24
Tornadoes	45.38% 54	37.82% 45	13.45% 16	3.36% 4	119	3.25
Winter Hazards - Snow, Ice & Sleet	45.83% 55	41.67% 50	11.67% 14	0.83% 1	120	3.33
Fire - Hazardous Material (i.e. scrap tire)	12.82% 15	35.04% 41	45.30% 53	6.84% 8	117	2.54
Fire - Structural	13.04% 15	46.09% 53	36.52% 42	4.35% 5	115	2.68
Flooding - Dam Failure	17.09% 20	27.35% 32	41.88% 49	13.68% 16	117	2.48
Flooding - Urban (stormwater)	21.19% 25	42.37% 50	29.66% 35	6.78% 8	118	2.78
Flooding – High River Levels	41.03% 48	41.88% 49	15.38% 18	1.71% 2	117	3.22
Hazmat Incidents - Fixed Site	21.37% 25	47.86% 56	27.35% 32	3.42% 4	117	2.87
Hazmat Incidents - Transportation	27.73% 33	43.70% 52	24.37% 29	4.20% 5	119	2.95
Infrastructure Failure - Bridges, Roads, Overpasses, Structures, etc.	40.34% 48	43.70% 52	15.97% 19	0.00% 0	119	3.24
Infrastructure Failure - Communications	46.61% 55	43.22% 51	10.17% 12	0.00% 0	118	3.36
Infrastructure Failure - Energy	57.50%	32.50%	10.00%	0.00%		

(electrical, gas, oil, pipeline)	69	39	12	0	120	3.48
Infrastructure Failure - Sanitary/Storm Sewers	34.45% 41	45.38% 54	15.97% 19	4.20% 5	119	3.10
Infrastructure Failure - Water System	56.30% 67	33.61% 40	7.56% 9	2.52% 3	119	3.44
Nuclear Power Plant Accidents	21.37% 25	23.08% 27	36.75% 43	18.80% 22	117	2.47
Sinkholes – Mining, man-made, infrastructure	4.24% 5	22.88% 27	49.15% 58	23.73% 28	118	2.08
Civil Unrest	26.50% 31	40.17% 47	27.35% 32	5.98% 7	117	2.87
Criminal Acts - Arson & Vandalism	17.09% 20	40.17% 47	35.90% 42	6.84% 8	117	2.68
Criminal Acts - Mass Shootings/Active Assailant	42.37% 50	38.98% 46	13.56% 16	5.08% 6	118	3.19
Cybersecurity Intrusion	48.33% 58	39.17% 47	10.83% 13	1.67% 2	120	3.34
Supply Chain Disruptions (gas/oil shortages, PPE, etc.)	29.06% 34	53.85% 63	15.38% 18	1.71% 2	117	3.10
Public Health Emergencies - Pandemics, Epidemics, Contaminated Food/Water	60.33% 73	29.75% 36	8.26% 10	1.65% 2	121	3.49
Terrorism/Sabotage	25.42% 30	36.44% 43	33.05% 39	5.08% 6	118	2.82
Transportation - Air	10.53% 12	30.70% 35	46.49% 53	12.28% 14	114	2.39
Transportation - Surface Roads/Highways	17.80% 21	55.08% 65	24.58% 29	2.54% 3	118	2.88
Transportation - Marine	7.76% 9	25.00% 29	53.45% 62	13.79% 16	116	2.27
Transportation - Rail	9.48% 11	33.62% 39	43.97% 51	12.93% 15	116	2.40
Weapons of Mass Destruction	21.19% 25	25.42% 30	37.29% 44	16.10% 19	118	2.52
Other (Please specify below)	42.86% 3	14.29% 1	14.29% 1	28.57% 2	7	2.71

REDACTED FOR PUBLIC VIEW

Q9 Based on the hazards mentioned in previous questions, what are the top three (3) priority hazards for your local township/ municipality (Please list the most important first)

Answered: 122 Skipped: 8

ANSWER CHOICES	RESPONSES
Choice 1	99.18% 121
Choice 2	99.18% 121
Choice 3	98.36% 120
Please state your township or municipality	99.18% 121

#	CHOICE 1	DATE
1	Public Health ie. pandemics	[REDACTED]
2	Transportation - Rail	[REDACTED]
3	Storms	[REDACTED]
4	CYBER INFRASTRUCTURE PENETRATION AND COMPROMISE	[REDACTED]
5	climate change	[REDACTED]
6	Cyber Security	[REDACTED]
7	Anything that would impact our building, land and congregation	[REDACTED]
8	Water	[REDACTED]
9	Severe thunderstorms and high wind	[REDACTED]
10	Terrorism	[REDACTED]
11	Structural Fires	[REDACTED]
12	flood water drainage	[REDACTED]
13	Climate Chage	[REDACTED]
14	Cyber security	[REDACTED]
15	Severe Storms/hail/lighting/high winds/tornado's	[REDACTED]
16	Cllimate Change	[REDACTED]
17	Climate Change	[REDACTED]
18	Pandemic	[REDACTED]
19	Public Health Emergencies	[REDACTED]
20	Civil unrest	[REDACTED]
21	Climate Change	[REDACTED]
22	Pandemic	[REDACTED]
23	Winter storms	[REDACTED]
24	Infrastructure Failure - bridges, roadways	[REDACTED]
25	Severe thunderstorms, lightning and hail	[REDACTED]

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

Publication Date:

26	Train derailments	
27	Climate Change	
28	Water	
29	Severe weather	
30	Ice Storm	
31	Hazmat hazards chemical co fixed site	
32	Cyber security	
33	hazmat	
34	Infrastructure Failure - Energy	
35	Fire	
36	Flooding	
37	flood river	
38	Extreme weather (hot/cold)	
39	Government Overreach	
40	Public health	
41	Cyber security	
42	Public health emergencies	
43	River flooding	
44	Public Health Emergencies (Current)	
45	Structural racism/segregated neighborhoods - more at risk	
46	Winter Hazards - Snow and Ice	
47	public health emergencies	
48	Natural Disasters	
49	flooding	
50	Infrastructure Failure - Communications	
51	civil unrest	
52	Hazmat - Fixed site	
53	Public Health Emergencies	
54	Public Health Emergency - Contaminated municipal water supply (ie bio-terrorism)	
55	Flooding - High river levels	
56	drought	
57	Severe Weather	
58	Pandemic	
59	Flooding	
60	Flooding-High River	
61	Winter Weather	
62	Climate Change	
63	Severe Weather - High Winds, Tornado	

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

Publication Date:

64	Pandemics	[REDACTED]
65	Flood River	[REDACTED]
66	Flooding	[REDACTED]
67	Hazmat Flxed	[REDACTED]
68	Civil unrest	[REDACTED]
69	flooding - river and shoreline	[REDACTED]
70	Severe Thunderstorms	[REDACTED]
71	climate change	[REDACTED]
72	Pandemic	[REDACTED]
73	Transportation Air	[REDACTED]
74	tornado	[REDACTED]
75	tornadoes	[REDACTED]
76	HAZMAT Release	[REDACTED]
77	Mass Shootings	[REDACTED]
78	Public Health Emergencies	[REDACTED]
79	High Waters/ River Flooding	[REDACTED]
80	Coastal flooding/river flooding	[REDACTED]
81	Active shooter	[REDACTED]
82	Pandemic	[REDACTED]
83	Flooding	[REDACTED]
84	Flooding	[REDACTED]
85	Flooding	[REDACTED]
86	Civil Unrest	[REDACTED]
87	weather extremes - wind, hail, heavy rain	[REDACTED]
88	Public Health Emergencies (Pandemic)	[REDACTED]
89	Climate Change	[REDACTED]
90	Infratstructure Failure - Energy	[REDACTED]
91	Tornado	[REDACTED]
92	Infrastructure energy	[REDACTED]
93	DAM Failure	[REDACTED]
94	Civil Disturbance	[REDACTED]
95	Power Outage	[REDACTED]
96	Winter Weather Hazard	[REDACTED]
97	Airplane Crash/Disaster	[REDACTED]
98	Flooding	[REDACTED]
99	Flooding - Riverline and Shoreline	[REDACTED]
100	Infrastructure Failure - Electrical	[REDACTED]
101	Pandemic	[REDACTED]

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

102	Water/Sewer	
103	Infrastructure Failure	
104	Infrastructure Failure Gas Electric	
105	Flooding	
106	pandemic, etc.	
107	high water/flooding	
108	Transportation by Rail	
109	Tornado	
110	Severe Weather	
111	Severe Weather	
112	Tornado	
113	thunderstorms	
114	Infrastructure failure	
115	Winter Storms, power outages	
116	pandemics	
117	Water Infrastructure	
118	Infrastructure	
119	Severe Weather	
120	Flooding	
121	Public Health	
#	CHOICE 2	DATE
1	Clean Water	
2	Fire - Structure	
3	Power grid	
4	RIVERINE FLOODING	
5	infrastructure failure - energy -> communications	
6	infrastructure damage/disruptions	
7	Anything that would impact our building, land and congregation	
8	Transportation	
9	Infrastructure failure - Energy	
10	Flooding	
11	Flooding	
12	flood lake	
13	Flooding - river and shoreline	
14	Weather - especially winter	
15	Severve winter storms/snow/ice/hail	
16	Supply Chain Disruptions	
17	Road Infrastructure	

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

Publication Date:

18	Infrastructure - Loss of Power	
19	Thunderstorms	
20	Water shortage (ground water)	
21	Flooding	
22	Civil Unrest	
23	flooding	
24	Public Health Emergency - Pandemics	
25	Flooding-High River Levels	
26	Highway incidents	
27	Infrastructure	
28	Flooding	
29	Flooding	
30	Tornados and straight line wind gusts of equal strength to a tornado	
31	Pandemic Covid 19	
32	Infrastructure failure	
33	electric disruption	
34	Infrastructure Failure - Communications	
35	Weather	
36	Natural. Disaster	
37	infrastructure pipe line	
38	Public Health emergency	
39	Tornado	
40	Weather related	
41	Active shooter	
42	Climate change	
43	Tornadoes	
44	River and Lake Water Levels (shoreline erosion)	
45	Pollution - environmental injustice hot spots	
46	Infrastructure Failure - Energy	
47	cybersecurity intrusion	
48	Public Health Emrgencies	
49	utility failure	
50	Flooding	
51	roads	
52	Communication disruption	
53	Severe weather	
54	Acute HazMat Incident (large scale fire/explosion)	
55	Winter Weather Hazards	

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

56	tornadoes	[REDACTED]
57	Infrastructure Failure -Energy	[REDACTED]
58	Infrastructure Failure - water, sewer, electric, critical businesses	[REDACTED]
59	Natural disasters	[REDACTED]
60	Winter Storm	[REDACTED]
61	Communications Failure	[REDACTED]
62	Public Health Emergencies	[REDACTED]
63	Infrastructure Failure - Electrical, Water	[REDACTED]
64	Infrastructure	[REDACTED]
65	Dam Failure	[REDACTED]
66	Severe Storms	[REDACTED]
67	Flooding	[REDACTED]
68	water availability	[REDACTED]
69	fire	[REDACTED]
70	infrastructure - sanitary sewer	[REDACTED]
71	Public Health	[REDACTED]
72	Flooding	[REDACTED]
73	Tornadoes	[REDACTED]
74	flooding	[REDACTED]
75	flooding	[REDACTED]
76	Flooding	[REDACTED]
77	Flooding	[REDACTED]
78	Cybersecurity Intrusion	[REDACTED]
79	Infrastructure Failure (Dams/ Bridges)	[REDACTED]
80	Infrastructure failures; sewer/water, bridges/roads	[REDACTED]
81	Transport hazmat	[REDACTED]
82	Cyber	[REDACTED]
83	Tornados	[REDACTED]
84	Tornado's	[REDACTED]
85	Infrastructure failures	[REDACTED]
86	Flooding (Rivers)	[REDACTED]
87	electrical system failures	[REDACTED]
88	Flooding - High River Levels	[REDACTED]
89	Cybersecurity	[REDACTED]
90	Infrastructure Failure - Sanitary	[REDACTED]
91	Acts of terrorism	[REDACTED]
92	Extreme weather cond.	[REDACTED]
93	Mass Shooting/Active assailant	[REDACTED]

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

Publication Date:

94	Extreme weather	
95	Flooding	
96	Civil Unrest	
97	Tornado	
98	Civil unrest	
99	Severe Thunderstorms - High Winds	
100	Infrastructure Failure - Water	
101	Infrastructure Failure	
102	Cyber	
103	Flooding	
104	Traffic related automobile	
105	Public Health Emergency	
106	Communications	
107	infrastructure water, roads, sewer etc	
108	Hazmat Release	
109	Windstorm	
110	Cyber Attack	
111	Hazmat	
112	High wind	
113	tornados	
114	supply chain	
115	Flooding	
116	flooding	
117	Flooding	
118	Flooding	
119	Civil Disturbance	
120	Severe Weather	
121	Communications	
#	CHOICE 3	DATE
1	Safety from criminal activity	
2	Hazmat - Fixed Site	
3	Pandemic	
4	EXTREME WEATHER	
5	supply chain disruptions -> civil unrest	
6	pandemic	
7	Anything that would impact our building, land and congregation	
8	Infrastructure - bridges	
9	Infrastructure - Water systems	

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

10	Roads	[REDACTED]
11	infrastructure failures	[REDACTED]
12	pandemic	[REDACTED]
13	Infrastruture - all	[REDACTED]
14	Shoreline erosion/flooding	[REDACTED]
15	Water system failure	[REDACTED]
16	Invasive Species	[REDACTED]
17	Public Health	[REDACTED]
18	Flooding	[REDACTED]
19	Infrastructure Failure - Bridges, Roads, Overpasses, Structures, Etc.	[REDACTED]
20	Weather/tornado	[REDACTED]
21	Infrastructure failure - water system	[REDACTED]
22	Infrastructure Failure - Water	[REDACTED]
23	severe storms	[REDACTED]
24	Infrastructure Failure - Water System	[REDACTED]
25	Public Health Emergencies	[REDACTED]
26	Agricultural incidents	[REDACTED]
27	Meeting peoples' basic living needs.	[REDACTED]
28	Transportation	[REDACTED]
29	Public health preparedness	[REDACTED]
30	Transportation based Hazmat incident (roadways)	[REDACTED]
31	Civil Unrest	[REDACTED]
32	Public Health Emergency	[REDACTED]
33	civil unrest	[REDACTED]
34	Winter Hazards - snow, ice, sleet	[REDACTED]
35	Pandemic	[REDACTED]
36	Pandemic	[REDACTED]
37	hazmat incident	[REDACTED]
38	Flooding (all types)	[REDACTED]
39	Electrical Grid Failure	[REDACTED]
40	Hazmat	[REDACTED]
41	Weather	[REDACTED]
42	Infrastructure failure	[REDACTED]
43	Water Infrastructure failure	[REDACTED]
44	Cybersecurity and Infrastructure supporting communications	[REDACTED]
45	Climate Change	[REDACTED]
46	Supply Chain Disruption	[REDACTED]
47	winter hazzards	[REDACTED]

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

48	Terrorism	[REDACTED]
49	cybersecurity	[REDACTED]
50	Public Health	[REDACTED]
51	tornadoes	[REDACTED]
52	flooding	[REDACTED]
53	Wild fires	[REDACTED]
54	Sustained power outage/communications disruption (especially winter)	[REDACTED]
55	Civil Unrest	[REDACTED]
56	electrical	[REDACTED]
57	Transportation Surface Roads/Highways	[REDACTED]
58	Tornadoes	[REDACTED]
59	Terrorism	[REDACTED]
60	Tornado	[REDACTED]
61	Electrical Failure	[REDACTED]
62	Cybersecurity	[REDACTED]
63	Cyber Security	[REDACTED]
64	Mass shootings	[REDACTED]
65	Hazard	[REDACTED]
66	Cyber Intrusions	[REDACTED]
67	Terrorism/Sabotage	[REDACTED]
68	power grid - vulnerability	[REDACTED]
69	cyber	[REDACTED]
70	Infrastructure - water	[REDACTED]
71	Infrastructure failure	[REDACTED]
72	Infrastructure	[REDACTED]
73	Criminal Acts- Active Shooter	[REDACTED]
74	infrastructure	[REDACTED]
75	gas pipeline accident	[REDACTED]
76	Civil Unrest	[REDACTED]
77	Supply Chain Distruption	[REDACTED]
78	Climate Change	[REDACTED]
79	Domestic Terrorism (Caledonia School District)	[REDACTED]
80	Gas terminals/transportation	[REDACTED]
81	Severe weather	[REDACTED]
82	Infrastructure	[REDACTED]
83	Severe Thuderstorms/Straight Line Winds	[REDACTED]
84	Chemical Spill - Transportation	[REDACTED]
85	Criminal Acts/Assailant	[REDACTED]

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

86	Public health	
87	theft and intrusion	
88	Climate Change	
89	Infrastructure Failure	
90	Infrastructure Failure - Water	
91	Cyber Security Threat	
92	supply line for supplies	
93	Tornado	
94	Infrastructure - Electrical	
95	Water/Sewer issues	
96	Potential Mass Casualty Incident/Active Shooter Event	
97	Dam Failure	
98	Infrastructure failure	
99	Hazmat Incidents - Transportation	
100	Cyberterrorism	
101	Weather	
102	Bridges	
103	Tornados	
104	Weather related tornado ice snow fog	
105	Infrastructure Failure- energy	
106	Natural disasters	
107	infrastructure power, internet etc	
108	Flooding	
109	Flooding	
110	Active Assailant	
111	Cyber	
112	winter hazards	
113	flooding	
114	Power outages	
115	infrastructure-electricity	
116	Severe Weather	
117	Storms	
118	Flooding	
119	Climate Change	
120	River Flooding	
#	PLEASE STATE YOUR TOWNSHIP OR MUNICIPALITY	DATE
1	Georgetown Twp. Ottawa County	
2	Holland Twp.	

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

Publication Date:

3	Olive Twp.	[REDACTED]
4	City of Grand Haven	[REDACTED]
5	Holland	[REDACTED]
6	Holland	[REDACTED]
7	Ottawa County	[REDACTED]
8	Ferrysburg	[REDACTED]
9	Holland, MI	[REDACTED]
10	City of Holland	[REDACTED]
11	Plainfield Township	[REDACTED]
12	Park Township	[REDACTED]
13	Ottawa County	[REDACTED]
14	Zeeland Charter	[REDACTED]
15	Georgetown Township	[REDACTED]
16	Holland City	[REDACTED]
17	Ottawa County	[REDACTED]
18	Crockery	[REDACTED]
19	Zeeland township	[REDACTED]
20	Ottawa County	[REDACTED]
21	Ottawa County	[REDACTED]
22	Holland Township	[REDACTED]
23	Spring Lake Twp	[REDACTED]
24	Grand Rapids	[REDACTED]
25	City of hudsonville	[REDACTED]
26	Holland	[REDACTED]
27	Holland Township	[REDACTED]
28	Robinson	[REDACTED]
29	Ottawa County Emergency Management	[REDACTED]
30	Ottawa County	[REDACTED]
31	Park Township	[REDACTED]
32	GHT	[REDACTED]
33	Blendon Twp	[REDACTED]
34	Zeeland	[REDACTED]
35	Spring Lake Township	[REDACTED]
36	Robinson Twp	[REDACTED]
37	Ottawa County	[REDACTED]
38	Port Sheldon	[REDACTED]
39	Multiple	[REDACTED]
40	Byron Center	[REDACTED]

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

Publication Date:

41	Hudsonville	[REDACTED]
42	Grandville	[REDACTED]
43	Ottawa County	[REDACTED]
44	City of Grand Rapids	[REDACTED]
45	Holland	[REDACTED]
46	Grand Haven	[REDACTED]
47	County of Ottawa	[REDACTED]
48	City of Zeeland	[REDACTED]
49	Ottawa County	[REDACTED]
50	Tallmadge	[REDACTED]
51	Zeeland	[REDACTED]
52	Oakfield Twonship	[REDACTED]
53	Grand Rapids	[REDACTED]
54	City of Grand Rapids	[REDACTED]
55	Alpine Township	[REDACTED]
56	Oakfield Township	[REDACTED]
57	Wyoming, MI	[REDACTED]
58	City of Grand Rapids	[REDACTED]
59	Kent County	[REDACTED]
60	Grand Rapids	[REDACTED]
61	Grand Rapids	[REDACTED]
62	Zeeland	[REDACTED]
63	Grand Rapids	[REDACTED]
64	Ada Township	[REDACTED]
65	I live in Grand Haven Township	[REDACTED]
66	Holland	[REDACTED]
67	Blendon	[REDACTED]
68	Ottawa County	[REDACTED]
69	Holland Charter Twp.	[REDACTED]
70	City of Zeeland	[REDACTED]
71	Ottawa County	[REDACTED]
72	Airport	[REDACTED]
73	kent county road commission	[REDACTED]
74	Sparta Township	[REDACTED]
75	Kent County	[REDACTED]
76	Kent County	[REDACTED]
77	None - schools	[REDACTED]
78	Caledonia Township	[REDACTED]

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

Publication Date:

79	unable to answer, our agency serves all of Ottawa County	
80	City of Ferrysburg	
81	Port	
82	Ottawa County	
83	Kent County	
84	Park Township	
85	Ottawa County	
86	Grand Rapids	
87	Kent and Ottawa counties	
88	City of Grand Rapids	
89	City of Grand Rapids	
90	Grand Rapids	
91	Grand Haven	
92	Gaines TWP and Caledonia TWP	
93	Cascade Township	
94	Allendale	
95	Jamestown Charter Township	
96	Ottawa County	
97	Cascade Charter Township	
98	City of Grand Rapids	
99	Grand Haven Township	
100	Grand Rapids	
101	Holland	
102	Zeeland Charter Township	
103	City of Holland	
104	Grand Rapids Township	
105	Ottawa County	
106	Grattan	
107	Grand Haven/ NW Ottawa county	
108	Ottawa County and Kent County	
109	Road Commission	
110	Ottawa County (personal - Georgetown Township)	
111	Grand Rapids Township	
112	chester Township	
113	Chester twp	
114	Wyoming	
115	Ottawa County	
116	Park Township/Ottawa County	

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

Publication Date:

117	City of Coopersville	[REDACTED]
118	Georgetown	[REDACTED]
119	City of Grand Haven	[REDACTED]
120	City of Coopersville	[REDACTED]
121	Grand Rapids	[REDACTED]

REDACTED FOR PUBLIC VIEW

Q10 Based on the hazards mentioned in previous questions, what are the top three (3) priority hazards for your county (Kent or Ottawa), or City of Grand Rapids (Please list the most important first)

Answered: 117 Skipped: 13

ANSWER CHOICES	RESPONSES
Choice 1	100.00% 117
Choice 2	97.44% 114
Choice 3	97.44% 114
Please state your jurisdiction - Kent, Ottawa or City of GR	94.87% 111

#	CHOICE 1	DATE
1	Public Health ie. pandemic etc.	[REDACTED]
2	Infrastructure - Bridges, Roads, Etc.	[REDACTED]
3	Storms	[REDACTED]
4	CYBER INFRASTRUCTURE PENETRATION AND COMPROMISE	[REDACTED]
5	climate change	[REDACTED]
6	Climate change	[REDACTED]
7	infrastructure damage/disruptions	[REDACTED]
8	Anything that would impact our building, land and congregation	[REDACTED]
9	Water	[REDACTED]
10	Flooding - Rivers	[REDACTED]
11	Criminal	[REDACTED]
12	Hazmat Transportation	[REDACTED]
13	flood	[REDACTED]
14	Climate Change	[REDACTED]
15	Cyber security	[REDACTED]
16	water system failure	[REDACTED]
17	Climate Change	[REDACTED]
18	Climate Health	[REDACTED]
19	Pandemic	[REDACTED]
20	Civil unrest	[REDACTED]
21	Climate Change	[REDACTED]
22	Pandemic	[REDACTED]
23	Winter storms	[REDACTED]
24	Public Health - Pandemics	[REDACTED]
25	Severe thunderstorms, lightning and hail	[REDACTED]

REDACTED FOR PUBLIC VIEW

26	Ammonia	[REDACTED]
27	Climate change	[REDACTED]
28	Weather	[REDACTED]
29	Severe weather	[REDACTED]
30	Ice Storm	[REDACTED]
31	Local Chemical Co fixed site	[REDACTED]
32	Cyber security	[REDACTED]
33	Vehicles containing housmaterials	[REDACTED]
34	Infrastructure Failure - Power	[REDACTED]
35	Fire	[REDACTED]
36	Water system	[REDACTED]
37	transpotation	[REDACTED]
38	Extreme weather (hot / cold)	[REDACTED]
39	Government Overreach	[REDACTED]
40	Public health	[REDACTED]
41	Cyber Security	[REDACTED]
42	Public health emergencies	[REDACTED]
43	Flooding	[REDACTED]
44	Structural racism/segregated neighborhoods - more at risk	[REDACTED]
45	Winter Hazards - Snow and Ice	[REDACTED]
46	public health emergencies	[REDACTED]
47	Natural Disasters	[REDACTED]
48	flooding	[REDACTED]
49	Infrastructure Failure - Communication	[REDACTED]
50	civil unrest	[REDACTED]
51	Hazmat	[REDACTED]
52	Don't know	[REDACTED]
53	Public Health Emergency - Contaminated municipal water supply (ie bio-terrorism)	[REDACTED]
54	Flooding - High river levels	[REDACTED]
55	Flooding	[REDACTED]
56	Severe Weather	[REDACTED]
57	Pandemic	[REDACTED]
58	River flooding	[REDACTED]
59	Flooding	[REDACTED]
60	Winter Weather	[REDACTED]
61	Climate Change	[REDACTED]
62	Severe Weather - High Winds, Tornado	[REDACTED]
63	Cybersecurity	[REDACTED]

REDACTED FOR PUBLIC VIEW

64	Hazmat Fixed	[REDACTED]
65	civil unrest	[REDACTED]
66	flooding - river and shoreline	[REDACTED]
67	Thunderstorms	[REDACTED]
68	climate change	[REDACTED]
69	Pandemic	[REDACTED]
70	Tornadoes	[REDACTED]
71	tornado	[REDACTED]
72	tornadoes	[REDACTED]
73	HAZMAT	[REDACTED]
74	Mass Shootings	[REDACTED]
75	Public Health Emergencies	[REDACTED]
76	Pandemics/ Community Health	[REDACTED]
77	Winter hazards	[REDACTED]
78	Flooding; coastal/rivers	[REDACTED]
79	N/A	[REDACTED]
80	same	[REDACTED]
81	Flooding	[REDACTED]
82	Flooding	[REDACTED]
83	Extreme Weather Cold/Heat	[REDACTED]
84	Flooding	[REDACTED]
85	Extreme Temperatures	[REDACTED]
86	weather extremes - hail, high winds, heavy rains	[REDACTED]
87	Public Health Emergencies (Pandemic)	[REDACTED]
88	Don't have a priority	[REDACTED]
89	Climate Change	[REDACTED]
90	Infrastructure Failure - Energy	[REDACTED]
91	Widespread severe thunderstorm and wind event	[REDACTED]
92	Criminal acts / mass shootings	[REDACTED]
93	Mass Shooting/Active Assailant	[REDACTED]
94	River Flooding	[REDACTED]
95	Communication Outage	[REDACTED]
96	Winter Weather Hazard	[REDACTED]
97	Tornado	[REDACTED]
98	Flooding	[REDACTED]
99	Flooding - Riverline and Shoreline	[REDACTED]
100	Infrastructure Failure - Electrical	[REDACTED]
101	Pandemic	[REDACTED]

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

102	Infrastructure Failure	
103	Flooding	
104	pandemic	
105	Water protection, use and availability	
106	Transportation by Rail	
107	Severe Weather	
108	Severe Weather	
109	Tornado	
110	public health	
111	Infrastructure	
112	Infrastructure (Communications)	
113	pandemic	
114	Shoreline Erosion	
115	Severe Weather	
116	flooding (shoreline and/or inland water way)	
117	Public Health	
#	CHOICE 2	DATE
1	Clean Safe Water	
2	Power Grid	
3	RIVERINE/SHORELINE FLOODING	
4	infrastructure failure - energy -> communications	
5	Public Health (pandemic/epidemic)	
6	cyber security	
7	Anything that would impact our building, land and congregation	
8	Transportation	
9	Severe thunderstorms with high winds	
10	Fire	
11	Infrastructure failure	
12	lake water	
13	Flooding - shoreline and river	
14	Weather - especially winter	
15	water system/sanitary sewer system failure	
16	Infrastructure Failure	
17	Road Infrastructure	
18	Infrastructure Failure - Loss of Power	
19	Weather	
20	Flooding	
21	Civil Unrest	

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

Publication Date:

22	Severe weather	[REDACTED]
23	Infrastructure Failure - roadways, Bridges	[REDACTED]
24	Flooding-High River Levels	[REDACTED]
25	Numerous train chemicals	[REDACTED]
26	Infrastructure	[REDACTED]
27	Railroads	[REDACTED]
28	Flooding	[REDACTED]
29	Tornados and straight line wind gusts equal to a tornado	[REDACTED]
30	Pandemic Covid-19	[REDACTED]
31	Infrastructure failure	[REDACTED]
32	Electrical disruption	[REDACTED]
33	Infrastructure Failure - Communications	[REDACTED]
34	Pandemic	[REDACTED]
35	Sanitation system	[REDACTED]
36	hazmat	[REDACTED]
37	Public Health emergency	[REDACTED]
38	Tornado	[REDACTED]
39	Weather related	[REDACTED]
40	Active Shooter	[REDACTED]
41	Climate change	[REDACTED]
42	Tornado	[REDACTED]
43	Pollution - environmental injustice hot spots	[REDACTED]
44	Infrastructure Failure - Water Systems	[REDACTED]
45	cybersecurity intrusion	[REDACTED]
46	Public Health Emergencies	[REDACTED]
47	utility failure	[REDACTED]
48	Civil Unrest	[REDACTED]
49	roads/infrastructure	[REDACTED]
50	Communication	[REDACTED]
51	Acute HazMat Incident (large scale fire/explosion)	[REDACTED]
52	Winter Weather Hazards	[REDACTED]
53	Infrastructure	[REDACTED]
54	Civil Unrest	[REDACTED]
55	Infrastructure Failure	[REDACTED]
56	Natural disaster	[REDACTED]
57	Winter Storm	[REDACTED]
58	Communications Failure	[REDACTED]
59	Public Health Emergency	[REDACTED]

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

60	Infrastructure Failure - Electrical, Water	
61	Flooding	
62	Flooding	
63	keeping police fully funded	
64	active shooter	
65	Tornados	
66	drought	
67	Flooding	
68	Active Shooter	
69	flood	
70	flooding	
71	Flooding	
72	Flooding	
73	Cybersecurity Intrusion	
74	Civil Unrest/ Domestic Terrorism	
75	Public Health Emergencies	
76	Infrastrure; water/sewer, bridge/roads	
77	N/A	
78	same	
79	Tornados	
80	Chemical Transpotation	
81	Flooding	
82	Infrastructure failures	
83	Flooding (Rivers)	
84	electrical system disruption	
85	Flooding - High River Levels	
86	Cybersecurity	
87	Infrastructure Failure - Sanitary	
88	Widespread flooding	
89	Infrastructure failure communications	
90	Tornado	
91	Extreme Weather	
92	Pendemic	
93	Civil Unrest	
94	Flooding	
95	Civil Unrest	
96	Severe Thunderstorms - High Winds	
97	Infrastructure Failure - Water	

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

98	Infrastructure Failure	
99	Tornados	
100	Public Health Emergency	
101	communications	
102	extreme weather events	
103	Hazmat Incidents	
104	Cyber Attack	
105	Cyber intrusion	
106	High Winds	
107	transportation	
108	public health	
109	Failover back up power	
110	flooding	
111	Severe Weather	
112	Flooding	
113	severe weather	
114	Communications	
#	CHOICE 3	DATE
1	Safety from Criminal Activity	
2	Hazmat - Transportation	
3	Pandemic	
4	EXTREME WEATHER	
5	supply chain disruptions -> civil unrest	
6	Cyber infrastructure failure	
7	pandemic	
8	Anything that would impact our building, land and congregation	
9	Infrastructure- bridges	
10	Public health emergencies	
11	Pandemic	
12	Severe Weather	
13	pandemic	
14	infrastructure	
15	Shoreline erosion/flooding	
16	Intrastructure/transportation/supply chain	
17	Mass Shootings	
18	Public Health	
19	Flooding	
20	Supply chain disruption	

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

Publication Date:

21	Infrastructure failure - water system	[REDACTED]
22	Infrastructure Failure - Water	[REDACTED]
23	Flooding	[REDACTED]
24	Infrastructure Failure - Water System	[REDACTED]
25	Public Health Emergencies	[REDACTED]
26	Traffic chemicals	[REDACTED]
27	Meeting peoples' basic needs for living	[REDACTED]
28	Highway	[REDACTED]
29	Public health preparedness	[REDACTED]
30	Transporation based hazmat incidents (roadways)	[REDACTED]
31	Civil Unrest	[REDACTED]
32	Public Health emergency	[REDACTED]
33	Civil unrest mitigation	[REDACTED]
34	Winter Hazards	[REDACTED]
35	Weather	[REDACTED]
36	Natural disaster	[REDACTED]
37	flooding	[REDACTED]
38	Flooding (all types)	[REDACTED]
39	Electrical Grid Failure	[REDACTED]
40	Hazmat	[REDACTED]
41	Weather	[REDACTED]
42	Infrastructure failure	[REDACTED]
43	Water Infrastructure Failure	[REDACTED]
44	Climate Change	[REDACTED]
45	Infrastructure Failure - Communications	[REDACTED]
46	winter hazzards	[REDACTED]
47	Terrorism	[REDACTED]
48	cybersecurity	[REDACTED]
49	Public Health	[REDACTED]
50	tornado	[REDACTED]
51	Flooding	[REDACTED]
52	Sustained power outage/communications disruption (especially winter)	[REDACTED]
53	Civil Unrest	[REDACTED]
54	PFOS	[REDACTED]
55	Flooding	[REDACTED]
56	Tornadoes	[REDACTED]
57	Terrorism	[REDACTED]
58	Tornado	[REDACTED]

REDACTED FOR PUBLIC VIEW

59	Electrical Failure	
60	Flooding	
61	Cyber Security	
62	severe storms	
63	Terrorism/Sabotage	
64	power grid - vulnerability	
65	cyber	
66	Hazmat - individual site	
67	public health	
68	Cyber intrusion	
69	Transportation-Air	
70	infrastructure	
71	Civil Unrest	
72	Supply Chain Disruption	
73	Climate Change	
74	Critical Infrastructure Failure	
75	Flooding - high river levels	
76	Natural hazards	
77	N/A	
78	same	
79	Severe Thunderstorms/Straight Line Winds	
80	Tornado	
81	Cyber Crime	
82	Criminal Acts/Assailant	
83	Public health	
84	theft and invasion	
85	Climate Change	
86	Infrastructure Failure	
87	Infrastructure Failure - Water	
88	Simultaneous terrorist attacks	
89	Supply chain disruption.	
90	Flood	
91	Infrastructure - Electrical	
92	Flooding	
93	Active Shooter Event	
94	Airplane Crash	
95	Infrastructure failure	
96	Hazmat Incidents - Transportation	

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

97	Cyberterrorism	
98	Weather	
99	Public Health Emergney	
100	Infrastructure- energy	
101	natural disasters	
102	blackouts with power or internet	
103	Flooding	
104	Active Assailant	
105	Hazmat release	
106	Sleet, Ice	
107	communications	
108	flooding	
109	early warning systems	
110	infrastructure-electricity	
111	Technology Hacking	
112	Civil Disturbance	
113	groundwater	
114	River Flooding	
#	PLEASE STATE YOUR JURISDICTION - KENT, OTTAWA OR CITY OF GR	DATE
1	Ottawa	
2	Ottawa	
3	Ottawa	
4	OTTAWA	
5	Ottawa	
6	Kent	
7	Ottawa	
8	Ottawa County	
9	Ottawa	
10	Ottawa County	
11	Ottawa	
12	Kent	
13	Ottawa county	
14	Ottawa County	
15	Ottawa	
16	Kent	
17	Ottawa	
18	Ottawa	
19	Ottawa County	

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

20	Ottawa County	[REDACTED]
21	Ottawa County	[REDACTED]
22	Ottawa County	[REDACTED]
23	Ottawa Co	[REDACTED]
24	Ottawa	[REDACTED]
25	GR	[REDACTED]
26	Ottawa	[REDACTED]
27	Ottawa	[REDACTED]
28	Ottawa	[REDACTED]
29	Ottawa	[REDACTED]
30	Ottawa	[REDACTED]
31	Ottawa	[REDACTED]
32	Ottawa	[REDACTED]
33	Ottawa County	[REDACTED]
34	Ottawa	[REDACTED]
35	Ottawa	[REDACTED]
36	Ottawa	[REDACTED]
37	Ottawa county	[REDACTED]
38	Ottawa	[REDACTED]
39	All	[REDACTED]
40	Kent County, Ottawa County	[REDACTED]
41	Ottawa	[REDACTED]
42	Kent	[REDACTED]
43	City of Grand Rapids	[REDACTED]
44	Ottawa	[REDACTED]
45	Ottawa	[REDACTED]
46	Ottawa	[REDACTED]
47	Ottawa	[REDACTED]
48	Ottawa	[REDACTED]
49	ottawa	[REDACTED]
50	Ottawa	[REDACTED]
51	Kent County	[REDACTED]
52	State-wide	[REDACTED]
53	City of Grand Rapids	[REDACTED]
54	Kent	[REDACTED]
55	Kent County7	[REDACTED]
56	Kent	[REDACTED]
57	City of Grand Rapids	[REDACTED]

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

58	Kent County	[REDACTED]
59	City of GR	[REDACTED]
60	Ottawa	[REDACTED]
61	Ottawa	[REDACTED]
62	Ottawa	[REDACTED]
63	Ottawa	[REDACTED]
64	Ottawa County	[REDACTED]
65	Ottawa	[REDACTED]
66	Ottawa	[REDACTED]
67	Kent County	[REDACTED]
68	kent	[REDACTED]
69	gas pipeline accident	[REDACTED]
70	Kent	[REDACTED]
71	Kent County	[REDACTED]
72	Ottawa	[REDACTED]
73	Kent	[REDACTED]
74	Ottawa	[REDACTED]
75	City of Ferrysburg	[REDACTED]
76	Federal	[REDACTED]
77	same	[REDACTED]
78	Kent County	[REDACTED]
79	Kent	[REDACTED]
80	Ottawa County	[REDACTED]
81	Kent	[REDACTED]
82	City of Grand Rapids	[REDACTED]
83	Ottawa	[REDACTED]
84	City of Grand Rapids	[REDACTED]
85	Kent	[REDACTED]
86	Grand Haven	[REDACTED]
87	Kent	[REDACTED]
88	Kent	[REDACTED]
89	Ottawa = Allendale, Kent = Grand Rapids	[REDACTED]
90	Jamestown Charter Township	[REDACTED]
91	Ottawa	[REDACTED]
92	Kent	[REDACTED]
93	City of Grand Rapids	[REDACTED]
94	Ottawa	[REDACTED]
95	City of GR	[REDACTED]

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

96	Ottawa	
97	Ottawa	
98	Grattan	
99	Grand Haven/NW Ottawa county	
100	Kent and Ottawa County	
101	Ottawa	
102	City of GR	
103	Ottawa	
104	chester twp ottawa county	
105	Kent County	
106	Ottawa	
107	Ottawa County	
108	Ottawa County	
109	Ottawa County	
110	Ottawa	
111	Grand Rapids	

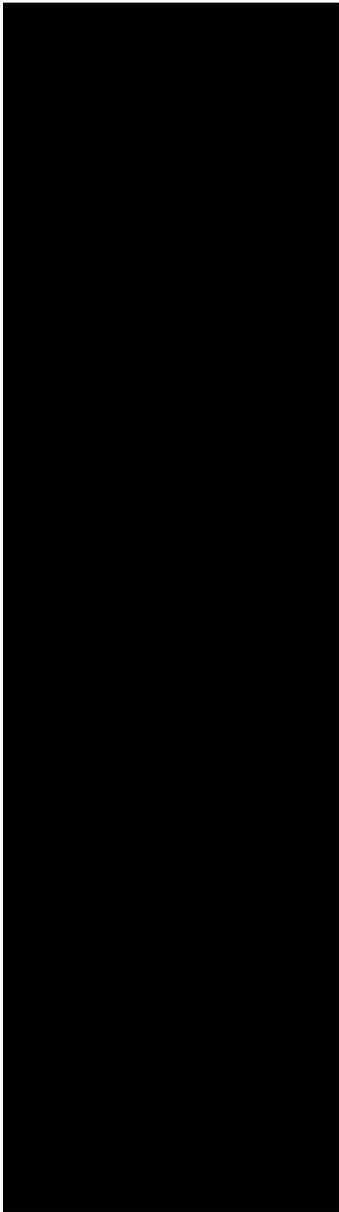
REDACTED FOR PUBLIC VIEW

Q11 Based on the hazards mentioned in previous questions, what are the top three (3) priority hazards for Kent and Ottawa Counties AND the City of Grand Rapids to address collectively? (Please list the most important first)

Answered: 119 Skipped: 11

ANSWER CHOICES	RESPONSES	
Choice 1	100.00%	119
Choice 2	98.32%	117
Choice 3	96.64%	115

#	CHOICE 1	DATE
1	Public Health ie. pandemic etc.	
2	Infrastructure - Bridges, Roads, Etc.	
3	Storms	
4	CYBER INFRASTRUCTURE PENETRATION AND COMPROMISE	
5	climate change	
6	Climate change	
7	infrastructure damage/disruptions	
8	Anything that would impact our building, land and congregation	
9	Water	
10	Flooding of the river	
11	Pandemic	
12	Infrastructure	
13	Pandemic	
14	Climate Change	
15	Cyber security	
16	Water system failure	
17	Climate Change	
18	Climate Change	
19	Pandemic	
20	Civil unrest	
21	Climate Change	
22	Pandemic	
23	winter storms	
24	Public Health - Pandemics	
25	Public Health Emergencies	



REDACTED FOR PUBLIC VIEW

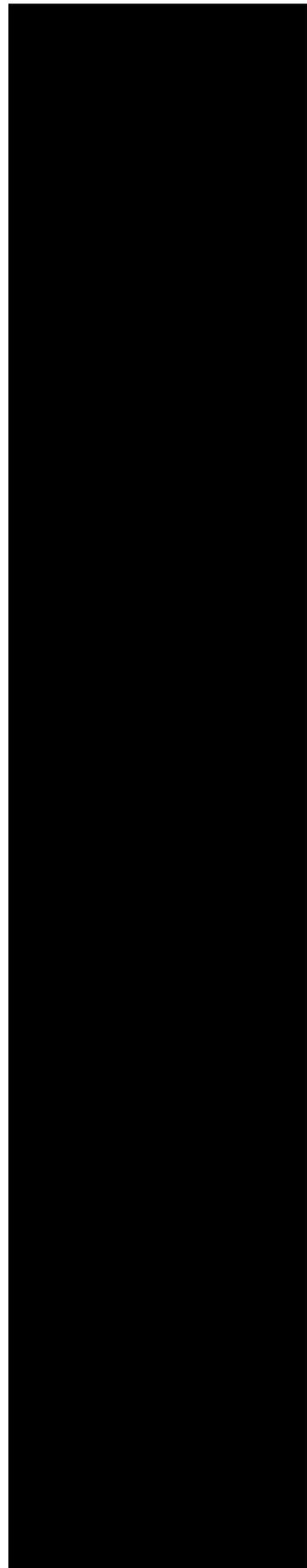
REDACTED FOR PUBLIC VIEW

26	Ammonia
27	Climate Change
28	Weather
29	Severe weather
30	Ice Storm
31	Flooding rivers, lakeshore
32	Cyber security
33	Transportation all hazardous materials through urban settings
34	Infrastructure Failure - Power
35	Pandemic
36	Crime
37	transportation infrastructure
38	Extreme weather (hot / cold)
39	Government Overreach
40	Public health
41	Cyber Security
42	Public health emergency
43	See #10
44	Structural Racism - having couregous leadership to change our policies and practices.
45	Winter Hazards - Snow & Ice
46	Public health emergencies
47	Natural Disaster
48	flooding
49	Infrastructure Failure - Communications
50	civil unrest
51	hazmat
52	Public Health Emergency - Contaminated municipal water supply (ie bio-terrorism)
53	Flooding - Riverine
54	Drinking water
55	Civil Unrest
56	Pandemic
57	same
58	Flooding
59	Winter Weather
60	Climate Change
61	Severe Weather - High Winds, Tornado
62	River flooding
63	Cybersecurity

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

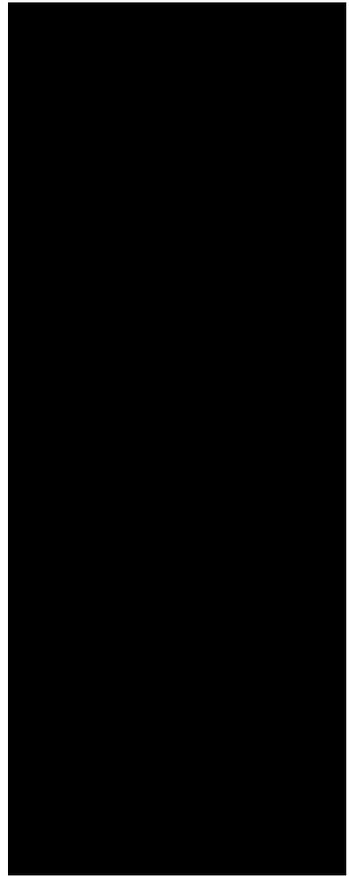
64	Hazmat Fixed
65	civil unrest
66	flooding
67	Supply chain disruptions
68	climate change
69	Pandemic
70	Active Shooter
71	tornado
72	tornadoes
73	Flooding
74	Mass Shootins
75	Public Health Emergencies
76	Pandemics/ Community Health
77	Public Health Emergencies
78	Flooding; coastal/rivers
79	Active Shooter
80	pandemic
81	Flooding
82	Flooding
83	Extreme Weather
84	Infrastructure failures
85	Extreme weather
86	weather extremes
87	Public Health Emergencies
88	Don't have a priority
89	Climate Change
90	Infrastructure Failure - Energy
91	Widespread severe thunderstorm and wind event
92	Infrastructure failure communications
93	Mass Shooting
94	Hazmat - Transportation
95	Flooding
96	Winter Weather
97	Tornado
98	Flooding
99	Public Health Emergencies
100	Infrastructure Failure - Electrical
101	Pandemic



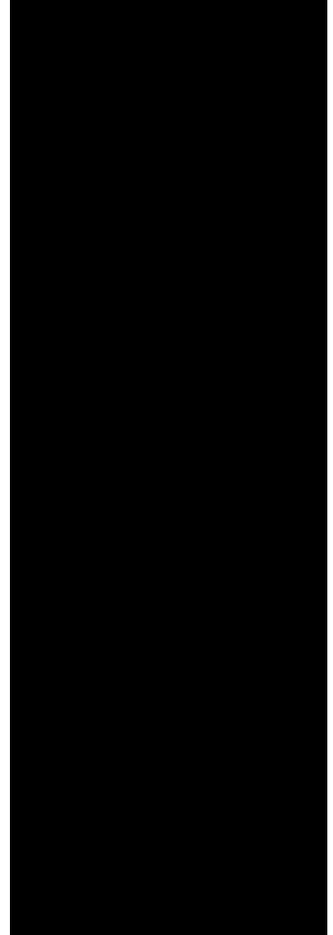
REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

102	Public Health Emergencies
103	infrastructure failure water electric communcations
104	Flooding
105	pandemic
106	Safety of water supply
107	Transportation by Rail
108	Civil disturbance
109	Cyber Attack
110	Cyber intrusion
111	Tornado
112	public health
113	supply chain
114	Infrastructure (Communications)
115	pandemic
116	Climate Change
117	Severe Weather
118	Climate Change
119	Publich Health
#	CHOICE 2
1	Clean safe drinking water
2	Infrastructure - Water System
3	Pandemic
4	EXTREME WEATHER
5	infrastructure failure - energy -> communications
6	Public Health (pandemic/epidemic)
7	cyber security
8	Anything that would impact our building, land and congregation
9	Transportation
10	Severe thunderstorms with high wind
11	Crime
12	Flooding
13	Transportation/roads
14	Infrastructure
15	Weather - especially winter (power outages, transportation delays, etc.)
16	Water system/sanitary sewer system failure
17	Civil Disturbance
18	Road Infrastucture
19	Infrastructure Failure - Loss of Power



DATE



REDACTED FOR PUBLIC VIEW

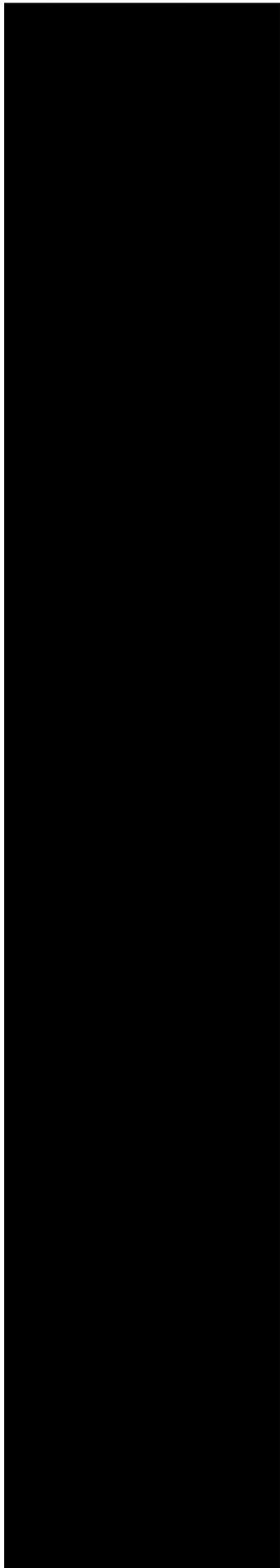
REDACTED FOR PUBLIC VIEW

20	Supply chain disruption
21	Flooding
22	Infrastructure Failure - Water
23	Severe weather
24	Infrastructure Failure - roadways, Bridges
25	Severe thunderstorms, lightning and hail
26	Train hazards
27	Infrastructure
28	Highways
29	Flooding
30	Tornados and straight line wind gusts equal to a tornado
31	Chemicals, fixed sites and transportation
32	Infrastructure failure
33	Civil unrest mitigation and relationship building
34	Infrastructure Failure - Communications
35	Weather
36	Floodind
37	energy
38	Public Health emergency
39	Tornado
40	Weather related
41	Active Shooter
42	Climate change
43	Pollution - enviro standards, natural mediation (tree canopy), etc.
44	Flooding - High River Levels
45	cybersecurity intrusions
46	Public Health Emergenies
47	utillity failure
48	Public Health
49	roads/infrastructur
50	communication
51	Acute HazMat Incident (large scale fire/explosion)
52	Transportation - Roads & Highways
53	solid waste
54	Criminal Activity
55	Infrastructure Failure
56	Same
57	Winter Storm

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

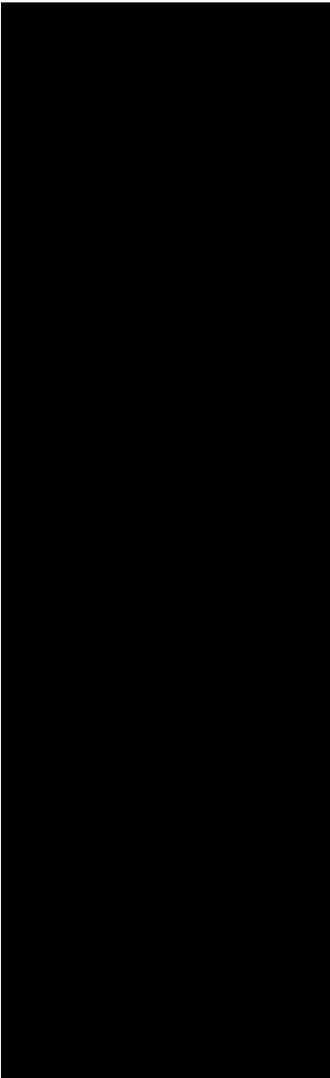
58	Communications Failure
59	Public Health Emergencies
60	Infrastructure Failure - Electrical, Water
61	IT systems
62	flooding
63	Flooding
64	keeping police fully funded
65	civil disturbance - active shooter
66	Public health emergencies
67	Public Health
68	Infrastructure
69	Tornadoes (multiple areas)
70	flood
71	flooding
72	HAZMAT
73	Flooding
74	Cybersecurity Intrusion
75	Critical Infrastructure Failure
76	Winter hazards
77	Infrastrure; water/sewer
78	Severe weather
79	cyber
80	Tornados
81	Chemical Transportation
82	Flooding
83	Flooding
84	Flooding
85	electrical infrastructure
86	Climate Change
87	Flooding - riverine
88	Infrastructure Failure - Sanitary
89	Flooding
90	supply chain
91	Tornado
92	Civil Protest
93	Power Outage
94	Civil Unrest
95	Flooding



REDACTED FOR PUBLIC VIEW

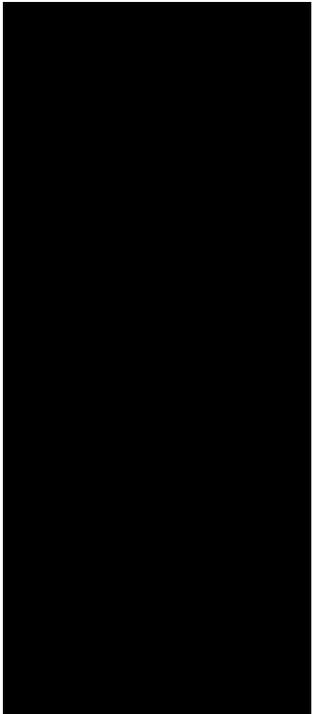
REDACTED FOR PUBLIC VIEW

96	Civil Unrest
97	Flooding - Riverline and Shoreline
98	Infrastructure Failure - Water
99	Infrastructure Failure
100	Flooding
101	flooding
102	Public Health Emergency
103	Communications
104	ability to quickly respond to natural disasters within county
105	Hazmat Incidents
106	Communications failure
107	Severe Weather
108	Severe weather
109	Ice, sleet
110	infrastructure roads
111	infrastructure
112	regional power grid
113	flooding
114	Flooding
115	Flooding
116	Severe Weather
117	Communciations



#	CHOICE 3
1	Safety from Criminal Activity
2	Civil Unrest
3	PHYSICAL INFRASTRUCTURE FAILURE
4	supply chain disruptions -> civil unrest
5	Cyber infrastructure failure
6	pandemic
7	Anything that would impact our building, land and congregation
8	Infrastructure - bridges
9	Weapons of mass destruction
10	Fire
11	Severe Weathere
12	Flood
13	Public Health
14	Shoreline erosion/flooding
15	infrastructure/transportation/supply chain

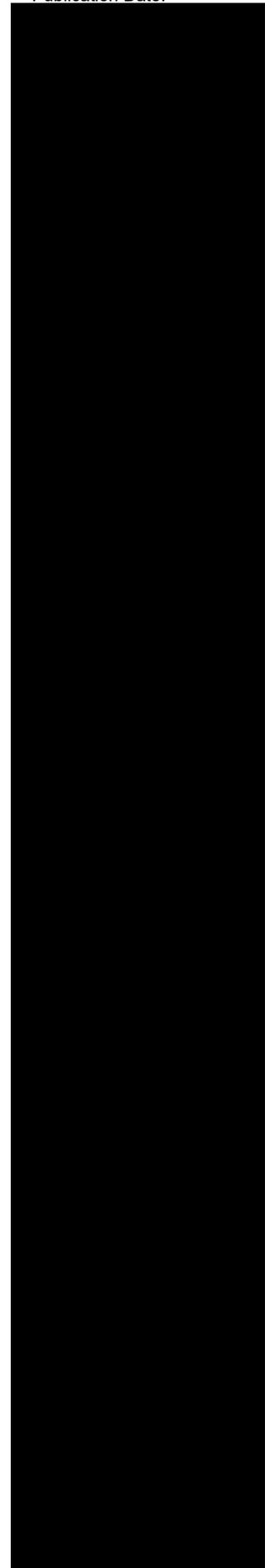
DATE



REDACTED FOR PUBLIC VIEW

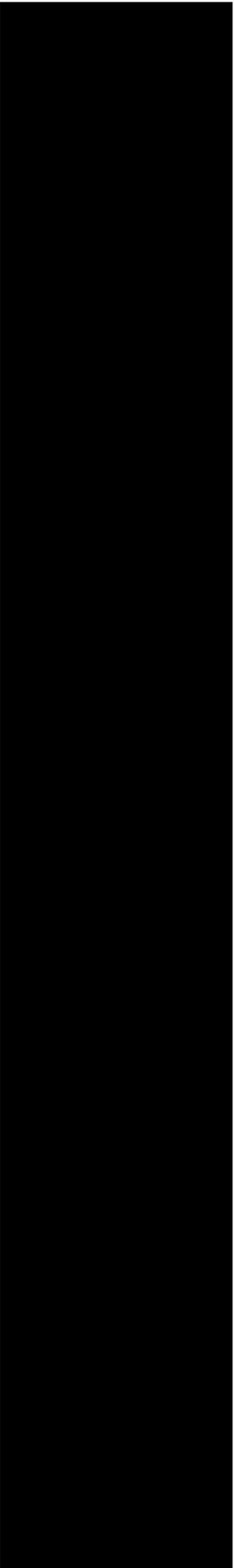
REDACTED FOR PUBLIC VIEW

16	Flooding
17	Public Health
18	Flooding
19	Pandemic
20	Infrastructure failure - water system
21	Civil Unrest
22	flooding
23	Infrastructure Failure - Water System
24	terrorism
25	Farm hazards
26	Meeting peoples' basic living needs.
27	Flooding
28	Public health preparedness
29	Transportation based Hazmat incident (roadways)
30	Pandemic Covid-19
31	Public health
32	Securing our utilities and pipelines
33	Supply Chain Disruptions
34	Fire
35	Pandema
36	flooding
37	Flooding (all types)
38	Electrical Grid Failure
39	Hazmat
40	Weather
41	Infrastructure failure
42	Reduce carbon footprint, embrace solar power, etc.
43	Severe Thunderstorm - High winds
44	winter hazzards
45	Civil Unrest
46	transportation
47	Flooding
48	tornado
49	flooding
50	Sustained power outage/communications disruption (especially winter)
51	Public Health
52	technology infrastructure
53	Severe Weather



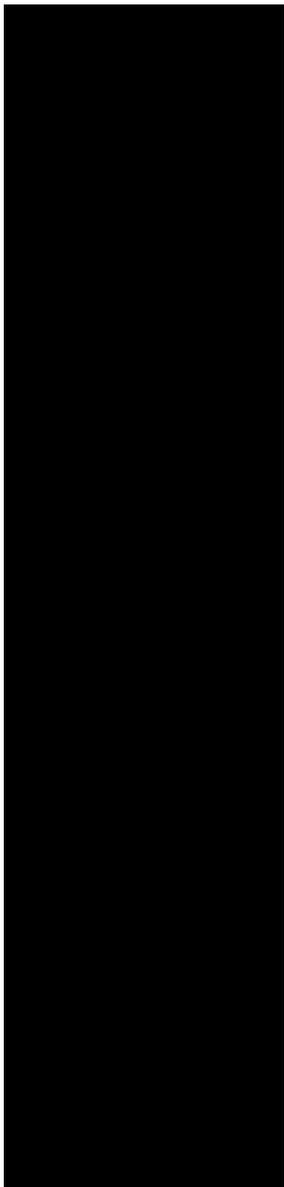
REDACTED FOR PUBLIC VIEW

54	Loss of communication
55	Same
56	Tornado
57	Electrical Failure
58	Flooding
59	Cyber Security
60	Climate change
61	sever storms
62	Terrorism/Sabotage
63	stopping BLM and Antifa movements - these are NOT healthy
64	cyber
65	Infrastructure - electrical
66	Infrastructure failure
67	Flooding
68	infrastructure
69	civil unrest
70	Civil Unrest
71	Supply Chain Disruption
72	Climate Change
73	Flooding of rivers and streams
74	Flooding
75	Infrastructure
76	Hazmat
77	infrastructure
78	Severe Thunderstorms/Straight Line Winds
79	Tornado
80	Pandemic
81	Criminal Acts/Assailant
82	Public health
83	transportation - roads
84	Infrastructure Failure (Roads, etc.)
85	Cybersecurity
86	Infrastructure Failure - Water
87	Simultaneous acts of terrorism
88	Criminal acts / mass shootings
89	Flood
90	Flooding - River
91	Pandemic



REDACTED FOR PUBLIC VIEW

92	MCI/Active Shooter
93	Airplane Crash
94	Infrastructure failure
95	Hazmat Incidents - Transportation
96	Cyberterrorism
97	Weather
98	Public Unrest
99	weather related
100	Infrastructure -energy
101	natural disasters
102	redundant power supply as well as wireless access
103	Flooding
104	Water system failure
105	Critical Infrastructure (Communications & Energy) Failure
106	Infrastructure failure-comms
107	civil unrest
108	infrastructure energy
109	public health
110	Winter storms
111	infrastructure
112	Misinformation
113	Civil Disturbance
114	Flooding
115	Hazmat Incidents



Agenda

Date: April 19, 2021

**RE: Workshop #1
Kent & Ottawa County Hazard Mitigation Plan Update (ASTI File No. 11772)**

Meeting Objectives: Review HMP Purpose and Process, Hazard Identification & Prioritization

1. **Introductions**
2. **The Function of a Hazard Mitigation Plan**
3. **Overview of the Planning Process**
4. **Overview of 2017 Plan**
5. **Confirm Goals**
6. **Update the Plan - Review & Rank Hazardous Events**
7. **Identify Vulnerable Assets**
8. **Is 7 a homework question(s)?**
9. **Next Survey - suggest general timeline**
10. **Next Workshop - identify any conflicts in general timeline**

MEMO

ASTI Environmental

Date: May 11, 2021
To: Kent & Ottawa Counties & Grand Rapids Advisory Committee
From: ASTI Environmental
Subject: MEETING SUMMARY, 1ST Hazard Mitigation Plan Update WORKSHOP, HELD APRIL 19, 2021

Kent & Ottawa Counties Hazard Mitigation Plan Update

1st Hazard Mitigation Update Workshop
via Zoom

April 19, 2021

Workshop began at 9 a.m.

Attendees (see attached Zoom chat sign-in)

32 individuals representing 23 community departments/organizations, including 7 municipalities, attended the first workshop.

Presentation

- Attendees introduced themselves in the Zoom chat and as they spoke throughout the workshop
- Kera Sharpe, Project Manager for ASTI Environmental, welcomed everyone and thanked everyone for participating in the workshop
- Paul Rentschler, ASTI Environmental, presented a slideshow describing the purposes of, and process for, updating the Counties' Hazard Mitigation Plan (HMP) (please see attached Workshop Presentation)

Main objectives of the HMP Update

- To identify ways to prevent or minimize the loss of life, injuries, or damage to property in the vent of future disasters or emergencies,
- Develop a FEMA approved plan update so that Kent and Ottawa County communities may maintain eligibility for pre-disaster hazard mitigation funding.

The list of hazards to be considered in the planning process include:

Natural Hazards

- Celestial Impact
- Climate Change
- Drought
- Earthquake
- Extreme Temperatures – Hot or Cold
- Flooding & Erosion – Riverine or Lakeshore/Coastal
- Fog
- Invasive Species
- Severe Wind and Tornadoes
- Subsidence - Natural
- Thunderstorms – incl. Hail, Sleet, Lightning

- Wildfire
- Winter Weather – Ice, Sleet, Snowstorms
- Petroleum and Natural Gas Pipeline Accidents
- Subsidence – Mining or Technical/Infrastructure

Technological Hazards

- Fire – Structural or Tires
- Flooding - Dam Failure
- Flooding – Urban/Stormwater
- Hazmat Incidents - Transportation or Fixed Site
- Infrastructure Failure - Bridges, Roads, Overpasses
- Infrastructure Failure - Communications
- Infrastructure Failure - Electrical Systems
- Infrastructure Failure - Sanitary Sewer System
- Infrastructure Failure - Storm Sewer System
- Infrastructure Failure - Structural Collapse
- Infrastructure Failure - Water System
- Nuclear Power Plant Accidents
- Oil and Gas Well or Pipeline Accidents

Human Hazards

- Catastrophic Events/National Emergencies
- Civil Disturbance
- Criminal Acts - Vandalism and Arson
- Criminal Acts - Mass Shootings/Active Assailant(s)
- Information Technology Intrusion
- Gas/Oil Shortages or Supply Disruptions
- Public Health Emergencies – Pandemics, Epidemics, Contaminated Food/Water
- Terrorism/Sabotage/Violent Extremism
- Transportation Accidents – incl. Air, Hwy/Roads, Marine, & Rail
- Weapons of Mass Destruction

During discussions, workshop participants recommended several existing plans for sustainability, climate change efforts, and goals for making sure hazard mitigation strategies addressed concerns surrounding equity. Those reports and studies mentioned included the following:

- City of Grand Rapids Climate Resiliency Report
- City of Grand Rapids Strategic Plan
- City of Grand Rapids Stormwater Vulnerability Assessment
- City of Grand Rapids Stormwater Master Plan
- City of Grand Rapids Parks & Recreation Strategic Master Plan
- City of Grand Rapids Demographic Statement
- City of Grand Rapids Dashboard
- Kent County Strategic Plan

Hazard history frequency information from the 2019 Michigan Hazard Assessment were compared to priorities from the 2017 Kent/Ottawa HMP and the results of the survey taken prior to the first workshop (slide #41). Participants were asked to discuss whether the 2021 survey results represented the top hazards for the two-county area or whether changes needed to be made.

It was noted that the Michigan Department of Health & Human Services has identified respiratory conditions, heat illness, waterborne diseases, vector-borne diseases, and physical and mental health impacts as the state's priority climate-related health impacts.

City representatives wished to make sure that civil unrest, terrorism, and equity issues are noted as concerns.

While discussing goals of the Plan, it became evident that the City, through its various initiatives and focus statements, note and place greater emphasis on inclusion and equity, and in disaggregating available data by race, ethnicity, gender/gender identity than do the counties. Although the HMP is to be developed as a single document for both counties, it should reflect these differences by geographic and/or demographic targeting of the proposed mitigation strategies.

Climate change and equity concerns were deemed to be larger issues outside of the individual hazards and were noted as parking lot issues for later discussion.

The online survey taken prior to the first workshop, noted the following hazards as priorities:

2021 HMP Priority Hazards (from survey & subsequent discussion)

- Public Health Emergencies (Epidemic, Pandemic, Contaminated Food/Water)
- Infrastructure Failure (Transportation, Sanitary/Storm Sewers, Water, Gas/Oil, Electric)
- Infrastructure Failure (Communications & Internet)
- Flooding & Erosion (Riverine & Shoreline)
- Winter Weather (Snow, Ice, Sleet)
- Severe Summer Weather (High Winds, Thunderstorms, Lightning)
- Extreme Temperatures (Hot/Cold)
- Cyber Security Intrusion
- Supply Chain Disruptions (Oil/Gas, etc.)
- Criminal Acts (Active Assailant(s)/Mass Shootings)
- Civil Unrest

To begin prioritizing this list of hazards, the following four factors were compared and scored relative to one another as weighting criteria.

Ranking Criteria For Hazards

2021 Plan Update Meeting Results

	Response & Recovery Difficulty	Infrastructure Failure	Loss of Life and Injury	# of People Impacted	Sum
Response & Recovery Difficulty		4	1	2	7
Infrastructure Failure	2		1	2	5
Loss of Life and Injury	5	5		4	14
# of People Impacted	4	4	2		10

With respect to the criterion, the importance of one item to the other is;
5 = much greater
4 = greater than
3 = the same as
2 = lower than
1 = much lower

Time allocated for the workshop ended before we were able to complete prioritizing the hazards noted above. As such, this will be done through a short survey dedicated to this particular task.

The workshop was adjourned at noon.

Workshop 1: April 19, 2021

Hazard Mitigation Plan Update



Meeting Agenda



1. Introductions
2. The Function of a Hazard Mitigation Plan
3. Overview of the Planning Process
4. Overview of 2017 Plan
5. Update the Plan - Confirm Goals
6. Update the Plan - Review & Rank Hazards
7. First Public Meetings
8. Next Survey
9. Identify Vulnerable Assets
10. Next Workshop

Confidentiality



Contact Information Confidential
But You Will Be Listed in the Plan
Workshop Sources Confidential
Secure Version of Final Document
Critical Assets
Critical Infrastructure

Poll Questions 1 & 2

Hazard Mitigation Plan Update



Teams

Project Team

Kent County

Ottawa County

City of Grand Rapids

ASTI Environmental

Advisory Committee

Local Communities

Other Stakeholders/Public

ASTI Environmental

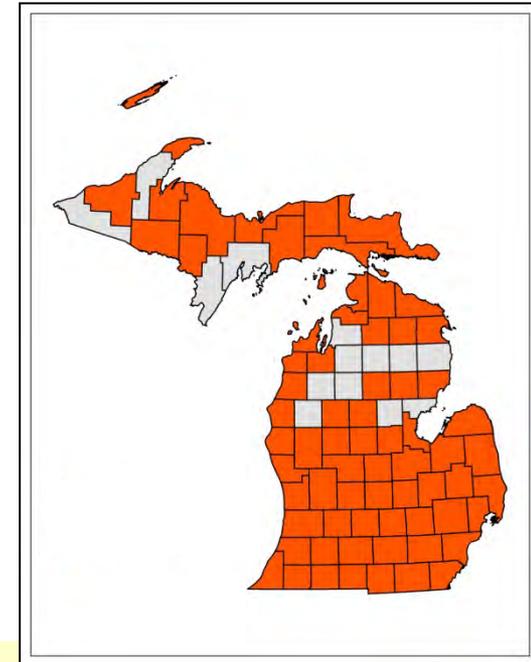
Established in 1985
Over 90% Repeat/Referral
Over 11,000 projects in the United States
Projects in Canada, Mexico and the
Czech Republic

1.800.395.2784 • www.asti-env.com

Investigations • Compliance
Remediation • Restoration



Project Locations



Michigan Offices: Detroit, Grand Rapids, Brighton

ASTI Environmental

Investigation



Restoration



Remediation



Compliance



Contact Information

Kera Sharpe

Project Manager

10448 Citation, Suite 100

Brighton, Michigan 48116

Phone 810.225.2800

Fax 810.225.3800

ksharpe@asti-env.com

Advisory Committee

County & City Departments

Local Communities

Schools/Universities

Industry/Businesses

Health Care

Utilities

Community Reps

59 Communities

- Emergency Management Coordinators
- Elected Officials
- Fire & Police Personnel
- Public Works Personnel
- Planners
- Other Local Leaders/Stakeholders

Stakeholders

Adjacent Communities

Industry and Business

Non-Government Organizations

Interested Individuals

Hazard Mitigation Plans



What is an HMP?

A Hazard Mitigation Plan (HMP)
will...

- identify hazards in the community,
- evaluate and highlight those hazards,
- provide mitigation alternatives

What is an HMP?

The objectives of a Plan are to;

- reduce risks from natural, human, and technological hazards by focusing on those hazards,
- provide guidance when committing resources that will reduce the effects of hazards, and
- **provide a basis for technical assistance and funding**

What is a HMP?

The Plan must comply with:

- the Disaster Mitigation Act of 2000,
- the Emergency Management Act,
- FEMA and Michigan Department of State Police guidance documents,
- and all applicable federal, state, and local regulations.

What is an HMP?

The Plan is only a part of the emergency planning, mitigation, preparedness, response, and recovery process. Must coordinate with:

- All existing plans and programs
- **Existing Plans can be included in the Final HMP by reference**

Why Prepare A Plan?



To save lives and protect property



To preserve and protect an area's environment and economy



To preserve and maintain an area's essential services and quality of life

Why Prepare A Plan?

To provide information to citizens, businesses, and officials (including future emergency managers), for

- Planning
- Economic development
- Project development decisions
- Emergency management

Why Prepare A Plan?

To support hazard mitigation project implementation and **funding.**

- Identifies specific hazards
- Identifies specific vulnerabilities
- Documents mitigation options
- Demonstrates community involvement and support

The Process

Prepare hazard history and
community profiles

Identify significant hazards and
risks

Identify specific vulnerabilities

The Process

Identify hazard mitigation goals and objectives

Suggest strategies to achieve mitigation goals and objectives

Evaluate strategies using locally chosen criteria

Select feasible strategies based on evaluation criteria

The Process

Propose specific action steps that
will achieve desired objectives

Prepare the plan

FEMA review & approval

Adopt the plan

Implement the plan

Monitor and update the plan

Questions?

Break: 10 Minutes

Hazard Mitigation Plan Update



Current HMP for Kent & Ottawa Counties (2017)



Hazards Evaluated (2017)

24 Hazards Evaluated

Primarily Natural & Infrastructure-Related

Included: Intentional Acts (terrorism, crime, civil unrest, etc.)

Priority Hazards 2017

High:

- Communication/Cyber Failure
- Electrical Failure
- Tornado
- Riverine Flooding
- Thunderstorm Hazards
- Urban Flooding
- Severe Winter Weather

Low

- Drought
- Earthquake
- Fire & Wildfires
- Nuclear Power Plant Accident
- Shoreline Flooding/Erosion
- Landslide

Medium:

- Climate Change
- Extreme Temperatures
- Urban/Structural Fire
- Dam Failure
- Intentional Acts
- Transportation Accidents
- Hazardous Materials Releases
- Water System Failure
- Epidemic
- Sanitary Sewer System Failure
- Extreme Temperatures
- Public Health Hazards

Risk Assessment Criteria

<u>Criteria</u>	<u>Weight</u>
Historical Occurrence	12
Seriously Affected Population	11
Collateral Damage	10
Population Impact	9
Economic Effects	8
Affected Area	7
Duration	6
Availability of Warning	5
Speed of Onset	4
Seasonal Pattern	3
Predictability	2
Mitigation Potential	1

Priority Hazards 2017

Top Ten Hazards (following Risk Assessment analysis)

• Severe Winter Weather	68.8
• Electrical Failure	60.7
• Tornadoes	53.8
• Riverine Flooding	52.6
• Cyber/Communications Failure	52.1
• Thunderstorms	50.9
• Urban Flooding	47.4
• Intentional Acts	47.0
• Transportation Accidents	44.9
• Hazardous Materials Release(s)	44.9

Priority Hazards 2017

Notable Differences between Communities:

- Dam Failure (higher for Kent Co.)
- Drought (higher outside GR)
- Landslide (slightly higher outside GR)

- Coastal Erosion?
- Civil Unrest?
- Terrorism?

Kent & Ottawa Counties HMP 2021 Update (Workshop #1)



The Heavy Lifting

Identify Goal(s)

Hazard Ranking (Consequence)

Next Steps

Review General HMP Goals

- Saving lives & protecting property
- Preserving & protecting the area's environment & economy
- Preserving & maintaining the area's essential services & quality of life

Review Goals

To retain access to Federal Emergency Management Agency (FEMA) funding for the Counties and their communities by complying with Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165)

Review Goals

To provide a basis for identifying and mitigating hazards that affect the Counties and their communities

Review Goals

To develop a method to
incorporate hazard identification
and mitigation into county and
municipal planning processes

From 2013 Workshops

Review Goals

2017 Goal: To reduce the impact of hazards on citizen life, health and economic well-being based on a continuing hazard risk and vulnerability analysis.

2012 Goals (focus on hazard mitigation actions):

1. Severe Weather – Timely alerts and notification for threatening weather.
2. Flooding – Reduce the number of vulnerable structures in floodplains. Discourage further development of property that would create undue risk.
3. Communication Disruption – Reduce communication downtime.
4. Other hazard mitigation efforts – Consider and seek other cost-effective or convenient hazard mitigation opportunities.

Poll Question 3

Hazard Mitigation Plan Update



Hazards Considered (2021)



Natural – 17 Total

Technological – 17 Total

Human Related – 15 Total

Celestial Impact

Climate Change*

Invasive Species

Landslides**

Subsidence – Natural or Mining/Infrastructure

Catastrophic Events/National Emergencies

Civil Disturbance

Criminal Acts - Arson & Vandalism

Criminal Acts - Mass Shootings/Active Assailant

Cyber Security/Information Technology Intrusion*

Supply Chain Disruptions (gas/oil shortages, PPE, etc.)

Weapons of Mass Destruction

Considerations - Hazards

Post 2001 Emphasis

Terrorism

Weapons of Mass

Destruction

Catastrophic

Events

Post 2015

Flooding

Infrastructure Failure

Subsidence

Pipeline Ruptures

Nuclear Accidents

Post 2020??

Coastal Erosion

Climate Change

Cyber Attacks

Active Assailant(s)

Survey Results – Important or Very

130 Respondents
 37+ Communities/
 Organizations

2021 Survey Rank	% VI or Important
Public Health Emergencies (Pan, Epi, Con F&W)	90.1
Infrastructure Failure (Electric, Gas/Oil, Pipeline)	90.0
Infrastructure Failure (Water)	89.9
Infrastructure Failure (Communications)	89.8
Flooding (Riverine/Shoreline)	87.6
Winter Weather (Snow, Ice, Sleet)	87.5
Cyber Security Intrusion	87.5
Severe Thunderstorms (Hail, Lightning, High Winds)	85.0
Infrastructure Failure (Bridges, Roads, Structures)	84.0
Supply Chain Disruption (Gas/Oil, PPE, etc.)	82.9
Criminal Acts (Mass Shootings/Active Assailant)	81.4
Infrastructure Failure (Sanitary/Storm Sewers)	79.8

Hazard Rankings Comparison

MI Top Categorization	SLP Annual Frequency Rank	Annual Incidents	Annual Deaths	Annual Injuries	Ann. Prop & Crop Damage	2017 Plan Rank	2021 Survey Rank
Floods	Severe Winds ^{K,O}	6.3	0.8	7.7	3,146	Sev. Winter Weather	Public Health Emergencies (Pan, Epi, Con F&W)
Public Health Emergencies	Snowstorms	3.2	0	>0	536	Electrical Failure	Infrastructure Failure (Electric, Gas/Oil, Pipeline)
Oil & Gas Pipeline Incidents	Hail	2.6	0	0.2	11,753	Tornadoes	Infrastructure Failure (Water)
Major Fires/Industrial Incidents	Shoreline Hazards	0.8	0.8	0.4	938	Riverine Flooding	Infrastructure Failure (Communications)
Invasive Species	Flooding ^O	0.7	0.3	0.4	11,782	Cyber/Comm. Failure	Flooding [& Erosion] (Riverine/Shoreline)
Severe Winds	Tornadoes	0.3	0.2	2.6	9,333	Thunderstorms	Winter Weather (Snow, Ice, Sleet)
Tornadoes	Extreme Cold	0.2	0.1	5.7	1,390	Urban Flooding	Cyber Security Intrusion
Infrastructure Failure	Extreme Heat	0.2	0	3.1	---	Intentional Acts	Severe Thunderstorms (Hail, Lightning, High Winds)
Extreme Heat	Lightning	0.2	0.2	2.1	294	Transport. Accidents	Infrastructure Failure (Bridges, Roads, Structures)
Cyber-Attack*	Ice & Sleet Storms	0.2	0	>0	2,949	Haz. Mat. Releases	Supply Chain Disruption (Gas/Oil, PPE, etc.)
Catastrophic Incidents*							Criminal Acts (Mass Shootings/Active Assailant)
Nuclear Attack*							Infrastructure Failure (Sanitary/Storm Sewers)
Terrorism & Similar*							

Kent Severe Winds: \$4,660,112
 Ottawa Severe Winds: \$2,955,566
 Ottawa Flooding: \$2,356,708

Differences Between Counties:
 Floods- Dam Failure (L) Ottawa, (M) Kent
 Coastal Issues - Ottawa
 Civil Unrest concerns - Kent/GR

Missing?
 Tornadoes
 Extreme Temperatures
 Urban Flooding (H)
 Climate Change (M)
 Civil Unrest/Intent. Acts (M)
 Coastal Erosion

Poll Question 4

Hazard Mitigation Plan Update



Poll Question 5

Hazard Mitigation Plan Update



Poll Question 6

Hazard Mitigation Plan Update



Risk Assessment

Analyze threats

$$R = V \times P \times C$$

- vulnerability, probability, consequence

Importance:

Fear \neq Risk

Consequence:

Typical not Worst Case

The End Game: Mitigation \neq Response

Keep in Mind

Decision Assisting Tool
Not A
Decision Making Tool

Poll Question 7

Hazard Mitigation Plan Update



Questions?

Break: 5 Minutes

Hazard Mitigation Plan Update



Switch to Spreadsheets for Risk Assessment

Hazard Mitigation Plan Update



Poll Question 8

Hazard Mitigation Plan Update



MI Top Categorization	SLP Annual Frequency Rank	Annual Incidents	Annual Deaths	Annual Injuries	Ann. Prop & Crop Damage	2017 Plan Rank	2021 Survey Rank	% VI or Important
Floods	Severe Winds ^{K,O}	6.3	0.8	7.7	3,146	Sev. Winter Weather	Public Health Emergencies (Pan, Epi, Con F&W)	90.1
Public Health Emergencies	Snowstorms	3.2	0	>0	536	Electrical Failure	Infrastructure Failure (Electric, Gas/Oil, Pipeline)	90.0
Oil & Gas Pipeline Incidents	Hail	2.6	0	0.2	11,753	Tornadoes	Infrastructure Failure (Water)	89.9
Major Fires/Industrial Incidents	Shoreline Hazards	0.8	0.8	0.4	938	Riverine Flooding	Infrastructure Failure (Communications)	89.8
Invasive Species	Flooding ^O	0.7	0.3	0.4	11,782	Cyber/Comm. Failure	Flooding [& Erosion] (Riverine/Shoreline)	87.6
Severe Winds	Tornadoes	0.3	0.2	2.6	9,333	Thunderstorms	Winter Weather (Snow, Ice, Sleet)	87.5
Tornadoes	Extreme Cold	0.2	0.1	5.7	1,390	Urban Flooding	Cyber Security Intrusion	87.5
Infrastructure Failure	Extreme Heat	0.2	0	3.1	---	Intentional Acts	Severe Thunderstorms (Hail, Lightning, High Winds)	85.0
Extreme Heat	Lightning	0.2	0.2	2.1	294	Transport. Accidents	Infrastructure Failure (Bridges, Roads, Structures)	84.0
Cyber-Attack*	Ice & Sleet Storms	0.2	0	>0	2,949	Haz. Mat. Releases	Supply Chain Disruption (Gas/Oil, PPE, etc.)	82.9
Catastrophic Incidents*							Criminal Acts (Mass Shootings/Active Assailant)	81.4
Nuclear Attack*							Infrastructure Failure (Sanitary/Storm Sewers)	79.8
Terrorism & Similar*								

Kent Severe Winds: \$4,660,112
 Ottawa Severe Winds: \$2,955,566
 Ottawa Flooding: \$2,356,708

Differences Between Counties:
 Floods- Dam Failure (L) Ottawa, (M) Kent
 Coastal Issues - Ottawa
 Civil Unrest concerns - Kent/GR

Missing?
 Tornadoes
 Extreme Temperatures
 Urban Flooding (H)
 Climate Change (M)
 Civil Unrest/Intent. Acts (M)
 Coastal Erosion

09:03:58 From Lance Corey : Lance Corey
09:04:05 From Alison Sutter (she/her) : Alison Sutter, Sustainability and Performance Management Officer, City of GR
09:04:16 From Allison Farole City of Grand Rapids : Allison Farole, City of Grand Rapids, Emergency Manager
09:04:30 From Jenny Kimball James : Jennifer James, Deputy County Administrator, Kent County
09:04:33 From Jason Kelley : Jason Kelley
09:04:33 From Darwin Baas : Dar Baas, Kent County DPW
09:04:34 From Karla Black : Karla Black, Emergency Preparedness Coordinator, Kent County Health Department,
09:04:35 From Lou Hunt-Ottawa Emer. Mgt. : Lou Hunt, Ottawa County Director of Emergency Management
09:04:35 From Pat Staskiewicz : Pat Staskiewicz, Public Utilities Director, Ottawa County Road Commission
09:04:35 From Wayne Jernberg : Wayne Jernberg, Water System Manager, City of Grand Rapids
09:04:50 From Jason Kelley : Jason Kelley, Lieutenant, Kent County Sheriff
09:04:55 From Paul Sachs (Ottawa Co. MI) : Paul Sachs, Director of Planning and Performance Improvement, Ottawa County
09:04:56 From jlehman : John Lehman, Fire Chief City of Grand Rapids
09:05:01 From Matt Groesser - Kent County : Matt Groesser - Emergency Management Coordinator - Kent County
09:05:10 From Michael Morrow : Michael Morrow II, Technical Infrastructure Manager, Ottawa County, Cybersecurity Role
09:05:11 From Lance Corey : Lance Corey, Kent County EMS, MCA Systems Administrator
09:05:18 From Annabelle Wilkinson (she/her) : Annabelle Wilkinson, Sustainability Specialist - City of Grand Rapids
09:05:25 From Josiah Timmermans - Deputy, Ottawa : Josiah Timmermans - Chief Deputy, Ottawa County Water Resources
09:06:30 From Mark Rambo : Mark Rambo, Deputy City Administrator, City of Kentwood
09:07:04 From Tom Byle Video only : Tom Byle, Assistant 't Director of Engineering, Kent County Road Commission
09:07:29 From Sam Peterson Oakfield Fire : Samuel Peterson Fire Chief Oakfield Township Fire Department
09:08:15 From Joe Bush : Joe Bush, Ottawa County Water Resources Commissioner,(or Drain Commissioner)
09:08:52 From Matthew Woolford : Matt Woolford, Equalization Director
09:09:10 From ASTI Environmental : Feel free to post any comments or questions here as well.
09:09:15 From Al Jano : Al Jano Kent County Facilities Management Director
09:09:49 From Mike's iPhone : Mike Lehnertz - foreman- Kent county road commission
09:12:43 From Deb Alderink : Deborah Alderink
09:12:58 From Deb Alderink : Deborah Alderink - LEPC Chair
09:13:09 From Michael Morrow : First time
09:17:39 From Alison Sutter (she/her) : It's dated, but Dec. 2013: Climate

Resiliency Report for GR:

<https://www.grandrapidsmi.gov/files/assets/public/departments/human-resources/office-of-sustainability/reports-and-documents/climate-resiliency-report.pdf>

09:19:18 From Alison Sutter (she/her) : City of GR's Strategic Plan:

<https://www.grandrapidsmi.gov/Government/Departments/Office-of-the-City-Manager/Strategic-Plan>

09:20:17 From ASTI Environmental : Thanks so much, Alison. I will save those links and we will look those over.

09:21:26 From gmadura : Greg Madura, Alpine Township

09:22:23 From Alison Sutter (she/her) : Annabelle and I are working to complete a Stormwater Vulnerability Assessment that we can make available. We also have a stormwater Master Plan (2013) and Parks and Rec Strategic Master Plan (2017). Unsure how much you want.

09:23:30 From Jenny Kimball James : Kent County Strategic Plan

<https://www.accesskent.com/Departments/BOC/pdfs/Reports/2019-Strategic-Plan.pdf>

09:40:09 From Alison Sutter (she/her) : From MDHHS: MI's priority climate-related health impacts: respiratory conditions, heat illness, waterborne diseases, vector-borne diseases, physical and mental health impacts

09:50:46 From Alison Sutter (she/her) : Kera - great point. Equity is one of the City's six values and we are working to lead with it in all work (other values: accountability, collaboration, customer service, innovation and sustainability).

09:59:15 From ASTI Environmental : If anyone comes across a plan, data set, map, etc. in either County or the city of Grand Rapids after this workshop that relates to the hazards discussed today, please feel free to forward them to ksharpe@asti-env.com.

10:00:05 From Chris Tinney : Think prevention efforts or lessen impacts

10:04:54 From Alison Sutter (she/her) : City's demographics statement - under Neighborhoods of Focus there is a great map to use:

<https://www.grandrapidsmi.gov/Government/Departments/Office-of-Equity-and-Engagement/Demographics-Statement>

10:12:52 From Alison Sutter (she/her) : City Health Dashboard:

<https://www.cityhealthdashboard.com/>

ESRI Maps for Public Policy: <https://livingatlas.arcgis.com/policy/issues/>

10:13:55 From Alison Sutter (she/her) : Neighborhoods as Risk (climate impacts): <https://headwaterseconomics.org/apps/neighborhoods-at-risk/>

10:16:13 From Megan Salazar - ASTI Environmental to ASTI: Paul Rentschler(Privately) : 23 of 32 so far

10:16:58 From Alison Sutter (she/her) : % of City of GR residents within 10 min walk of park or active green space (this speaks to flood mitigation as well) - significant disparities across the City:

<https://data.grandrapidsmi.gov/stories/s/hfma-ea3d>

10:27:04 From Alison Sutter (she/her) : Thank you Kera.

10:28:43 From ASTI Environmental : Hazard mitigation plan website with the most recent survey: <https://kentottawahmp.com/>

10:33:48 From Alison Sutter (she/her) : I have to step off - thanks! Looking forward to this work. Very important.

10:49:38 From Karla Black : I agree with Lou.

10:52:23 From Annabelle Wilkinson (she/her) : I agree with Allison. Weaving climate change throughout.

10:56:57 From Karla Black : I have to jump off for a bit. I'll try to rejoin as soon as I can

11:29:37 From Chris Tinney : Confirming, you want our contact info in the chat?

11:30:06 From Megan Salazar - ASTI Environmental : Yes please, Chris

11:32:36 From Al Jano : Al Jano Kent County Facilities Management Director

11:37:09 From Chris Tinney : Chris Tinney, Captain of Fire Operations/ EM Coordinator: City of Holland.

11:49:35 From Chris Tinney : These are interwoven threads throughout the emergency management model. Hazard mitigation is not different. Make sure they are present.

12:00:03 From Allison Farole City of Grand Rapids : Please make sure Chief Eric Payne, Chief of GRPD is on the attendance list

12:01:46 From Lance Corey : Thank you for the invitation. Have to jump off.

12:01:56 From Michael Morrow : Thank you everyone. Great dialog.

REDACTED FOR PUBLIC VIEW

From: [Jeff Gritter](#)
To: [Emmett Smrcka](#); [Kera Sharpe](#); matt.groesser@kentcountymi.gov
Cc: [Amos Tillema](#); [Peggy Sattler](#)
Subject: RE: 2022 Hazard Mitigation Plan - Byron Township
Date: Friday, December 9, 2022 4:02:33 PM
Attachments: [image003.png](#)
[image004.png](#)
[image005.png](#)

Hi Emmett,

I am responding to your email message below on behalf of Amos Tillema, Supervisor for Byron Township. I am the consulting civil engineer for Byron Township and we are currently evaluating participation in the NFIP for Byron Township based on information received by the Township a few months ago. We plan to have a discussion with the Township officials and Township Board early next year.

Please let me know if you need anything from me.

Thanks,

Jeff Gritter, P.E.



t. (616) 277-2185

c. (616) 292-8242

www.VKcivil.com

From: Amos Tillema [REDACTED]
Sent: Friday, December 9, 2022 12:30 PM
To: Peggy Sattler [REDACTED]; Jeff Gritter [REDACTED]
Subject: FW: 2022 Hazard Mitigation Plan - Byron Township

Amos

Byron Township Supervisor

Ph # (616) 878-1222

amos@byrontownship.org

From: Emmett Smrcka [REDACTED]
Sent: Friday, December 9, 2022 11:01 AM
To: Amos Tillema <[REDACTED]>
Cc: Kera Sharpe [REDACTED]

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

From: [Emmett Smrcka](#)
To: [Kera Sharpe](#)
Subject: Fwd: New Entry: Simple Contact Form (ID #10042)
Date: Friday, December 9, 2022 3:45:44 PM

Emmett Smrcka
Environmental Associate

ASTI Environmental

Brighton, Grand Rapids, and Detroit, Michigan

Ph: 810.225.2800

Fax: 810.225.3800

Cell: 810.360.7172

www.asti-env.com

emsmrcka@asti-env.com

Click [here](#) to receive ASTI's technical e-updates.

This email is nonbinding and is not intended to be used to form a contract unless and until a more formal and definitive written contract between the parties is signed.

From: City Manager [REDACTED]
Sent: Friday, December 9, 2022 3:29:04 PM
To: Emmett Smrcka [REDACTED]
Cc: matt.groesser@kentcountymi.gov <matt.groesser@kentcountymi.gov>
Subject: RE: New Entry: Simple Contact Form (ID #10042)

Mr. Smrcka,

Thank-you for your note. The City of Cedar Springs received a letter from FEMA back in late August directing us to contact a Matt Occhipinti, NFIP coordinator for Michigan regarding our participation in NFIP. I attempted to contact Mr. Occhipinti by phone and left messages on multiple occasions but never received any phone calls or e-mails back to my knowledge and it just fell off my radar at that point.

I would be happy for any assistance that Kent County can offer us in this regard, I have a tiny staff and apparently can't get a call back from the person that was supposed to help us. That letter directed the City to adopt some kind of floodplain management ordinance, is this something that our engineering firm should handle for us?

Thanks,

Mike Womack- City Manager
City of Cedar Springs
66 S Main St, Cedar Springs, MI 49319
(616) 696-1330 x104
City Hall Hours M-Th 7:30am to 5:30 pm



REDACTED FOR PUBLIC VIEW

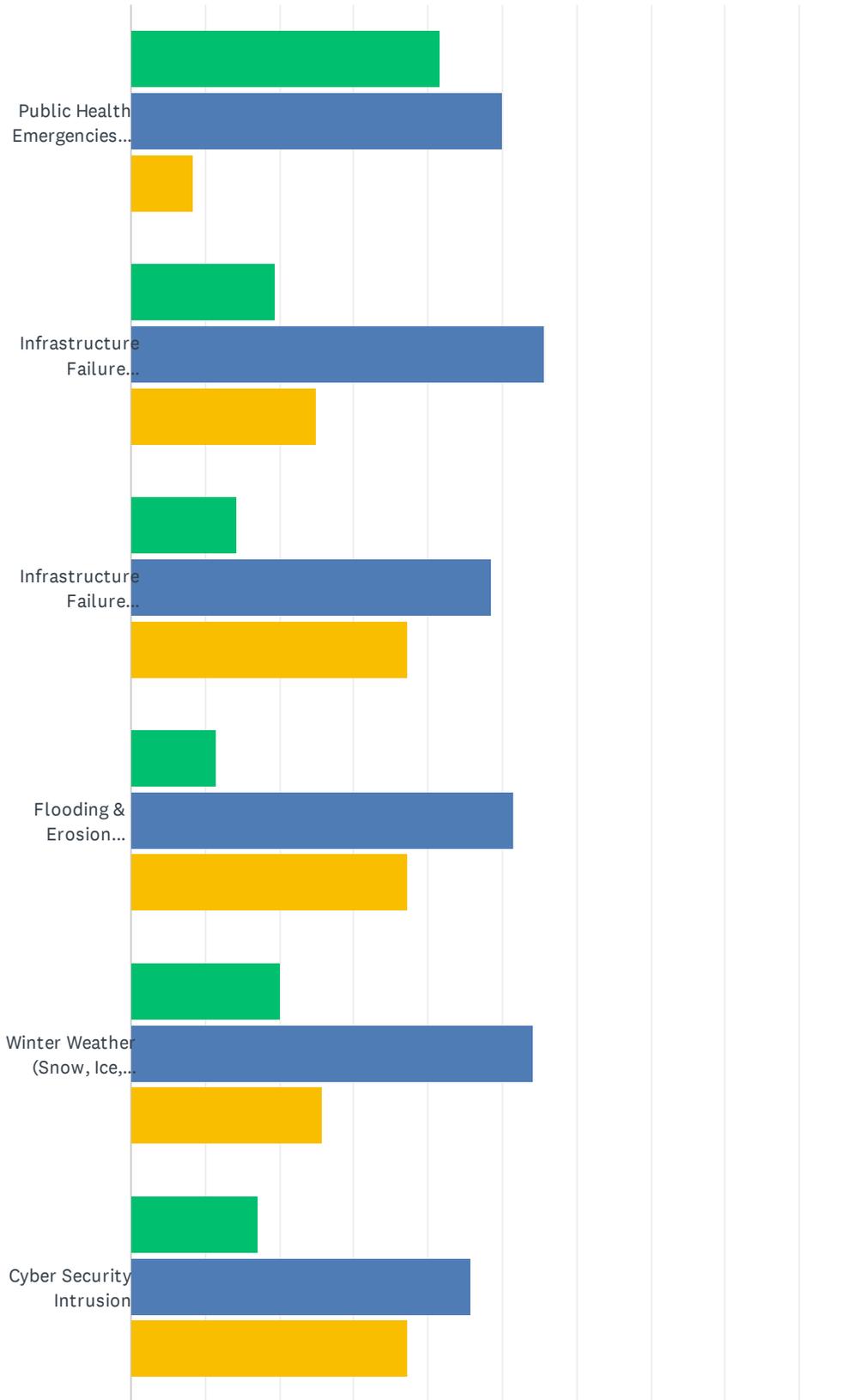
Q1 Respondant Information

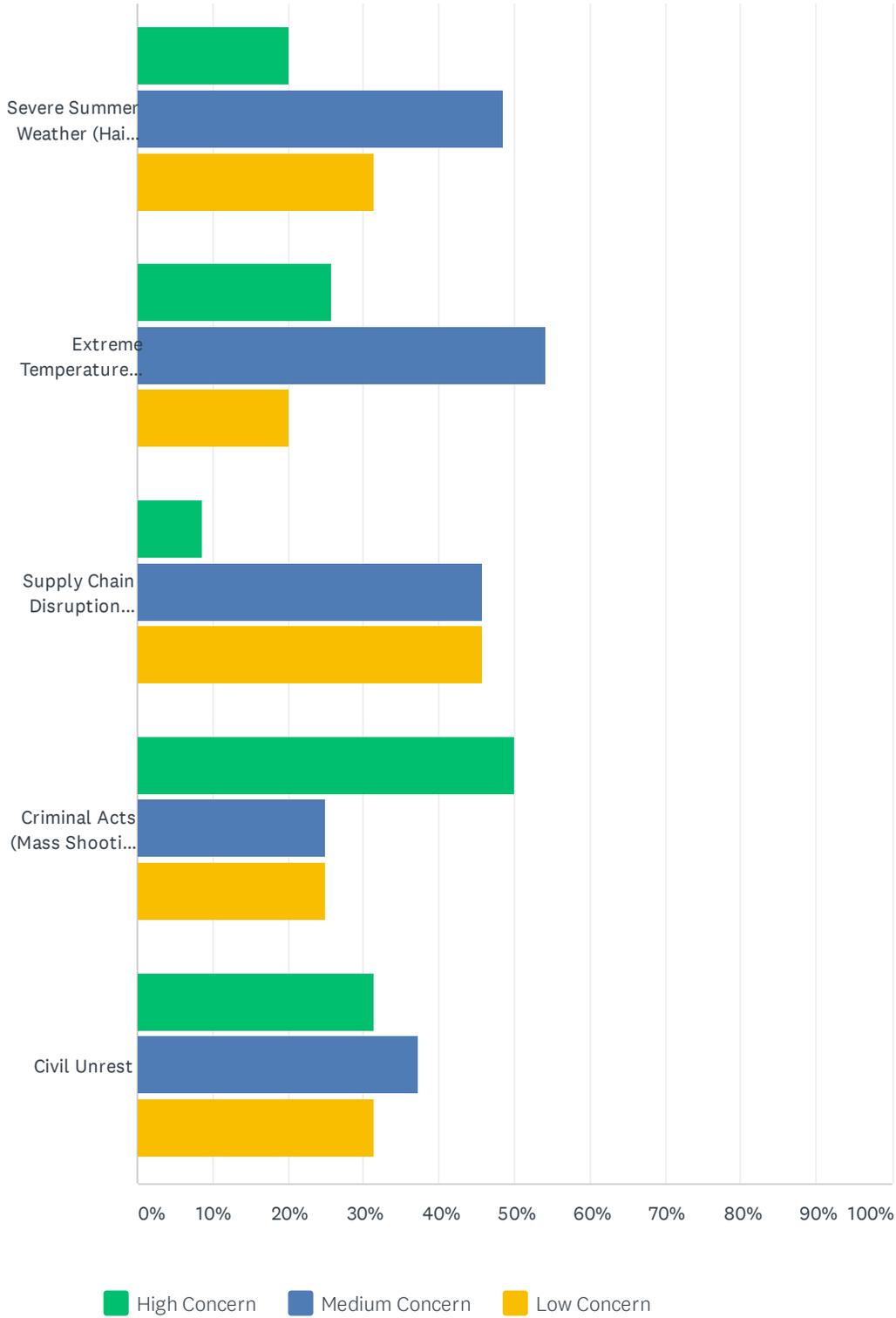
Answered: 36 Skipped: 0

ANSWER CHOICES	RESPONSES	
Name	100.00%	36
Title	100.00%	36
Community Representing	97.22%	35
Department/ Organization	88.89%	32
Email Address	100.00%	36

Q2 Please rank your level of concern/ perceived likelihood of each hazard below as it relates to LOSS OF LIFE/ INJURY

Answered: 36 Skipped: 0

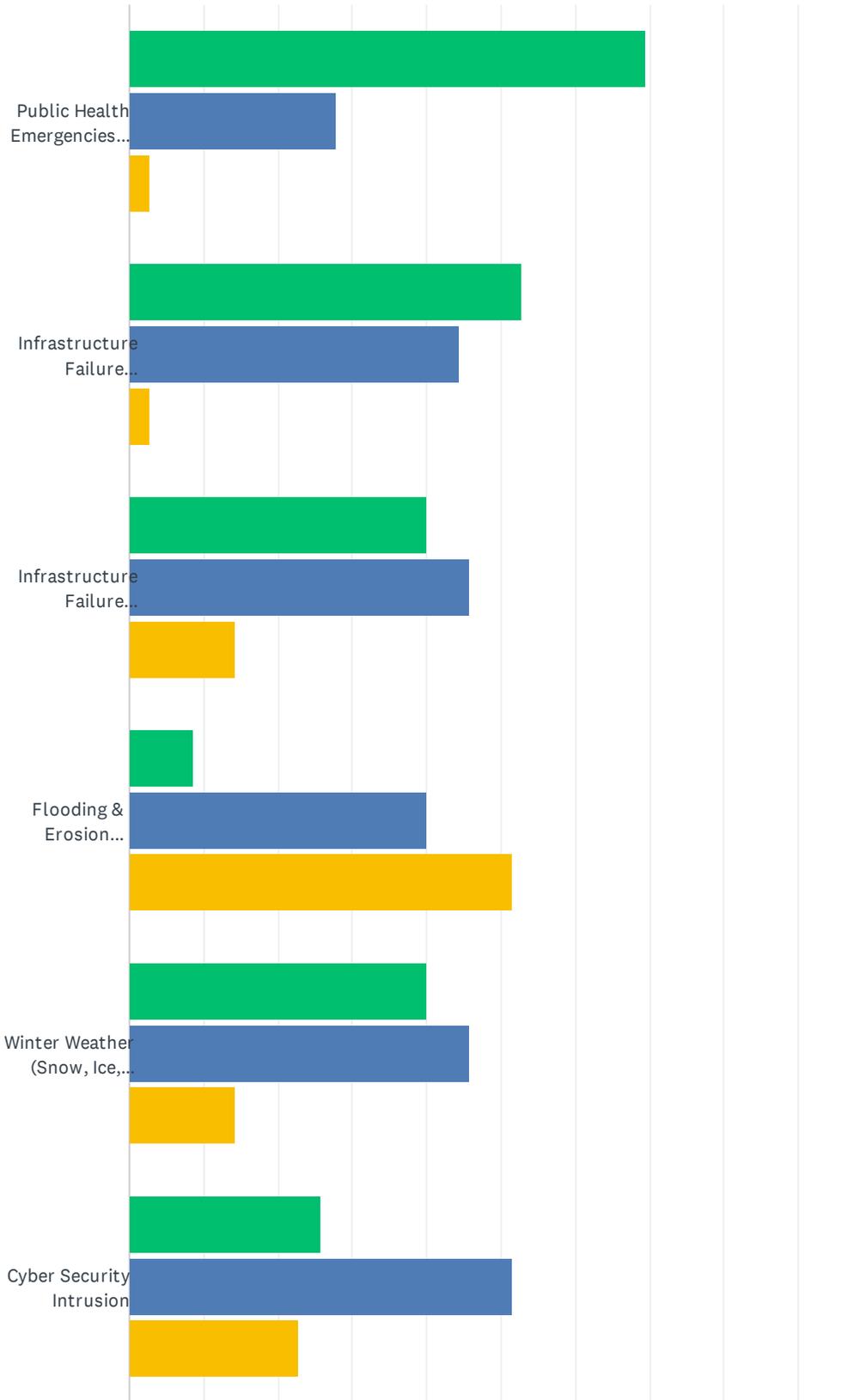


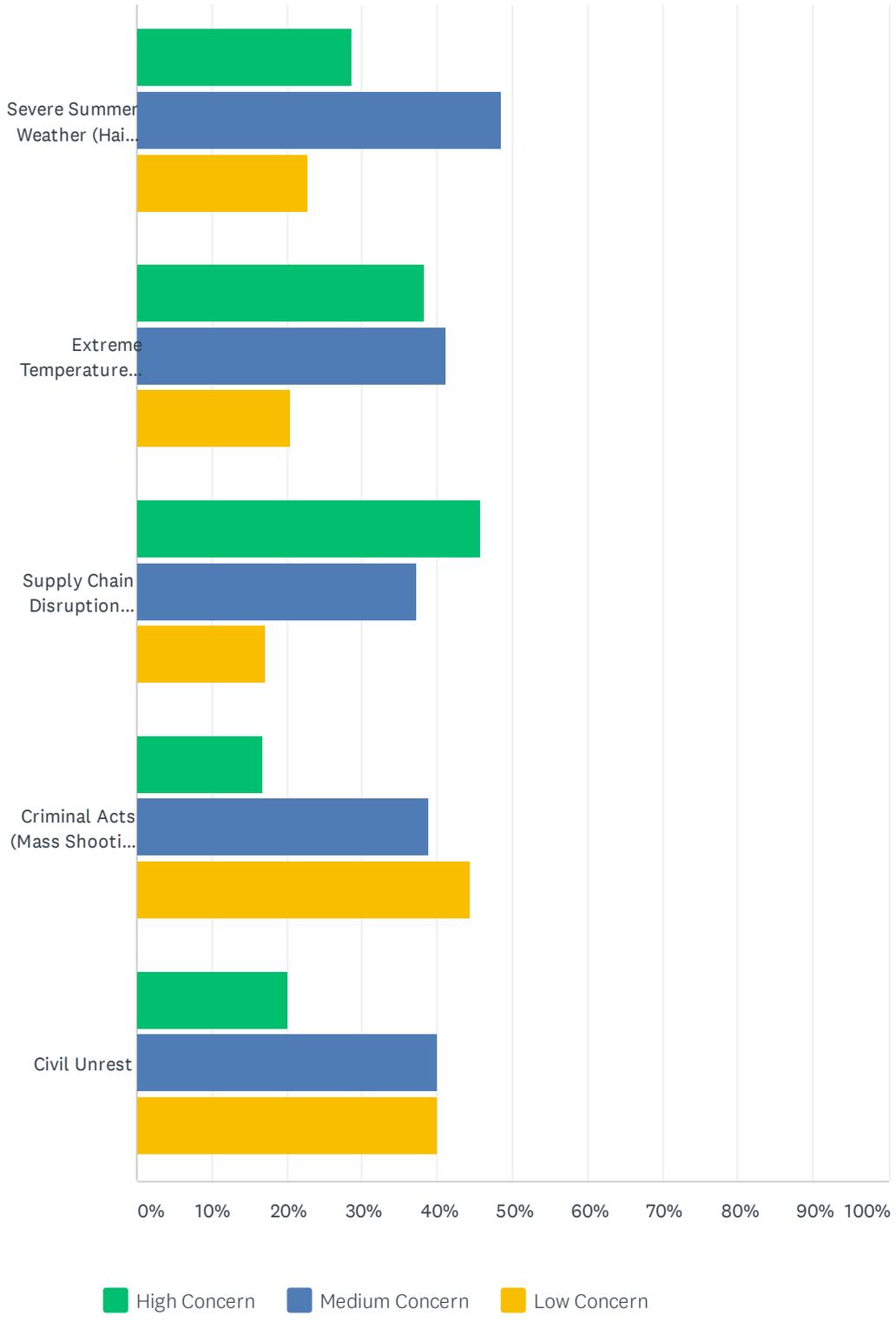


	HIGH CONCERN	MEDIUM CONCERN	LOW CONCERN	TOTAL	WEIGHTED AVERAGE
Public Health Emergencies (Pandemic, Epidemic, Contaminated Food & Water)	41.67% 15	50.00% 18	8.33% 3	36	2.33
Infrastructure Failure (Electric, Gas/Oil, Pipeline, Water, San/Storm Sewer, Transportation)	19.44% 7	55.56% 20	25.00% 9	36	1.94
Infrastructure Failure (Communications/ Internet)	14.29% 5	48.57% 17	37.14% 13	35	1.77
Flooding & Erosion (Riverline/ Shoreline)	11.43% 4	51.43% 18	37.14% 13	35	1.74
Winter Weather (Snow, Ice, Sleet)	20.00% 7	54.29% 19	25.71% 9	35	1.94
Cyber Security Intrusion	17.14% 6	45.71% 16	37.14% 13	35	1.80
Severe Summer Weather (Hail, Lightning, High Winds)	20.00% 7	48.57% 17	31.43% 11	35	1.89
Extreme Temperature (Hot/ Cold)	25.71% 9	54.29% 19	20.00% 7	35	2.06
Supply Chain Disruption (Gas/Oil, PPE, etc.)	8.57% 3	45.71% 16	45.71% 16	35	1.63
Criminal Acts (Mass Shooting/ Active Assailant)	50.00% 18	25.00% 9	25.00% 9	36	2.25
Civil Unrest	31.43% 11	37.14% 13	31.43% 11	35	2.00

Q3 Please rank your level of concern/ perceived likelihood of each hazard below as it relates to NUMBER OF PEOPLE IMPACTED

Answered: 36 Skipped: 0

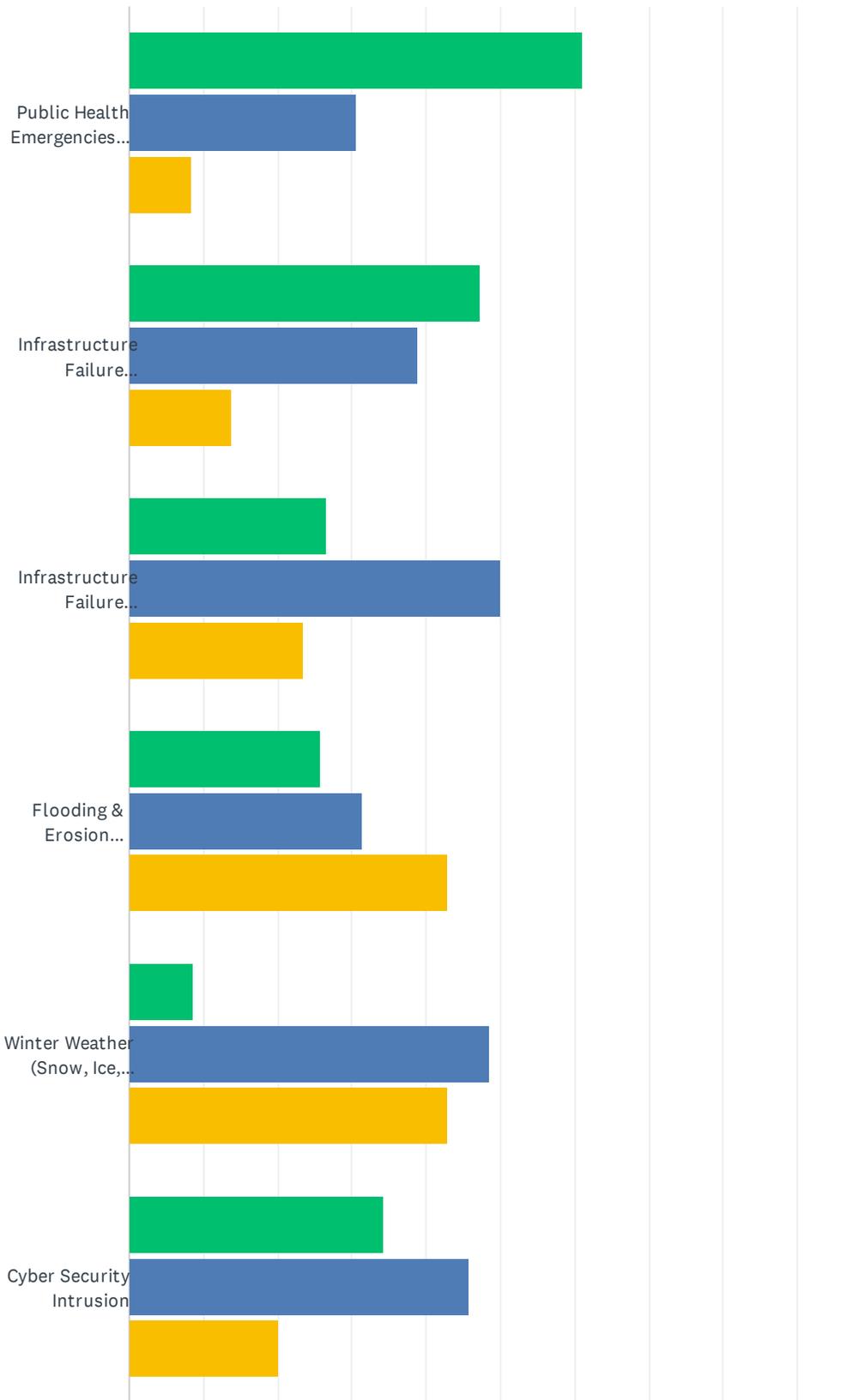


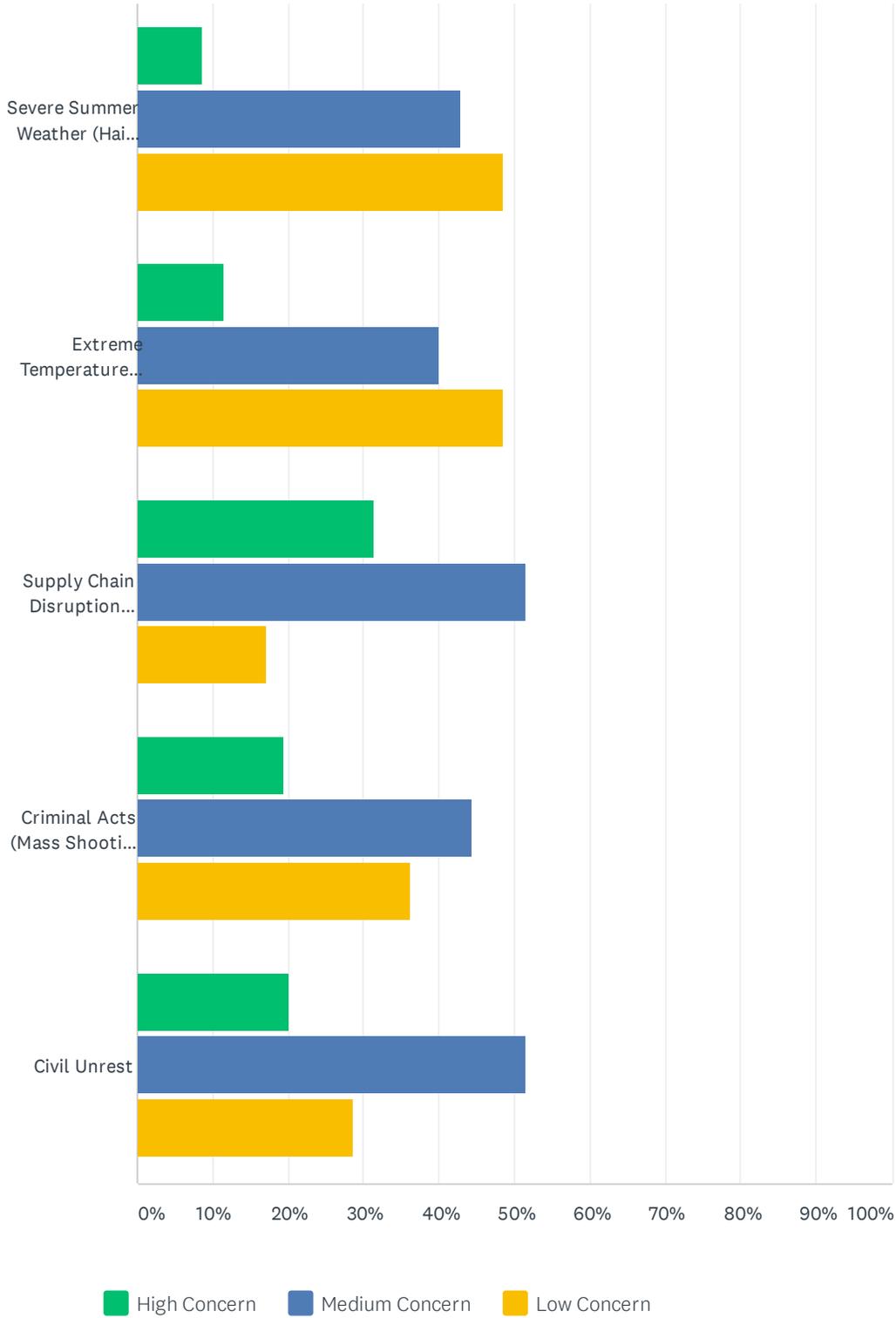


	HIGH CONCERN	MEDIUM CONCERN	LOW CONCERN	TOTAL	WEIGHTED AVERAGE
Public Health Emergencies (Pandemic, Epidemic, Contaminated Food & Water)	69.44% 25	27.78% 10	2.78% 1	36	2.67
Infrastructure Failure (Electric, Gas/Oil, Pipeline, Water, San/Storm Sewer, Transportation)	52.78% 19	44.44% 16	2.78% 1	36	2.50
Infrastructure Failure (Communications/ Internet)	40.00% 14	45.71% 16	14.29% 5	35	2.26
Flooding & Erosion (Riverline/ Shoreline)	8.57% 3	40.00% 14	51.43% 18	35	1.57
Winter Weather (Snow, Ice, Sleet)	40.00% 14	45.71% 16	14.29% 5	35	2.26
Cyber Security Intrusion	25.71% 9	51.43% 18	22.86% 8	35	2.03
Severe Summer Weather (Hail, Lightning, High Winds)	28.57% 10	48.57% 17	22.86% 8	35	2.06
Extreme Temperature (Hot/ Cold)	38.24% 13	41.18% 14	20.59% 7	34	2.18
Supply Chain Disruption (Gas/Oil, PPE, etc.)	45.71% 16	37.14% 13	17.14% 6	35	2.29
Criminal Acts (Mass Shooting/ Active Assailant)	16.67% 6	38.89% 14	44.44% 16	36	1.72
Civil Unrest	20.00% 7	40.00% 14	40.00% 14	35	1.80

Q4 Please rank your level of concern/ perceived likelihood of each hazard below as it relates to DIFFICULTY OF RESPONSE/RECOVERY

Answered: 36 Skipped: 0

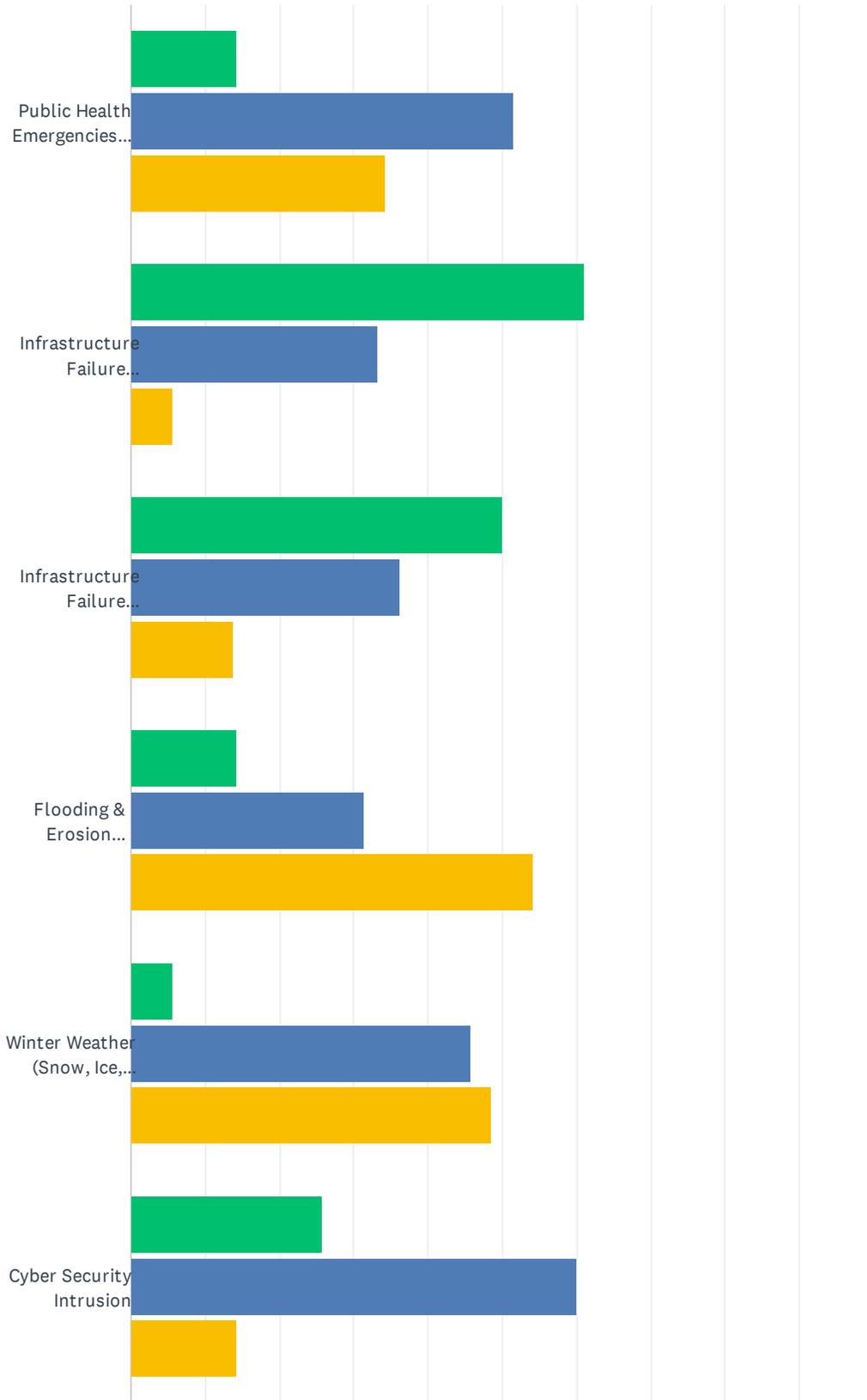


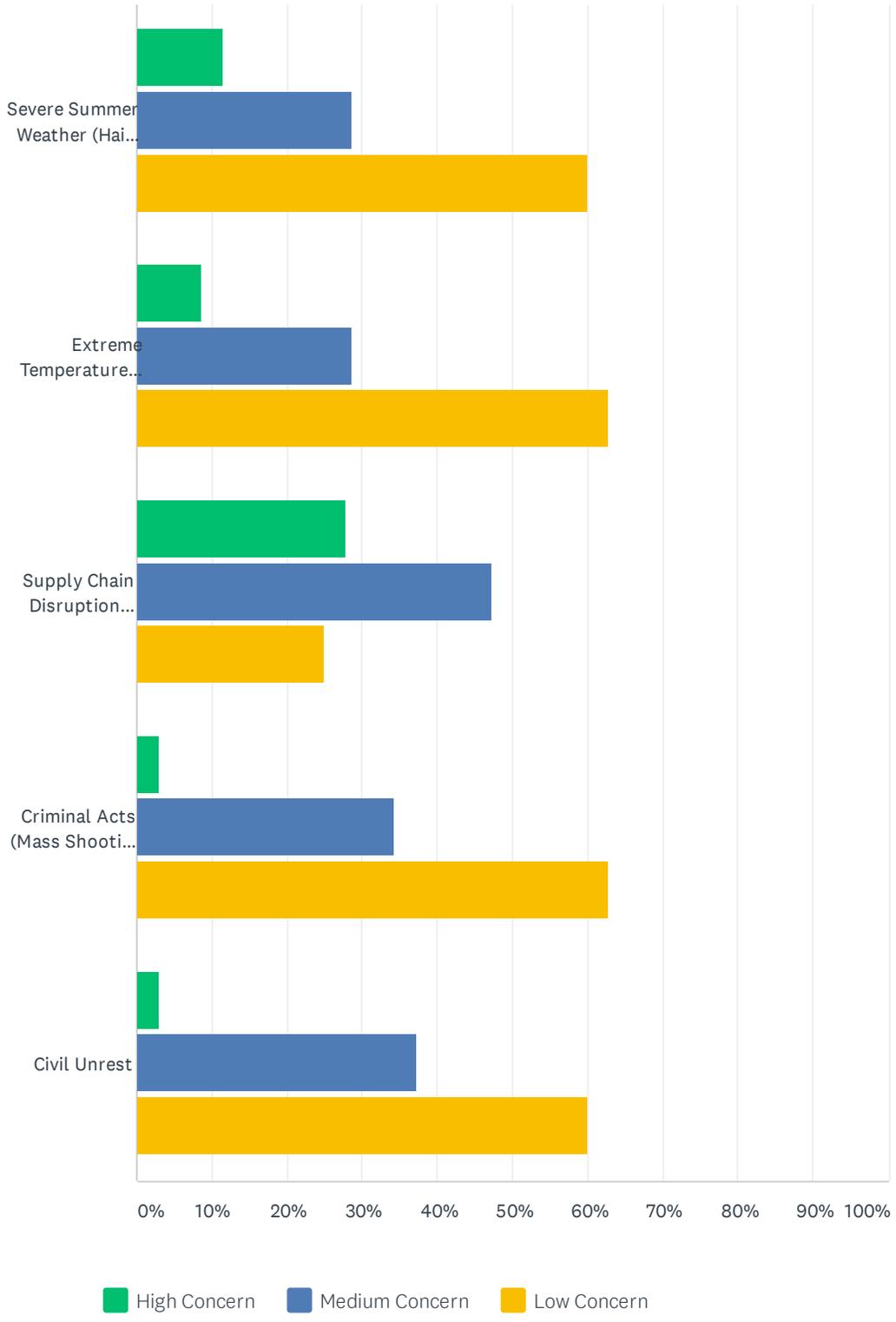


	HIGH CONCERN	MEDIUM CONCERN	LOW CONCERN	TOTAL	WEIGHTED AVERAGE
Public Health Emergencies (Pandemic, Epidemic, Contaminated Food & Water)	61.11% 22	30.56% 11	8.33% 3	36	2.53
Infrastructure Failure (Electric, Gas/Oil, Pipeline, Water, San/Storm Sewer, Transportation)	47.22% 17	38.89% 14	13.89% 5	36	2.33
Infrastructure Failure (Communications/ Internet)	26.47% 9	50.00% 17	23.53% 8	34	2.03
Flooding & Erosion (Riverline/ Shoreline)	25.71% 9	31.43% 11	42.86% 15	35	1.83
Winter Weather (Snow, Ice, Sleet)	8.57% 3	48.57% 17	42.86% 15	35	1.66
Cyber Security Intrusion	34.29% 12	45.71% 16	20.00% 7	35	2.14
Severe Summer Weather (Hail, Lightning, High Winds)	8.57% 3	42.86% 15	48.57% 17	35	1.60
Extreme Temperature (Hot/ Cold)	11.43% 4	40.00% 14	48.57% 17	35	1.63
Supply Chain Disruption (Gas/Oil, PPE, etc.)	31.43% 11	51.43% 18	17.14% 6	35	2.14
Criminal Acts (Mass Shooting/ Active Assailant)	19.44% 7	44.44% 16	36.11% 13	36	1.83
Civil Unrest	20.00% 7	51.43% 18	28.57% 10	35	1.91

Q5 Please rank your level of concern/ perceived likelihood of each hazard below as it relates to INFRASTRUCTURE FAILURE

Answered: 36 Skipped: 0

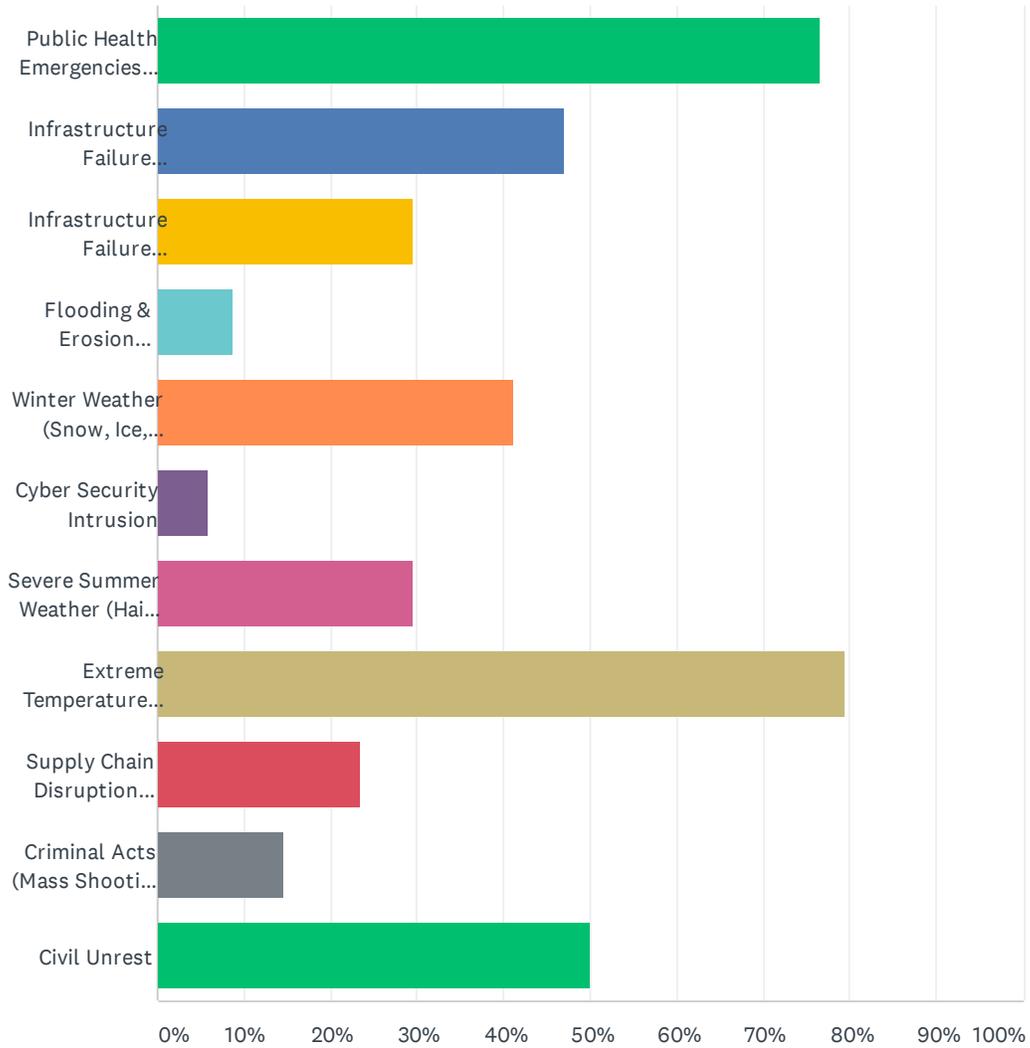




	HIGH CONCERN	MEDIUM CONCERN	LOW CONCERN	TOTAL	WEIGHTED AVERAGE
Public Health Emergencies (Pandemic, Epidemic, Contaminated Food & Water)	14.29% 5	51.43% 18	34.29% 12	35	1.80
Infrastructure Failure (Electric, Gas/Oil, Pipeline, Water, San/Storm Sewer, Transportation)	61.11% 22	33.33% 12	5.56% 2	36	2.56
Infrastructure Failure (Communications/ Internet)	50.00% 18	36.11% 13	13.89% 5	36	2.36
Flooding & Erosion (Riverline/ Shoreline)	14.29% 5	31.43% 11	54.29% 19	35	1.60
Winter Weather (Snow, Ice, Sleet)	5.71% 2	45.71% 16	48.57% 17	35	1.57
Cyber Security Intrusion	25.71% 9	60.00% 21	14.29% 5	35	2.11
Severe Summer Weather (Hail, Lightning, High Winds)	11.43% 4	28.57% 10	60.00% 21	35	1.51
Extreme Temperature (Hot/ Cold)	8.57% 3	28.57% 10	62.86% 22	35	1.46
Supply Chain Disruption (Gas/Oil, PPE, etc.)	27.78% 10	47.22% 17	25.00% 9	36	2.03
Criminal Acts (Mass Shooting/ Active Assailant)	2.86% 1	34.29% 12	62.86% 22	35	1.40
Civil Unrest	2.86% 1	37.14% 13	60.00% 21	35	1.43

Q6 Please select events that have the possibility to disproportionately affect Low-Income Populations and/or People of Color

Answered: 34 Skipped: 2



ANSWER CHOICES	RESPONSES	
Public Health Emergencies (Pandemic, Epidemic, Contaminated Food & Water)	76.47%	26
Infrastructure Failure (Electric, Gas/Oil, Pipeline, Water, San/Storm Sewer, Transportation)	47.06%	16
Infrastructure Failure (Communications/ Internet)	29.41%	10
Flooding & Erosion (Riverline/ Shoreline)	8.82%	3
Winter Weather (Snow, Ice, Sleet)	41.18%	14
Cyber Security Intrusion	5.88%	2
Severe Summer Weather (Hail, Lightning, High Winds)	29.41%	10
Extreme Temperature (Hot/ Cold)	79.41%	27
Supply Chain Disruption (Gas/Oil, PPE, etc.)	23.53%	8
Criminal Acts (Mass Shooting/ Active Assailant)	14.71%	5
Civil Unrest	50.00%	17
Total Respondents: 34		

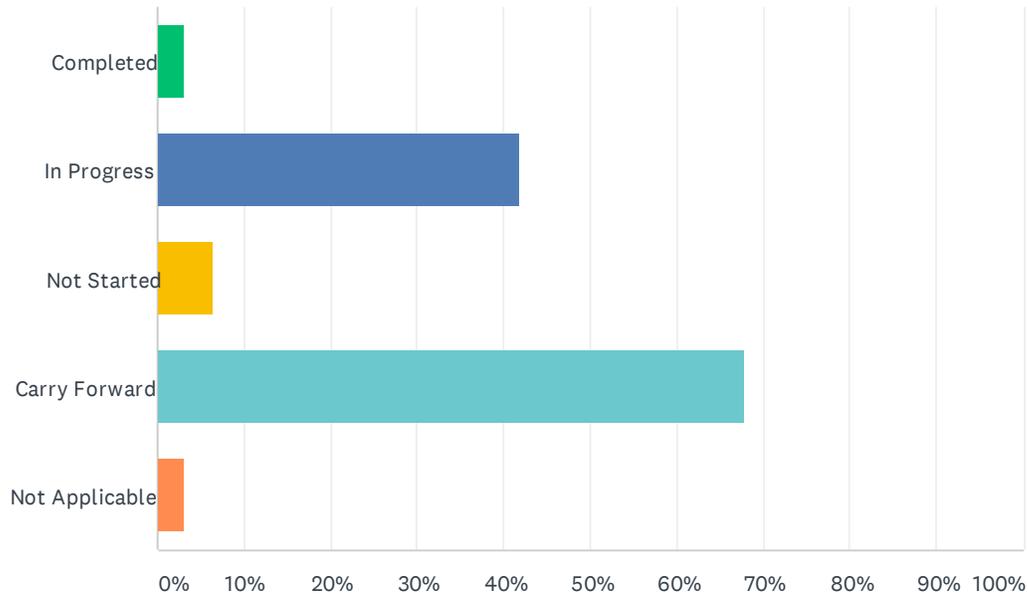
Q1 Participant Contact Information

Answered: 35 Skipped: 1

ANSWER CHOICES	RESPONSES	
Name	97.14%	34
Title	97.14%	34
Community/Jurisdiction Organization	97.14%	34

Q2 Priority 1 (see previous page or email for explanation)

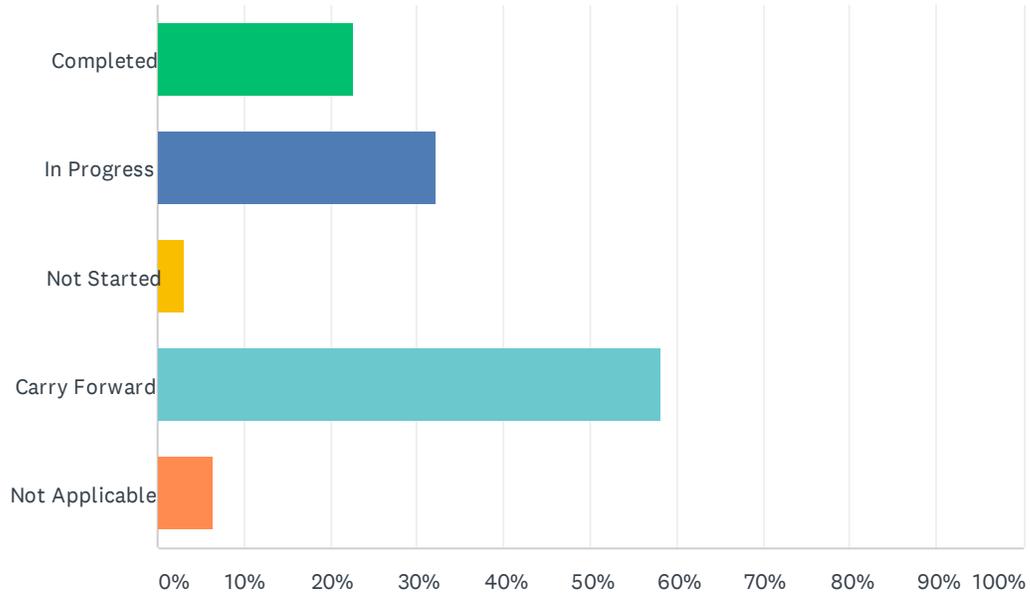
Answered: 31 Skipped: 5



ANSWER CHOICES	RESPONSES	
Completed	3.23%	1
In Progress	41.94%	13
Not Started	6.45%	2
Carry Forward	67.74%	21
Not Applicable	3.23%	1
Total Respondents: 31		

Q3 Priority 2

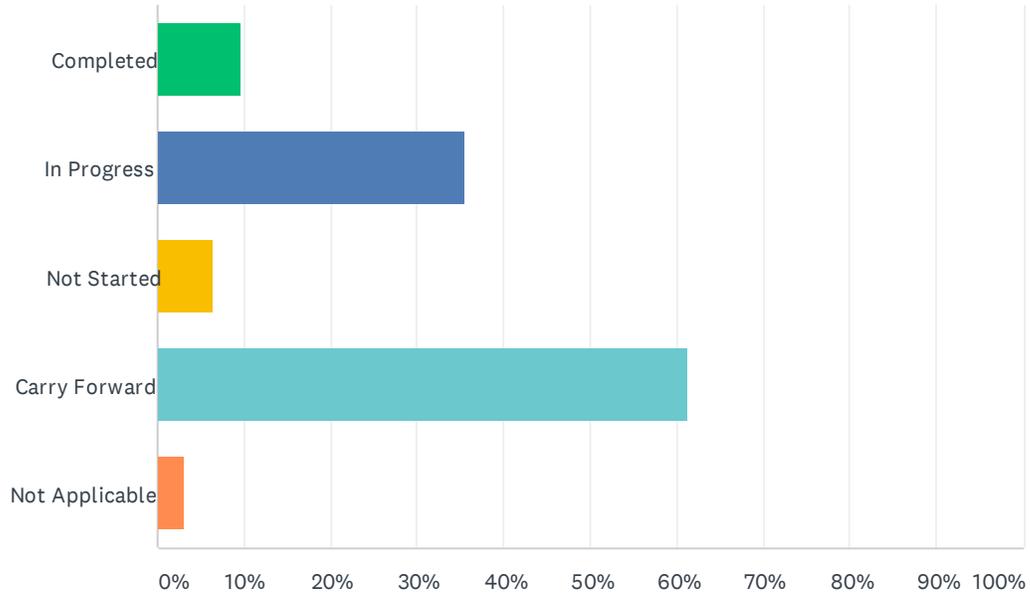
Answered: 31 Skipped: 5



ANSWER CHOICES	RESPONSES	
Completed	22.58%	7
In Progress	32.26%	10
Not Started	3.23%	1
Carry Forward	58.06%	18
Not Applicable	6.45%	2
Total Respondents: 31		

Q4 Priority 3

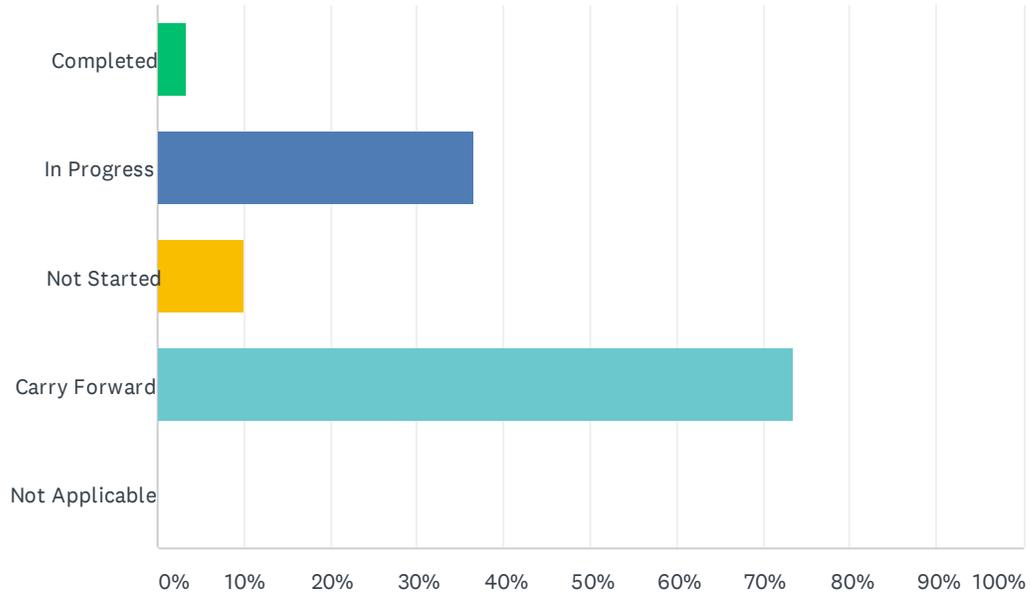
Answered: 31 Skipped: 5



ANSWER CHOICES	RESPONSES	
Completed	9.68%	3
In Progress	35.48%	11
Not Started	6.45%	2
Carry Forward	61.29%	19
Not Applicable	3.23%	1
Total Respondents: 31		

Q5 Priority 4

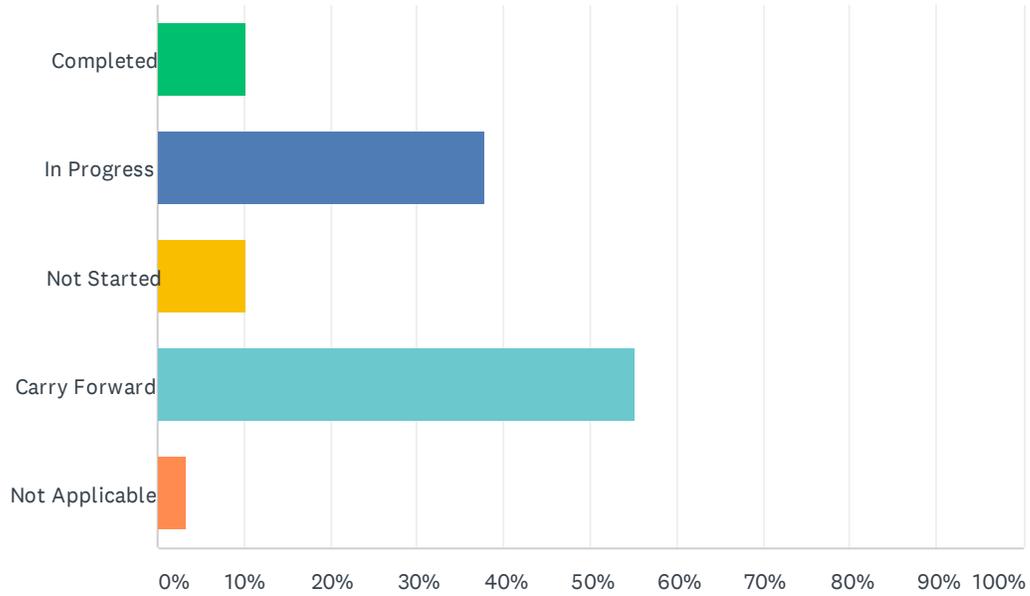
Answered: 30 Skipped: 6



ANSWER CHOICES	RESPONSES	
Completed	3.33%	1
In Progress	36.67%	11
Not Started	10.00%	3
Carry Forward	73.33%	22
Not Applicable	0.00%	0
Total Respondents: 30		

Q6 Priority 5

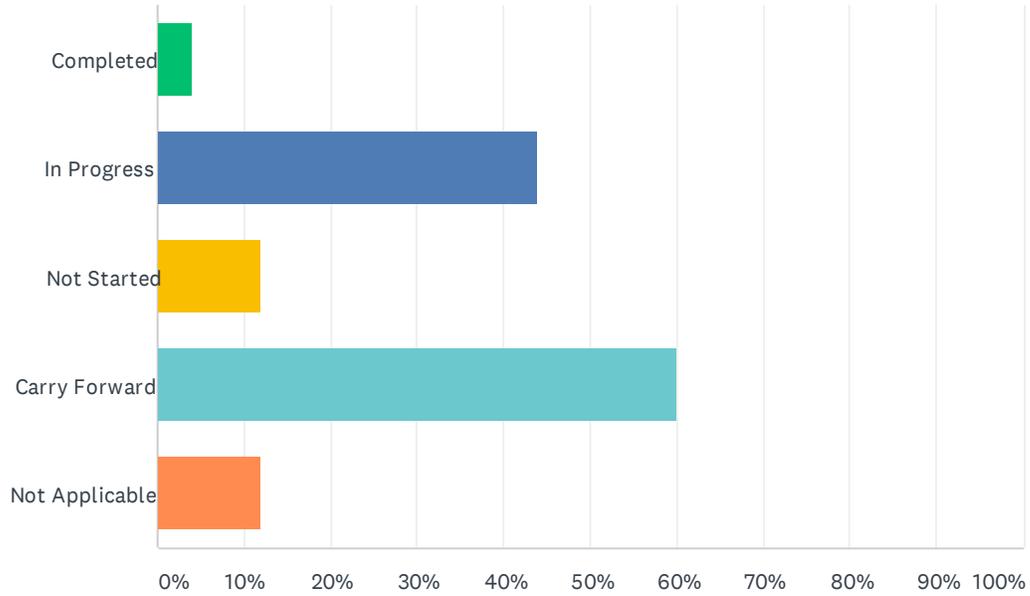
Answered: 29 Skipped: 7



ANSWER CHOICES	RESPONSES	
Completed	10.34%	3
In Progress	37.93%	11
Not Started	10.34%	3
Carry Forward	55.17%	16
Not Applicable	3.45%	1
Total Respondents: 29		

Q7 Priority 6

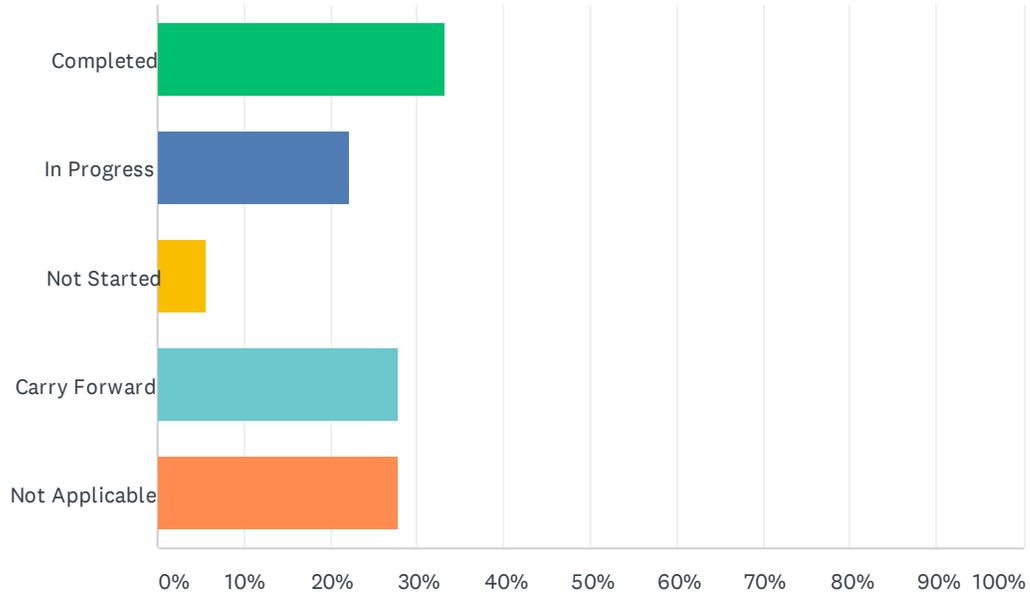
Answered: 25 Skipped: 11



ANSWER CHOICES	RESPONSES	
Completed	4.00%	1
In Progress	44.00%	11
Not Started	12.00%	3
Carry Forward	60.00%	15
Not Applicable	12.00%	3
Total Respondents: 25		

Q8 Priority 7

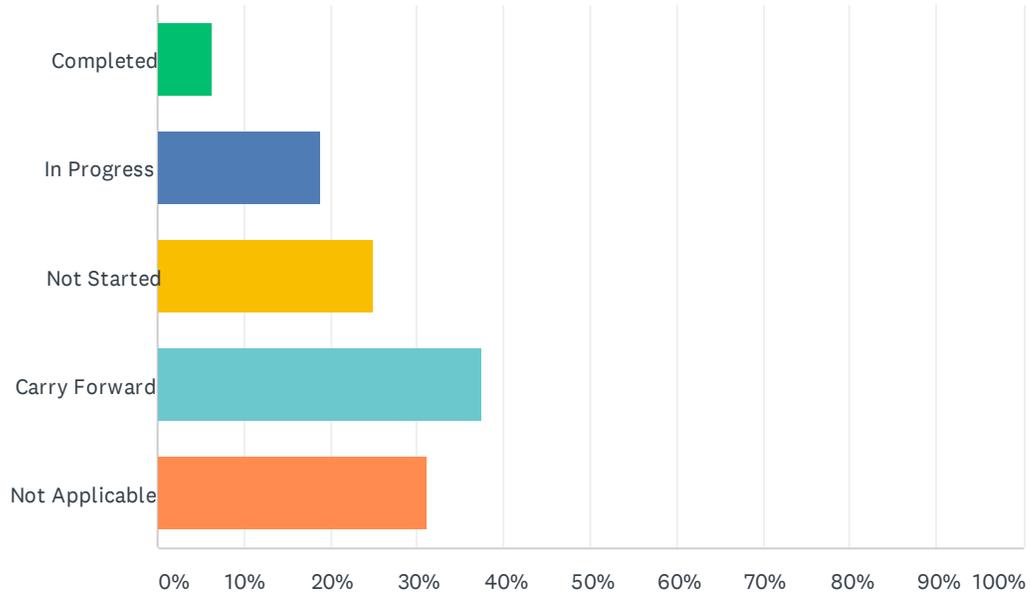
Answered: 18 Skipped: 18



ANSWER CHOICES	RESPONSES	
Completed	33.33%	6
In Progress	22.22%	4
Not Started	5.56%	1
Carry Forward	27.78%	5
Not Applicable	27.78%	5
Total Respondents: 18		

Q9 Priority 8

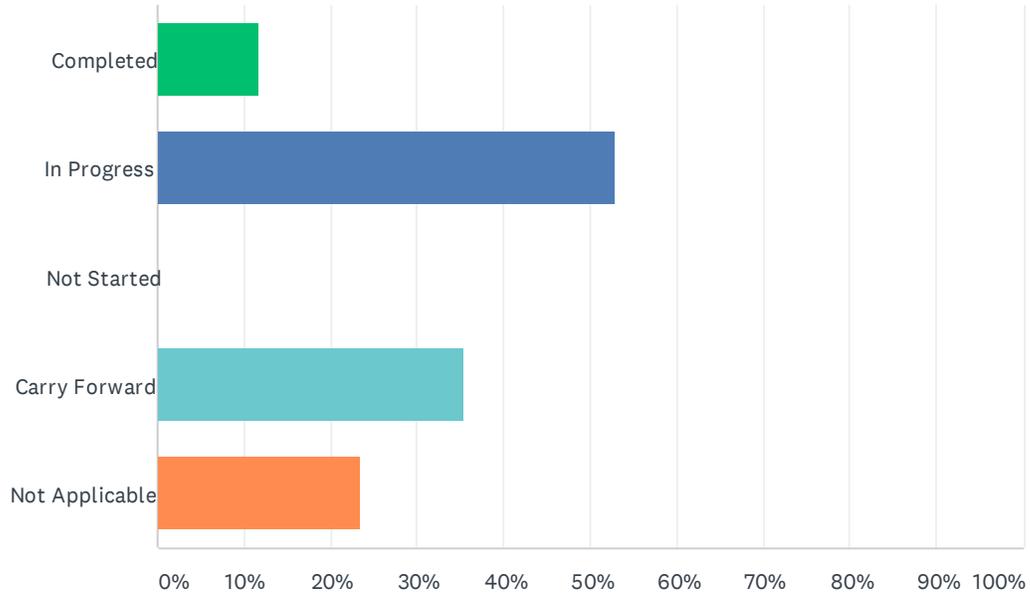
Answered: 16 Skipped: 20



ANSWER CHOICES	RESPONSES	
Completed	6.25%	1
In Progress	18.75%	3
Not Started	25.00%	4
Carry Forward	37.50%	6
Not Applicable	31.25%	5
Total Respondents: 16		

Q10 Priority 9

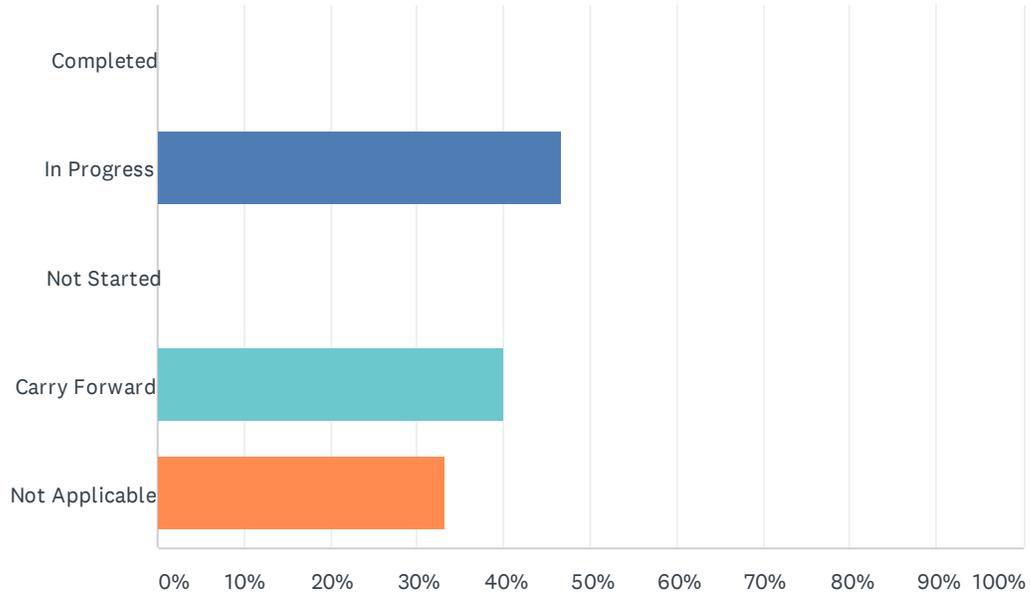
Answered: 17 Skipped: 19



ANSWER CHOICES	RESPONSES	
Completed	11.76%	2
In Progress	52.94%	9
Not Started	0.00%	0
Carry Forward	35.29%	6
Not Applicable	23.53%	4
Total Respondents: 17		

Q11 Priority 10

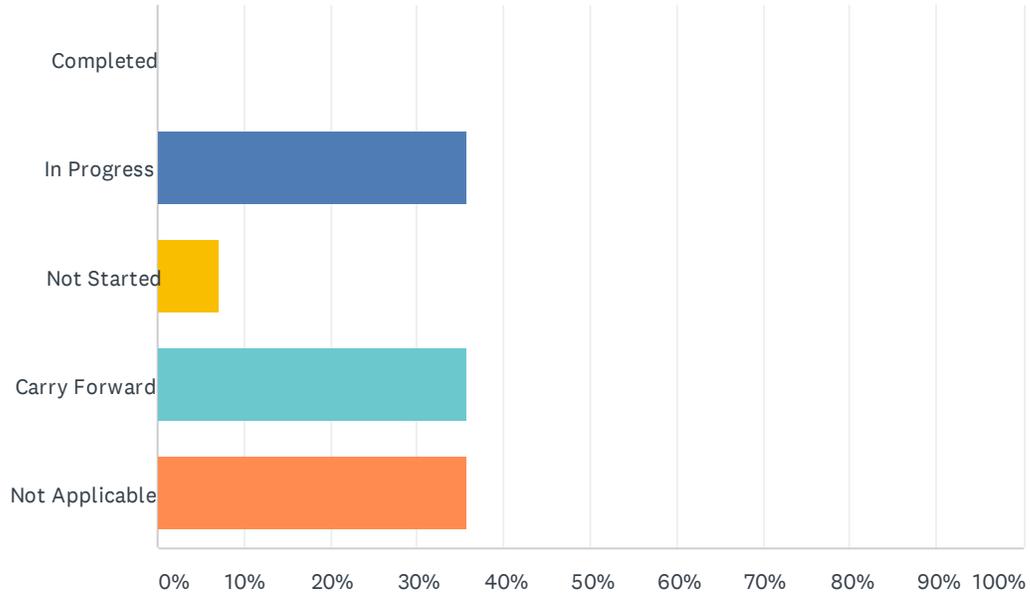
Answered: 15 Skipped: 21



ANSWER CHOICES	RESPONSES	
Completed	0.00%	0
In Progress	46.67%	7
Not Started	0.00%	0
Carry Forward	40.00%	6
Not Applicable	33.33%	5
Total Respondents: 15		

Q12 Priority 11

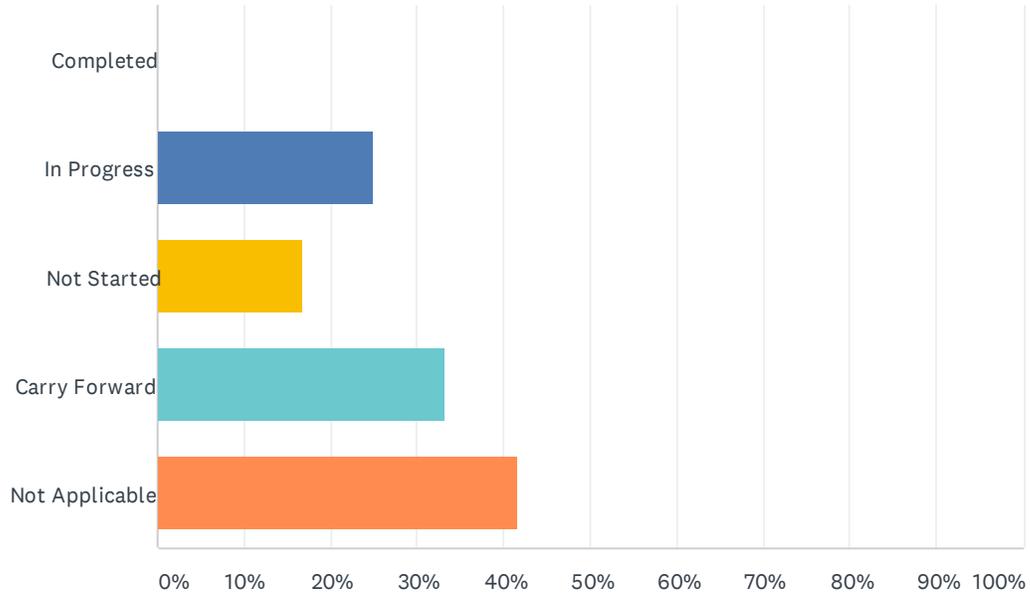
Answered: 14 Skipped: 22



ANSWER CHOICES	RESPONSES	
Completed	0.00%	0
In Progress	35.71%	5
Not Started	7.14%	1
Carry Forward	35.71%	5
Not Applicable	35.71%	5
Total Respondents: 14		

Q13 Priority 12

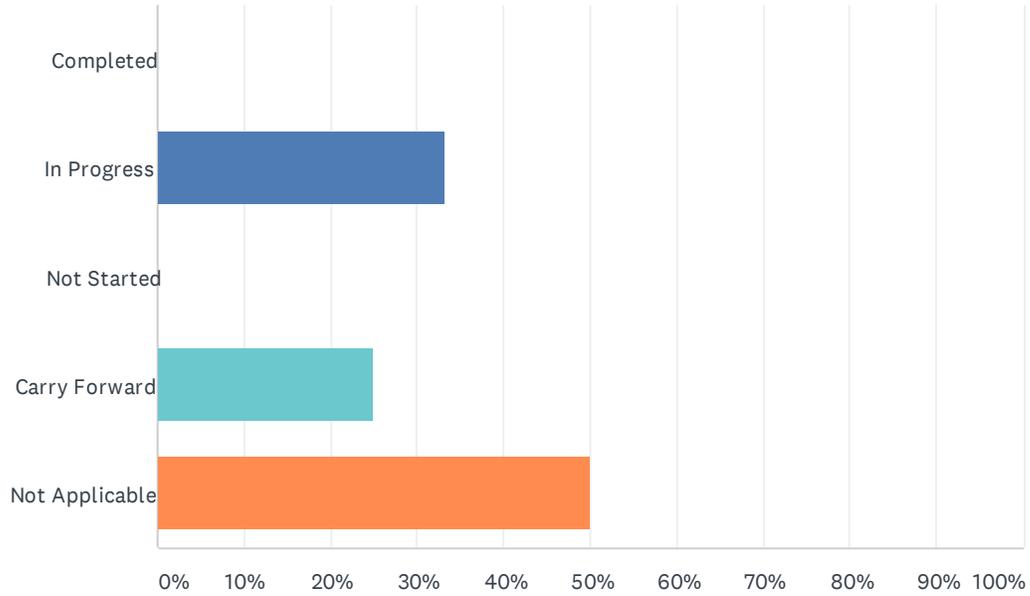
Answered: 12 Skipped: 24



ANSWER CHOICES	RESPONSES	
Completed	0.00%	0
In Progress	25.00%	3
Not Started	16.67%	2
Carry Forward	33.33%	4
Not Applicable	41.67%	5
Total Respondents: 12		

Q14 Priority 13

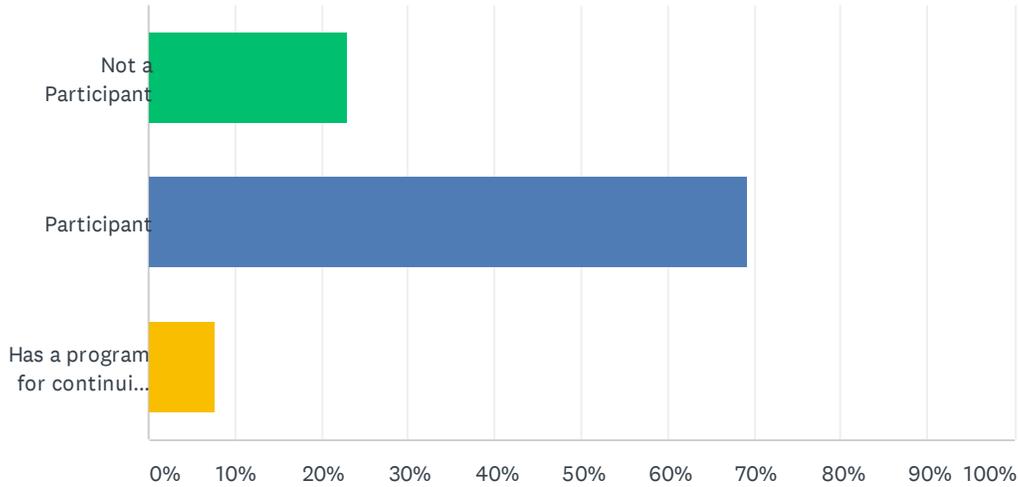
Answered: 12 Skipped: 24



ANSWER CHOICES	RESPONSES	
Completed	0.00%	0
In Progress	33.33%	4
Not Started	0.00%	0
Carry Forward	25.00%	3
Not Applicable	50.00%	6
Total Respondents: 12		

Q15 Community participation in the National Flood Insurance Program (NFIP) may be a requirement for funding opportunities. Please answer the following question regarding your community's status.

Answered: 26 Skipped: 10



ANSWER CHOICES	RESPONSES	
Not a Participant	23.08%	6
Participant	69.23%	18
Has a program for continuing compliance	7.69%	2
Total Respondents: 26		

Q16 [Historical Information] Urban Flooding - please list key assets or facilities in your community impacted by known storm drainage or urban flooding:

Answered: 17 Skipped: 19

ANSWER CHOICES	RESPONSES	
Name of Facility	94.12%	16
Address	58.82%	10
Reason (history, vulnerable population, location, aging infrastructure, etc.)	82.35%	14
Date/Year	64.71%	11
Impact Cost	58.82%	10
Name of Facility	35.29%	6
Address	23.53%	4
Reason (history, vulnerable population, location, aging infrastructure, etc.)	35.29%	6
Date/Year	23.53%	4
Impact Cost	11.76%	2
Name of Facility	5.88%	1
Address	5.88%	1
Reason (history, vulnerable population, location, aging infrastructure, etc.)	5.88%	1
Date/Year	5.88%	1
Impact Cost	0.00%	0

Q17 [Historical Information] Erosion - please list key assets or facilities in your community impacted by riverine or lakeshore erosion:

Answered: 9 Skipped: 27

ANSWER CHOICES	RESPONSES	
Name of Facility	100.00%	9
Address	33.33%	3
Reason (history, vulnerable population, location, aging infrastructure, etc.)	44.44%	4
Date/Year	44.44%	4
Impact Cost	22.22%	2
Name of Facility	33.33%	3
Address	22.22%	2
Reason (history, vulnerable population, location, aging infrastructure, etc.)	33.33%	3
Date/Year	33.33%	3
Impact Cost	22.22%	2
Name of Facility	22.22%	2
Address	22.22%	2
Reason (history, vulnerable population, location, aging infrastructure, etc.)	11.11%	1
Date/Year	11.11%	1
Impact Cost	0.00%	0

Q18 [Historical Information] Subsidence/Sinkholes - please list key assets or facilities in your community impacted by subsidence or sinkholes:

Answered: 6 Skipped: 30

ANSWER CHOICES	RESPONSES	
Name of Facility	100.00%	6
Address	33.33%	2
Reason (history, vulnerable population, location, aging infrastructure, etc.)	33.33%	2
Date/Year	33.33%	2
Impact Cost	33.33%	2
Name of Facility	16.67%	1
Address	16.67%	1
Reason (history, vulnerable population, location, aging infrastructure, etc.)	16.67%	1
Date/Year	16.67%	1
Impact Cost	16.67%	1
Name of Facility	0.00%	0
Address	0.00%	0
Reason (history, vulnerable population, location, aging infrastructure, etc.)	0.00%	0
Date/Year	0.00%	0
Impact Cost	0.00%	0

Q19 [Projected Information] Dam Failure - please list key assets or facilities in your community at risk of or impacted by dam failure:

Answered: 6 Skipped: 30

ANSWER CHOICES	RESPONSES	
Name of Facility	100.00%	6
Address	33.33%	2
Reason (history, vulnerable population, location, aging infrastructure, etc.)	33.33%	2
Date/Year	0.00%	0
Potential Impact Cost	16.67%	1
Name of Facility	16.67%	1
Address	16.67%	1
Reason (history, vulnerable population, location, aging infrastructure, etc.)	16.67%	1
Date/Year	0.00%	0
Potential Impact Cost	0.00%	0
Name of Facility	0.00%	0
Address	0.00%	0
Reason (history, vulnerable population, location, aging infrastructure, etc.)	16.67%	1
Date/Year	0.00%	0
Potential Impact Cost	0.00%	0

Q20 [Projected Information] Extreme Temperatures - please list key assets or facilities in your community at risk of or impacted by extreme hot or cold temperatures:

Answered: 11 Skipped: 25

ANSWER CHOICES	RESPONSES	
Name of Facility	100.00%	11
Address	54.55%	6
Reason (history, vulnerable population, location, aging infrastructure, etc.)	54.55%	6
Date/Year	27.27%	3
Potential Impact Cost	18.18%	2
Name of Facility	27.27%	3
Address	18.18%	2
Reason (history, vulnerable population, location, aging infrastructure, etc.)	9.09%	1
Date/Year	0.00%	0
Potential Impact Cost	0.00%	0
Name of Facility	9.09%	1
Address	9.09%	1
Reason (history, vulnerable population, location, aging infrastructure, etc.)	9.09%	1
Date/Year	0.00%	0
Potential Impact Cost	0.00%	0

Q21 [Projected Information] Pandemic - please list key assets or facilities in your community at risk of or impacted by public health emergencies/pandemics:

Answered: 20 Skipped: 16

ANSWER CHOICES	RESPONSES	
Name of Facility	100.00%	20
Address	70.00%	14
Reason (history, vulnerable population, location, aging infrastructure, etc.)	80.00%	16
Date/Year	45.00%	9
Potential Impact Cost	35.00%	7
Name of Facility	30.00%	6
Address	15.00%	3
Reason (history, vulnerable population, location, aging infrastructure, etc.)	20.00%	4
Date/Year	5.00%	1
Potential Impact Cost	0.00%	0
Name of Facility	20.00%	4
Address	15.00%	3
Reason (history, vulnerable population, location, aging infrastructure, etc.)	20.00%	4
Date/Year	5.00%	1
Potential Impact Cost	0.00%	0

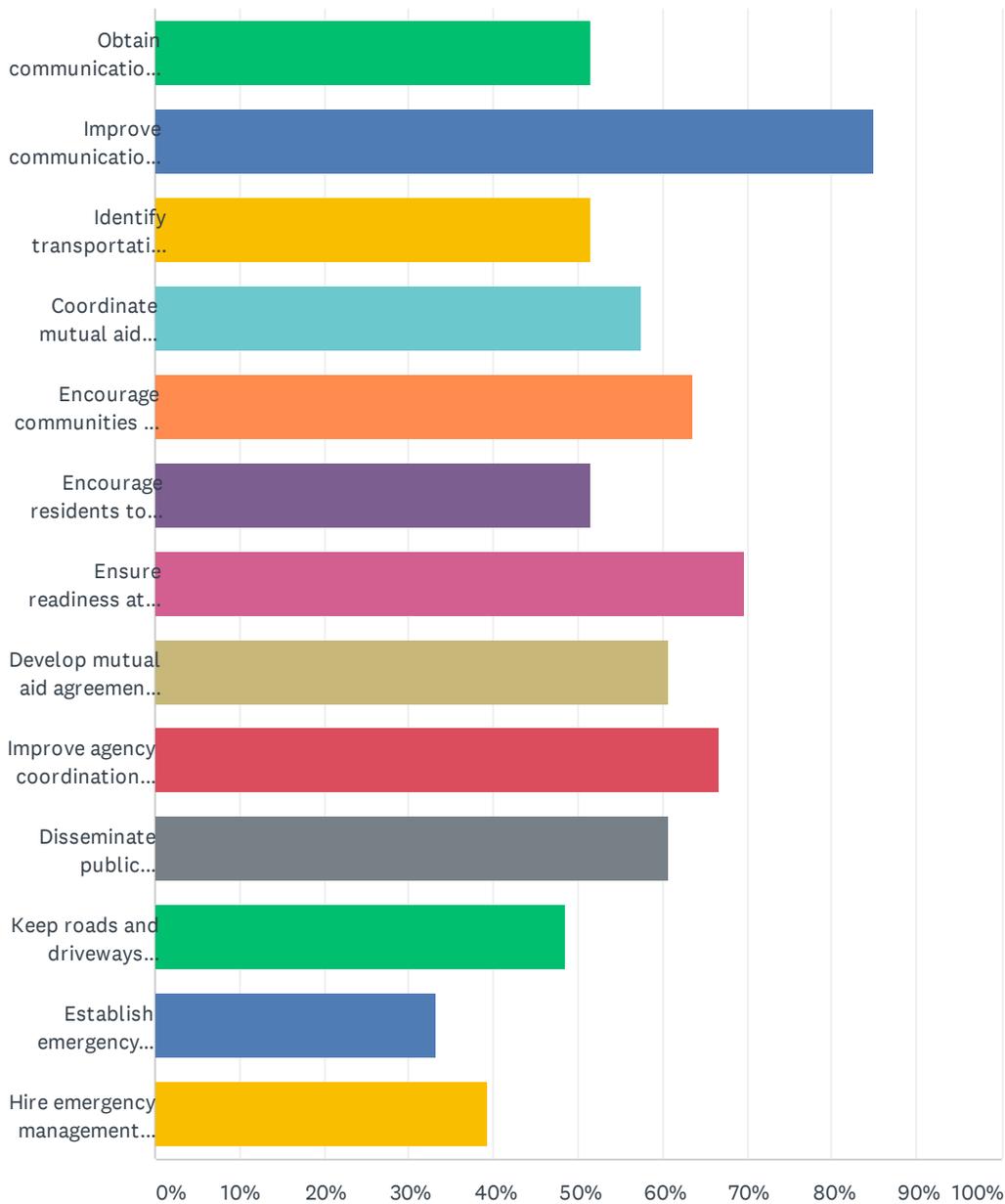
Q22 In a Workshop in April, members of the Hazard Mitigation Plan Advisory Committee identified the following hazards as the region’s highest priorities. Please use the space next to each hazard to describe the mitigation strategy(ies) you think would best address each hazard regionally. Strategies may include those listed below, within the previous plan, or other.

Answered: 24 Skipped: 12

ANSWER CHOICES	RESPONSES	
Public Health Emergencies – epidemic/pandemic/infectious disease	91.67%	22
Infrastructure Failure – Transportation/water/sewer/gas/electric	70.83%	17
Criminal Acts – active assailants / mass shootings	66.67%	16
Supply Chain Disruptions - fixed site/oil & gas pipelines & storage	70.83%	17
Civil Unrest	58.33%	14
Infrastructure Failure – electrical/communications/cyber	66.67%	16
Cyber Security Intrusion	66.67%	16
Flooding & Erosion – riverine/shoreline	75.00%	18
Severe Weather – winter (ice/snow)	83.33%	20
Severe Weather – thunderstorms/tornadoes/high winds	79.17%	19
Extreme Temperatures – hot/cold	75.00%	18

Q23 The following General Hazard Mitigation Strategies are outlined in the State of Michigan Hazard Mitigation Plan or other local plans. These strategies are suggested to be considered in the Grand Rapids, Kent County, and Ottawa County Regional Hazard Mitigation Plan. These possible mitigation strategies are identified as general strategies. Please identify any additional strategies that should be considered in the updated plan.

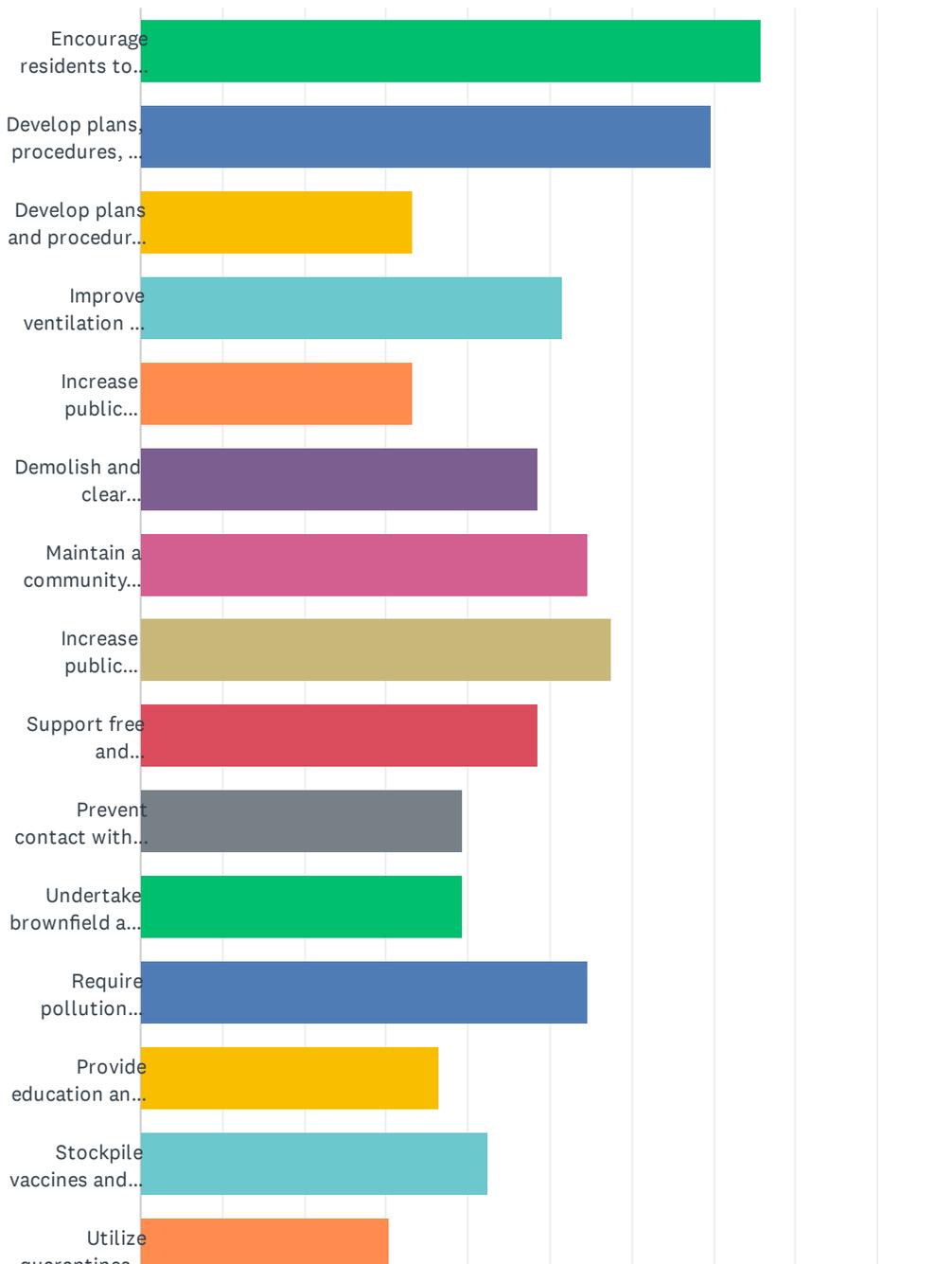
Answered: 33 Skipped: 3

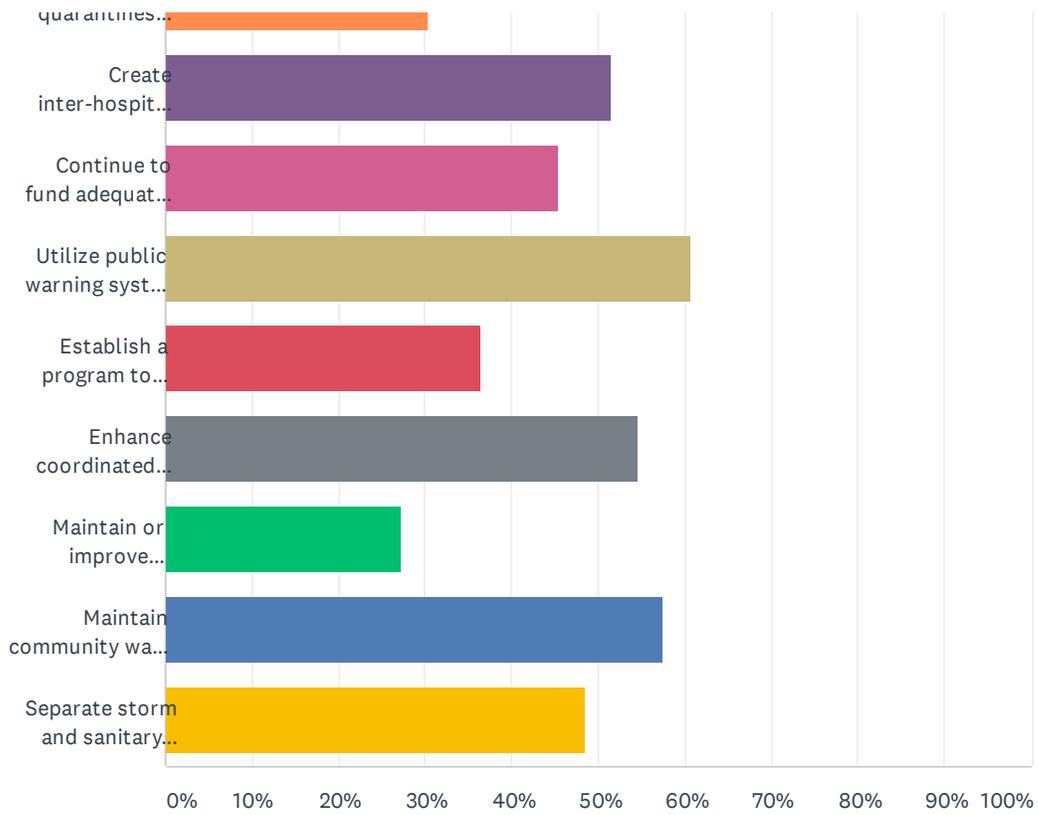


ANSWER CHOICES	RESPONSES	
Obtain communication boosters for deficient areas in city or county-wide communication network	51.52%	17
Improve communications between municipalities, state, and regional agencies in case of mass event	84.85%	28
Identify transportation bottlenecks to ensure emergency vehicle access and access to hospitals	51.52%	17
Coordinate mutual aid assistance for failures in utility and communications systems (including 911)	57.58%	19
Encourage communities to acquire generators for backup power at critical facilities	63.64%	21
Encourage residents to develop family escape plan and disaster supply kits	51.52%	17
Ensure readiness at critical facilities (e.g., warming/cooling centers, water and wastewater treatment facilities, etc.) by obtaining adequate emergency power generators and requiring facilities to perform regular maintenance and equipment checks, pre-plan for fuel needs of existing and backup power sources	69.70%	23
Develop mutual aid agreements for incident response	60.61%	20
Improve agency coordination in response and planning activities	66.67%	22
Disseminate public education materials (newsletters, pamphlets, articles, programs, web links, contact information) to explain key hazards, self and property protection measures, warning, and response systems currently in place	60.61%	20
Keep roads and driveways accessible to vehicles and fire equipment - bridges should be able to support emergency vehicles, roads should be adequate for vehicles to turn and cross both ways	48.48%	16
Establish emergency routing procedures for emergency vehicles to avoid road or bridge closures due to construction or emergency	33.33%	11
Hire emergency management coordinator or liaison to coordinate recognition, warning, and response activities within the community and with regional officials	39.39%	13
Total Respondents: 33		

Q24 The following Public Health Emergency Hazard Mitigation Strategies are outlined in the State of Michigan Hazard Mitigation Plan or other local plans. These strategies are suggested to be considered in the Grand Rapids, Kent County, and Ottawa County Regional Hazard Mitigation Plan. Possible mitigation strategies are listed under this high priority hazard selected in the initial Advisory Committee Workshop in April 2021. Please identify any additional strategies that should be considered in the updated plan.

Answered: 33 Skipped: 3

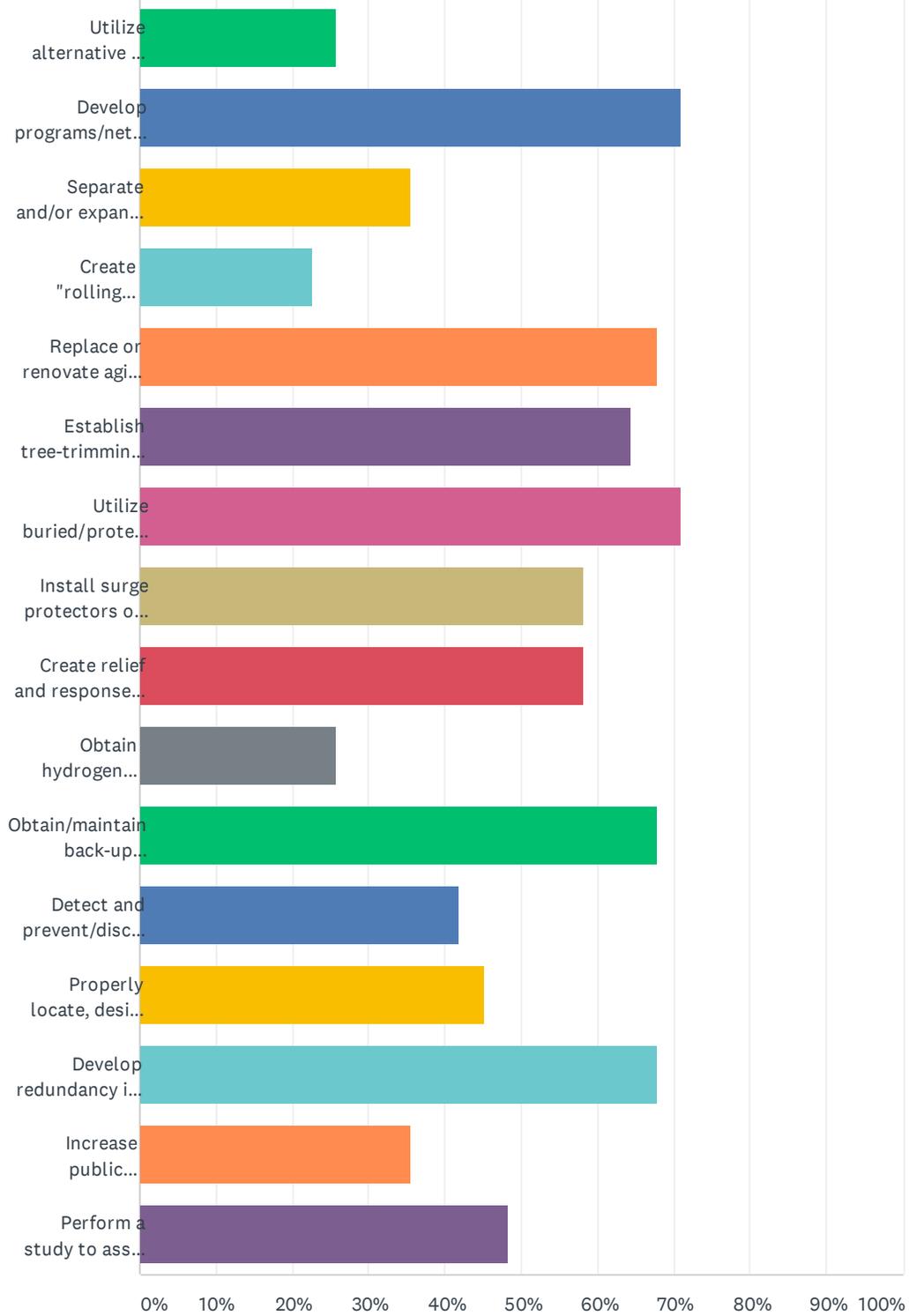




ANSWER CHOICES	RESPONSES	
Encourage residents to receive immunizations against communicable diseases	75.76%	25
Develop plans, procedures, and locations for isolating and treating infected individuals	69.70%	23
Develop plans and procedures for improved social distancing	33.33%	11
Improve ventilation in areas/facilities prone to crowding, or that may involve exposure to contagion or noxious atmospheres	51.52%	17
Increase public awareness of radon dangers and efforts to prevent/reduce radon concentrations in homes and buildings	33.33%	11
Demolish and clear vacant/condemned structures to prevent rodent infestations	48.48%	16
Maintain a community public health system with sufficient disease monitoring and surveillance capabilities to adequately protect population from large-scale outbreaks	54.55%	18
Increase public awareness of the causes, symptoms, and protective actions for disease outbreaks and other potential public health emergencies	57.58%	19
Support free and reduced-cost clinics and school health services	48.48%	16
Prevent contact with contaminated sites or waters (including flood waters)	39.39%	13
Undertake brownfield and urban blight cleanup	39.39%	13
Require pollution control, enforcement, and cleanup, and proper disposal of chemicals and scrap materials	54.55%	18
Provide education and enforcement regarding proper location, installation, cleaning, monitoring, and maintenance of septic systems	36.36%	12
Stockpile vaccines and antidotes in case of epidemic, chemical emergency, or biological or chemical weapons attack	42.42%	14
Utilize quarantines where applicable	30.30%	10
Create inter-hospital mutual aid pacts to assure communication and service delivery in the event of quarantine or outbreak	51.52%	17
Continue to fund adequate food and sanitation inspections	45.45%	15
Utilize public warning systems for public health communications	60.61%	20
Establish a program to identify and properly abandon unused water wells	36.36%	12
Enhance coordinated public health response plans	54.55%	18
Maintain or improve standards for food and livestock production, storage, and handling	27.27%	9
Maintain community water and sewer infrastructure at acceptable operating standards	57.58%	19
Separate storm and sanitary sewer systems	48.48%	16
Total Respondents: 33		

Q25 The following Infrastructure Failure Hazard Mitigation Strategies are outlined in the State of Michigan Hazard Mitigation Plan or other local plans. These strategies are suggested to be considered in the Grand Rapids, Kent County, and Ottawa County Regional Hazard Mitigation Plan. Possible mitigation strategies are listed under this high priority hazard selected in the initial Advisory Committee Workshop in April 2021. Please identify any additional strategies that should be considered in the updated plan.

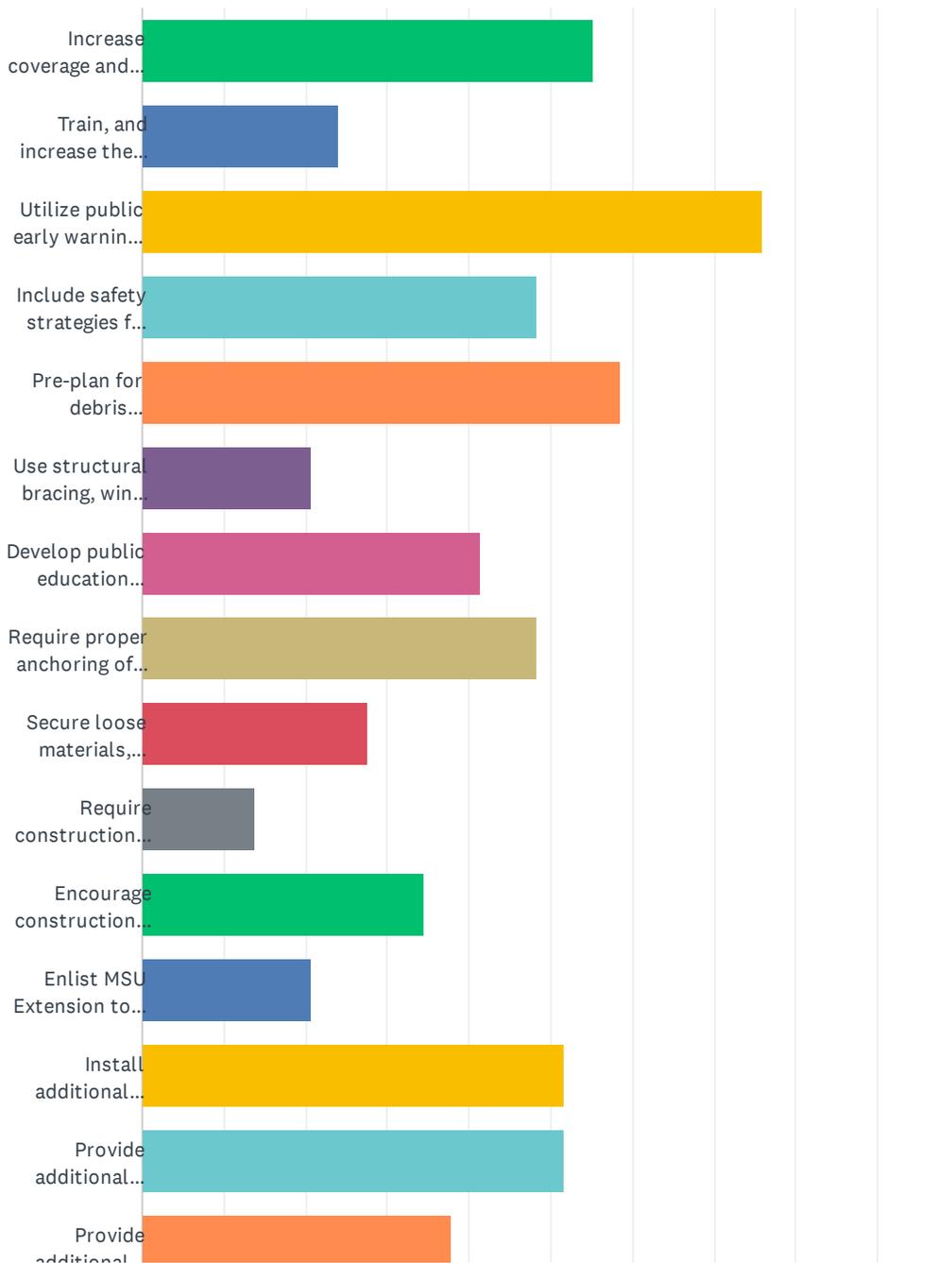
Answered: 31 Skipped: 5

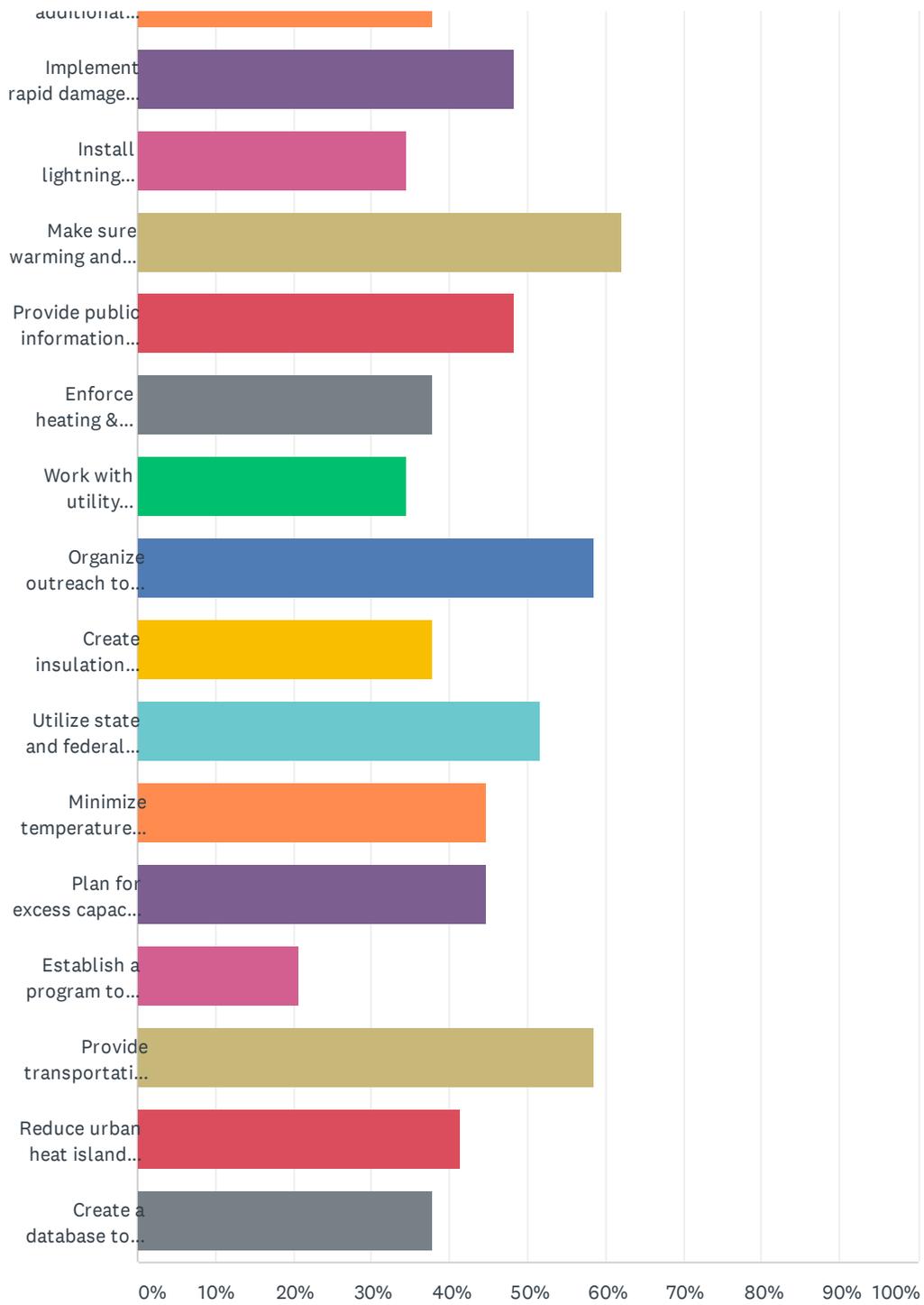


ANSWER CHOICES	RESPONSES	
Utilize alternative 911 access through radio operators whose homes are identified with special markings	25.81%	8
Develop programs/networks for contacting elderly or homebound persons during periods of infrastructure failure	70.97%	22
Separate and/or expand sewer system to handle anticipated stormwater volumes	35.48%	11
Create "rolling blackouts" in electrical systems that would otherwise fail due to overload	22.58%	7
Replace or renovate aging structures and equipment (to be made as hazard resistant as economically possible)	67.74%	21
Establish tree-trimming programs to protect utility wires from falling branches (establish local community forestry programs with goal of creating and maintaining disaster resistant landscapes in public rights of way)	64.52%	20
Utilize buried/protected power and utility lines	70.97%	22
Install surge protectors on critical electronic equipment	58.06%	18
Create relief and response centers for impacted residents	58.06%	18
Obtain hydrogen sulfide detection equipment	25.81%	8
Obtain/maintain back-up generators for pump and lift stations and wastewater treatment plants	67.74%	21
Detect and prevent/discourage illegal discharges into storm sewers from home footing drains, downspouts, and sump pumps	41.94%	13
Properly locate, design, and maintain water and sewer systems to insulate critical components from freezing	45.16%	14
Develop redundancy in utility and communication systems, especially "lifeline" systems	67.74%	21
Increase public awareness and use of "MISS DIG"	35.48%	11
Perform a study to assure redundancies in water systems	48.39%	15
Total Respondents: 31		

Q26 The following Severe Summer Weather Hazard Mitigation Strategies are outlined in the State of Michigan Hazard Mitigation Plan or other local plans. These strategies are suggested to be considered in the Grand Rapids, Kent County, and Ottawa County Regional Hazard Mitigation Plan. Possible mitigation strategies are listed under this high priority hazard selected in the initial Advisory Committee Workshop in April 2021. Please identify any additional strategies that should be considered in the updated plan.

Answered: 29 Skipped: 7





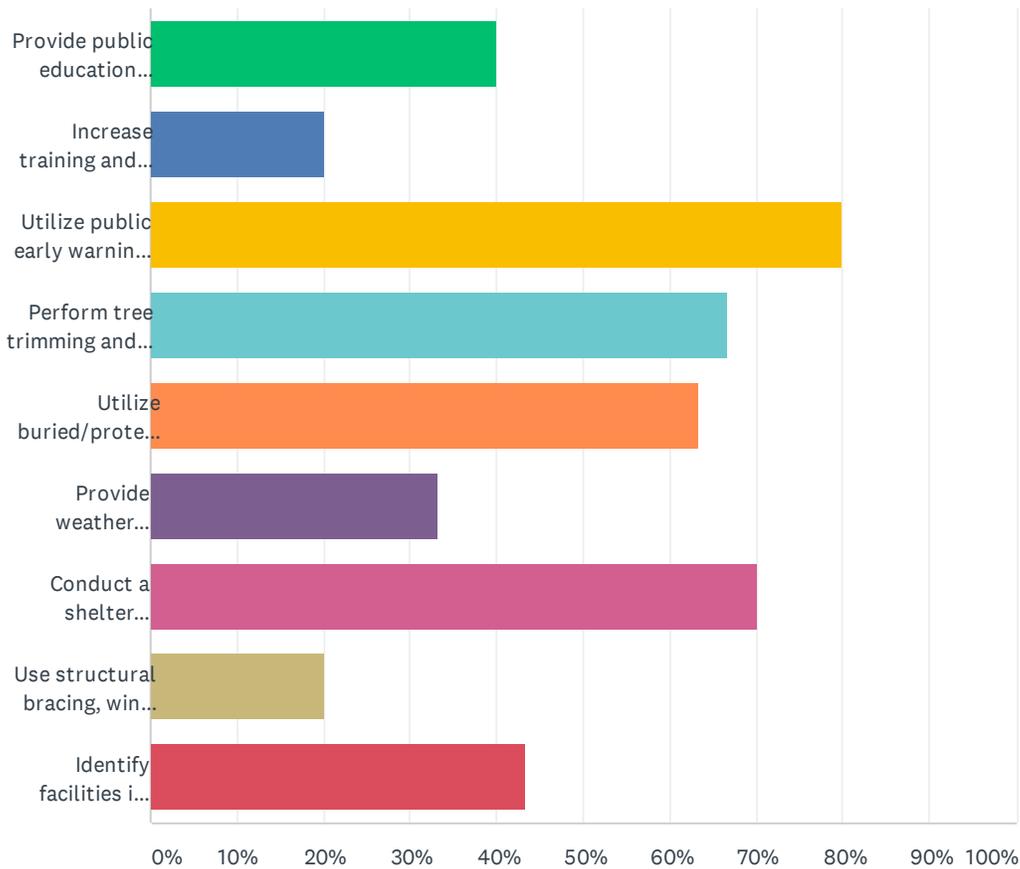
ANSWER CHOICES	RESPONSES
Increase coverage and use of NOAA Weather radio (detection and public notification)	55.17% 16
Train, and increase the use of, weather spotters	24.14% 7
Utilize public early warning systems and networks	75.86% 22
Include safety strategies for severe weather events in driver education classes and materials	48.28% 14
Pre-plan for debris management and storage and implement system to provide heavy equipment for storm debris cleanup	58.62% 17
Use structural bracing, window shutters, laminated window glass, and hail resistant roof shingles to minimize damage to public and private structures	20.69% 6
Develop public education materials to explain property protection measures and insurance options	41.38% 12
Require proper anchoring of manufactured homes and exterior structures such as carports and porches	48.28% 14
Secure loose materials, yard, and patio items so that they cannot be blown about in high winds	27.59% 8
Require construction of concrete safe rooms for new construction of single and multi-family homes and shelter areas in mobile home parks, fairgrounds, shopping malls, and other vulnerable public areas	13.79% 4
Encourage construction of concrete safe rooms to retrofit existing single and multi-family homes and shelter areas in mobile home parks, fairgrounds, shopping malls, and other vulnerable public areas	34.48% 10
Enlist MSU Extension to recommend protective vegetation	20.69% 6
Install additional tornado sirens in community	51.72% 15
Provide additional manpower to assist during and following storms	51.72% 15
Provide additional medical and confined space entry equipment	37.93% 11
Implement rapid damage assessment	48.28% 14
Install lightning protection devices in communities' communication infrastructure	34.48% 10
Make sure warming and cooling centers have adequate power backup generators	62.07% 18
Provide public information before extreme temperatures occur (spring & fall)	48.28% 14
Enforce heating & cooling requirements for landlords, especially those serving vulnerable populations	37.93% 11
Work with utility companies to allow special arrangements for those unable to pay heating/cooling bills	34.48% 10
Organize outreach to isolated, vulnerable, or special-needs populations during periods of extreme temperatures	58.62% 17
Create insulation standards to protect from extreme heat and cold and to increase efficiency (especially in buildings used to house vulnerable populations)	37.93% 11
Utilize state and federal programs that assist low-income families in home improvements that protect from extreme temperatures and increase efficiency	51.72% 15
Minimize temperature impacts on utilities and infrastructure (including substations)	44.83% 13
Plan for excess capacity in shelters for extreme temperature events	44.83% 13
Establish a program to address pavement buckling in extreme cold or heat	20.69% 6
Provide transportation for elderly and disable to shelters	58.62% 17
Reduce urban heat island effects by planting trees around buildings, to shade parking lots, and along public rights-of-way	41.38% 12

Create a database to track those individuals at high risk of death, such as the elderly, homeless, etc. 37.93% 11

Total Respondents: 29

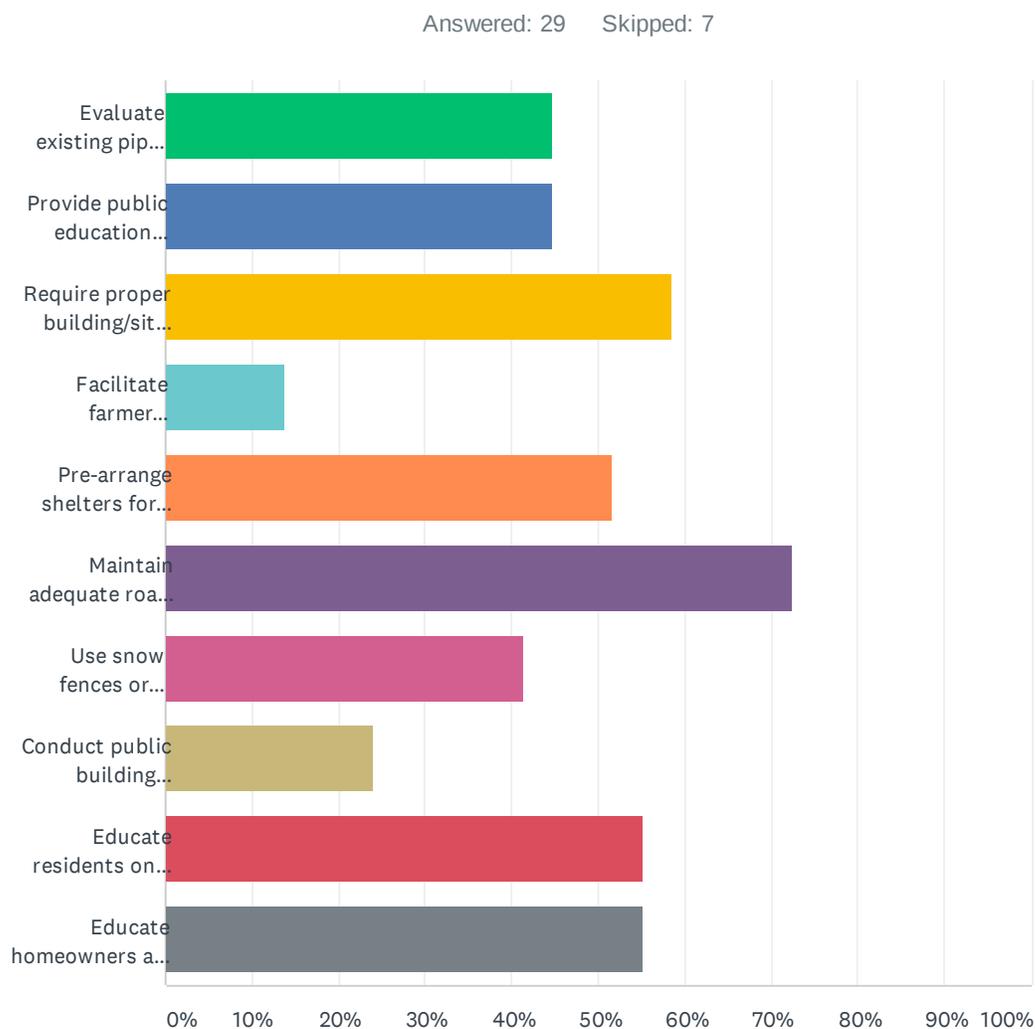
Q27 The following Severe Wind and Tornadoes Hazard Mitigation Strategies are outlined in the State of Michigan Hazard Mitigation Plan or other local plans. These strategies are suggested to be considered in the Grand Rapids, Kent County, and Ottawa County Regional Hazard Mitigation Plan. Possible mitigation strategies are listed under this high priority hazard selected in the initial Advisory Committee Workshop in April 2021. Please identify any additional strategies that should be considered in the updated plan.

Answered: 30 Skipped: 6



ANSWER CHOICES	RESPONSES	
Provide public education regarding the dangers of thunderstorms	40.00%	12
Increase training and use of weather spotters	20.00%	6
Utilize public early warning systems and networks	80.00%	24
Perform tree trimming and maintenance to prevent limb breakage and to safeguard utility lines	66.67%	20
Utilize buried/protected power and utility lines	63.33%	19
Provide weather monitors (not just NOAA weather radios) to schools and nursing homes and mobile home parks for severe wind warnings	33.33%	10
Conduct a shelter assessment for the purpose of identifying shelter facilities that could be used during or after severe wind events and/or severe winter storm conditions	70.00%	21
Use structural bracing, window shutters, laminated glass in windowpanes, and hail-resistant shingles to minimize damage to private and public structures	20.00%	6
Identify facilities in need of tornado shelters	43.33%	13
Total Respondents: 30		

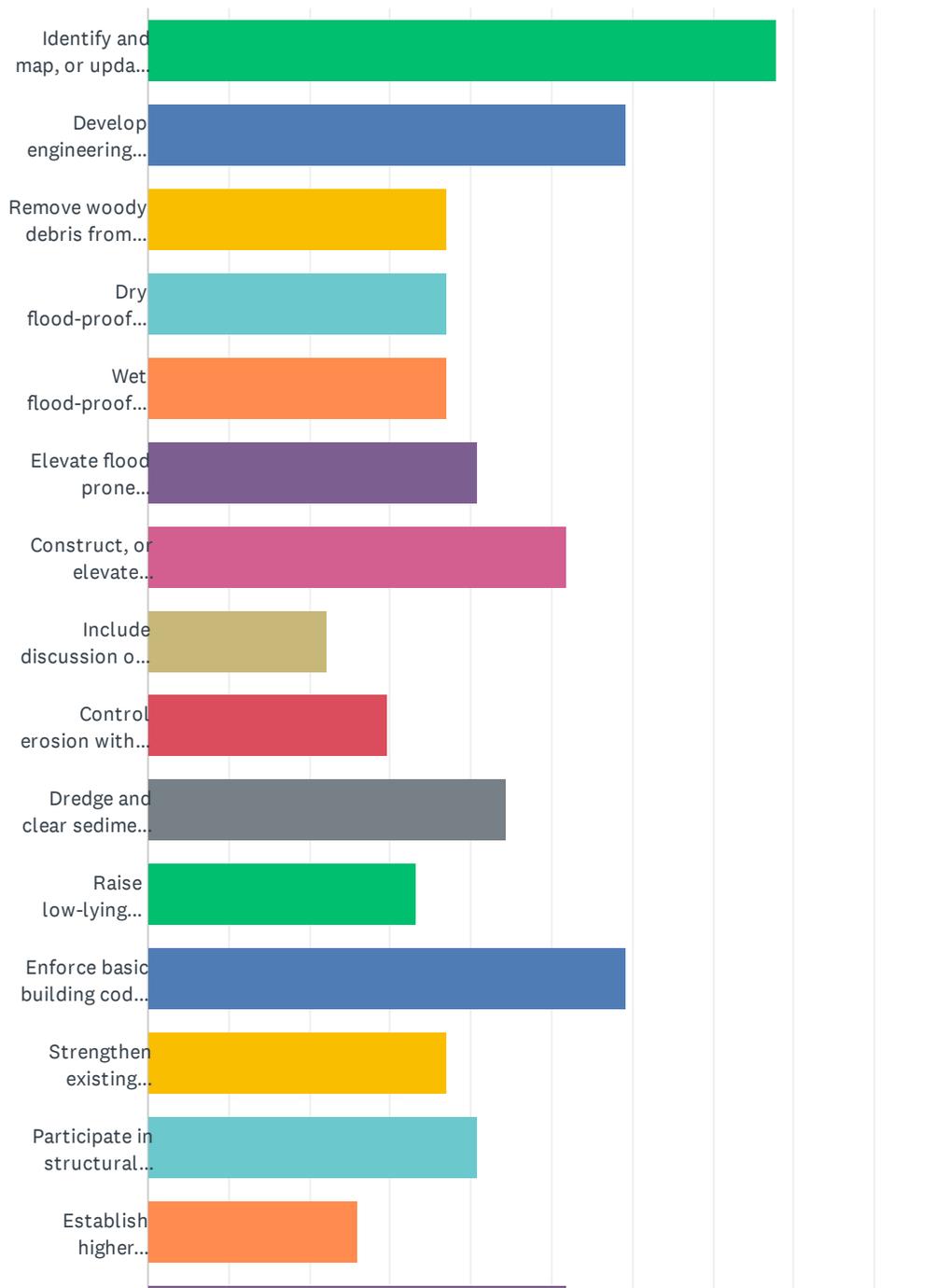
Q28 The following Severe Winter Weather Mitigation Strategies are outlined in the State of Michigan Hazard Mitigation Plan or other local plans. These strategies are suggested to be considered in the Grand Rapids, Kent County, and Ottawa County Regional Hazard Mitigation Plan. Possible mitigation strategies are listed under this high priority hazard selected in the initial Advisory Committee Workshop in April 2021. Please identify any additional strategies that should be considered in the updated plan.

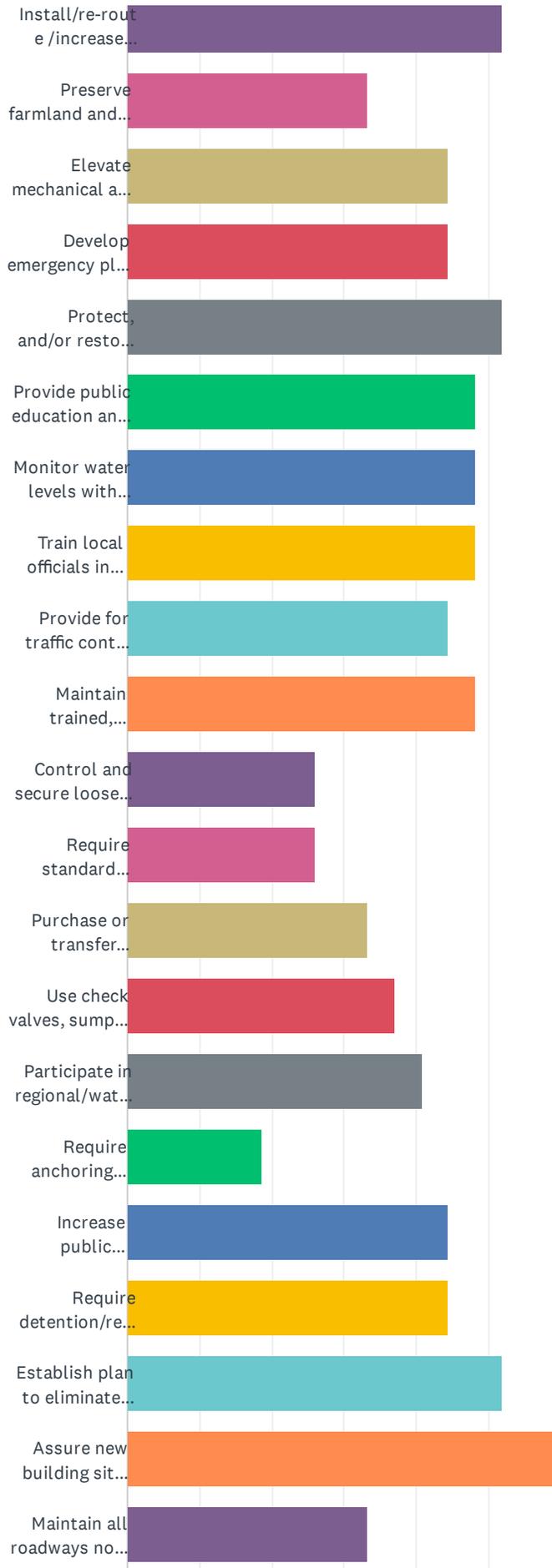


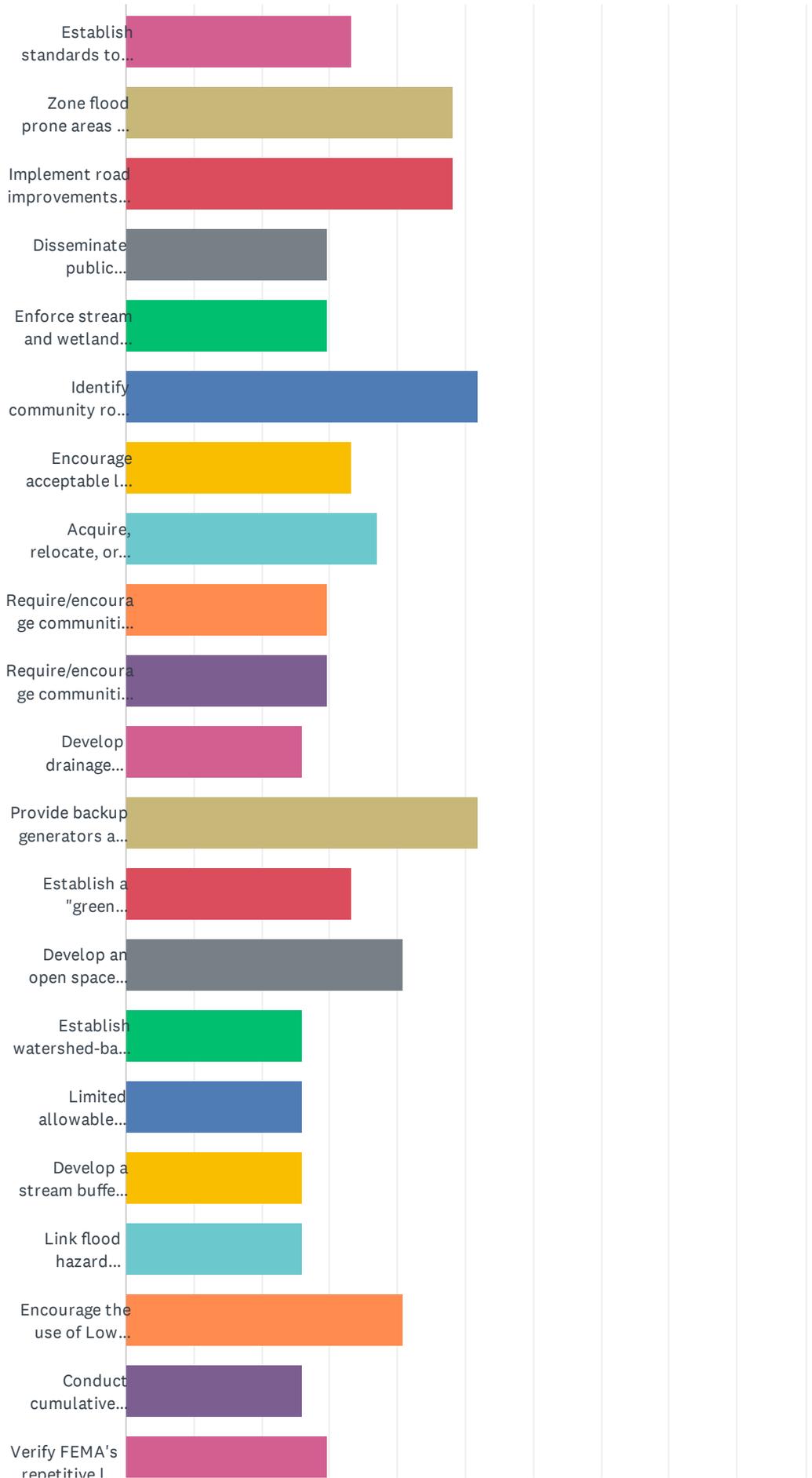
ANSWER CHOICES	RESPONSES	
Evaluate existing pipes for "brittleness" and replace as necessary and prudent	44.83%	13
Provide public education regarding severe winter weather hazards	44.83%	13
Require proper building/site design and code enforcement relating to snow loads, roof slope, snow removal and storage, etc.	58.62%	17
Facilitate farmer preparedness to address livestock needs/problems	13.79%	4
Pre-arrange shelters for stranded motorists/travelers, and others	51.72%	15
Maintain adequate road and debris clearing capabilities	72.41%	21
Use snow fences or "living snow fences" to limit blowing and drifting snow over critical road segments	41.38%	12
Conduct public building maintenance and educate homeowners regarding prevention of ice dam damage	24.14%	7
Educate residents on dangers of alternative heat sources (space heaters) when power is lost - to reduce risk of fire and carbon monoxide	55.17%	16
Educate homeowners and builders on how to protect their pipes, including letting faucets drip during extreme cold weather and locating water pipes on the inside of building insulation or keeping them out of attics, crawl spaces, and vulnerable outside walls	55.17%	16
Total Respondents: 29		

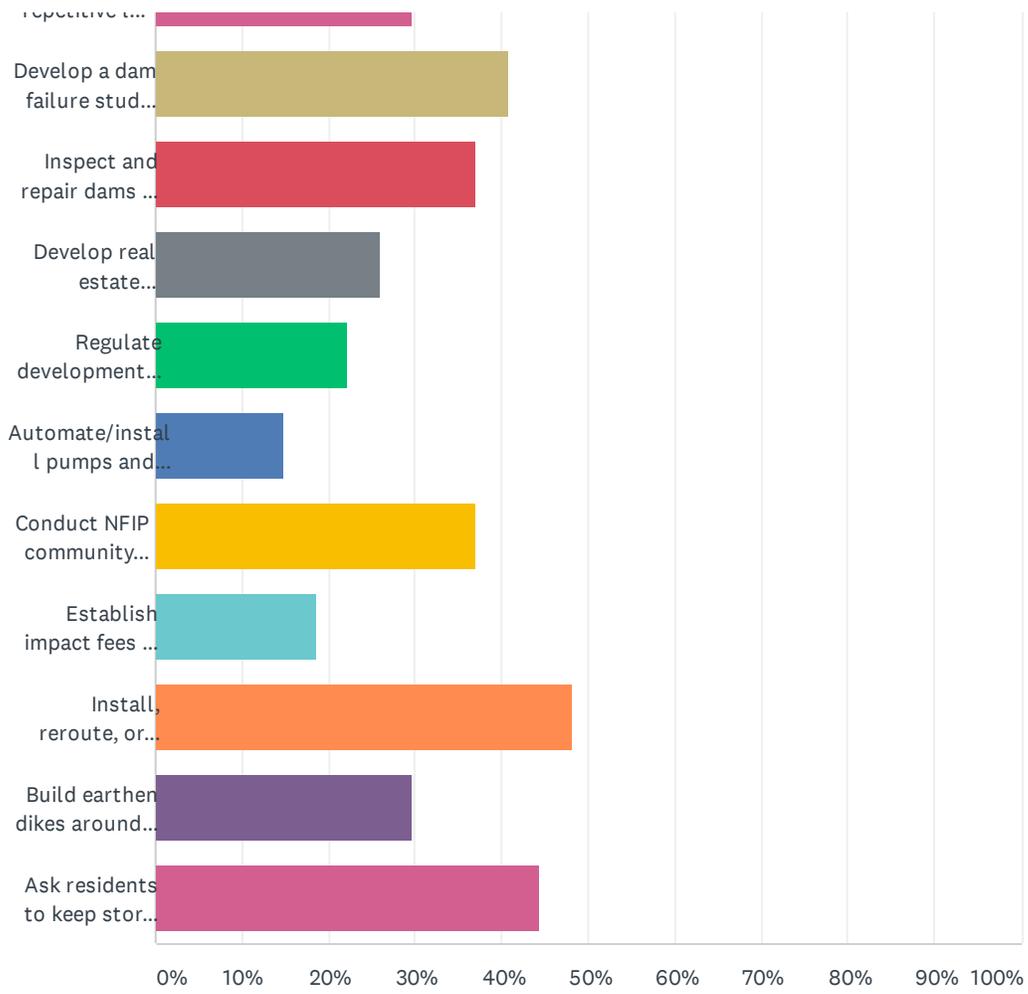
Q29 The following Flooding Mitigation Strategies are outlined in the State of Michigan Hazard Mitigation Plan or other local plans. These strategies are suggested to be considered in the Grand Rapids, Kent County, and Ottawa County Regional Hazard Mitigation Plan. Possible mitigation strategies are listed under this high priority hazard selected in the initial Advisory Committee Workshop in April 2021. Please identify any additional strategies that should be considered in the updated plan.

Answered: 27 Skipped: 9









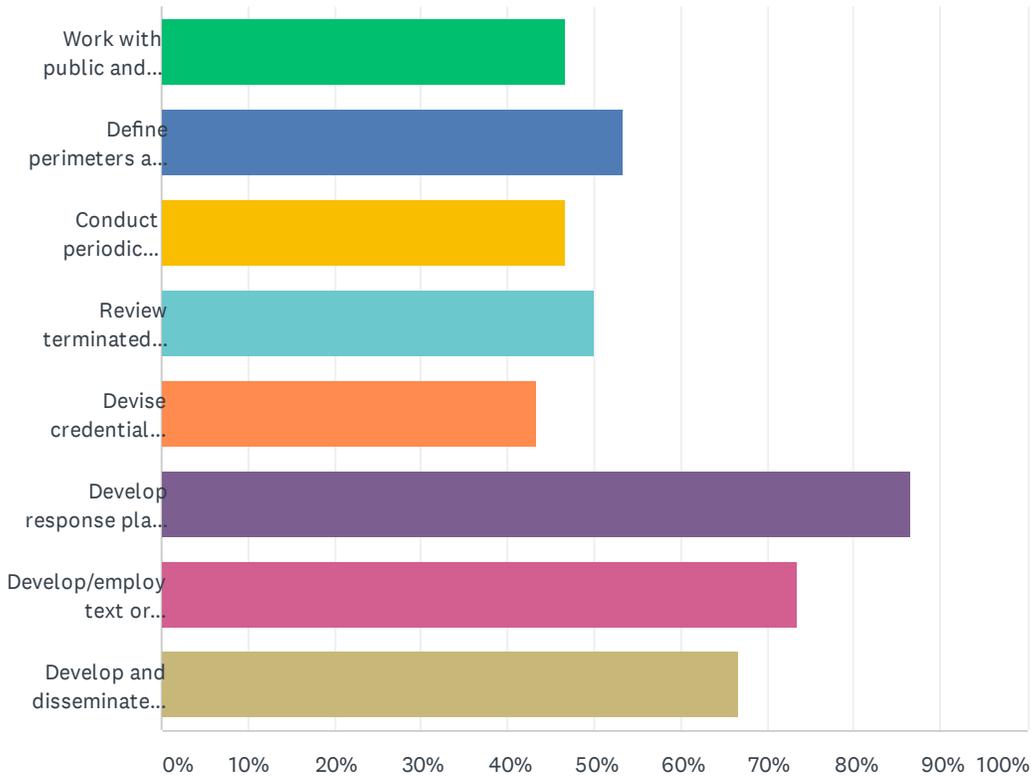
ANSWER CHOICES	RESPONSES	
Identify and map, or update existing maps of, floodplains and flood prone areas	77.78%	21
Develop engineering plans to address flood prone areas	59.26%	16
Remove woody debris from flood prone areas	37.04%	10
Dry flood-proof structures within know flood areas (strengthen walls, seal openings, use waterproof compounds or plastic sheeting on walls)	37.04%	10
Wet flood-proof structures within know flood areas (controlled flooding of structures to balance water forces and reduce structural collapse during floods)	37.04%	10
Elevate flood prone structures above the 100-year base flood elevation	40.74%	11
Construct, or elevate existing, roads or plan alternative roads that are unaffected by flooding. Make roads more flood resistant through better drainage and/or stabilization/armoring of vulnerable shoulders and embankments	51.85%	14
Include discussion of safety strategies for flood areas in driver education classes and materials	22.22%	6
Control erosion within the watershed	29.63%	8
Dredge and clear sediment and debris from drainage channels and from support bracing under bridges	44.44%	12
Raise low-lying bridges	33.33%	9
Enforce basic building code requirements related to flood mitigation	59.26%	16
Strengthen existing watershed councils	37.04%	10
Participate in structural projects to channel water away from people and property	40.74%	11
Establish higher engineering standards for drain and sewer capacity	25.93%	7
Install/re-route /increase storm drain system capacity, including the separation of storm and sanitary systems	51.85%	14
Preserve farmland and open space	33.33%	9
Elevate mechanical and utility devices above expected flood levels	44.44%	12
Develop emergency plans for schools, factories, office buildings, shopping malls, hospitals, prisons, stadiums and recreation areas, and other appropriate sites	44.44%	12
Protect, and/or restore, wetlands and natural water retention areas	51.85%	14
Provide public education and flood warning systems	48.15%	13
Monitor water levels with stream gauges and trained monitors	48.15%	13
Train local officials in flood control, flood plan management, flood proofing, etc.	48.15%	13
Provide for traffic control and road closures in flooded areas	44.44%	12
Maintain trained, equipped, and well-prepared search and rescue teams	48.15%	13
Control and secure loose materials, yard items, and stored objects in floodplains that otherwise be swept away, damaged or pose a hazard when flooding occurs	25.93%	7
Require standard tie-downs for propane tanks	25.93%	7
Purchase or transfer development rights to discourage development in floodplains	33.33%	9
Use check valves, sump pumps, and backflow prevention in homes and buildings	37.04%	10

Participate in regional/watershed cooperation	40.74%	11
Require anchoring manufacture homes to a permanent foundation (but with an option to move structures if necessary)	18.52%	5
Increase public awareness of the need for permits for building in floodplains	44.44%	12
Require detention/retention in new development	44.44%	12
Establish plan to eliminate repetitive loss properties	51.85%	14
Assure new building sites are above base flood elevation	59.26%	16
Maintain all roadways no more than 1 foot below the base flood elevation	33.33%	9
Establish standards to prevent erosion, including the use of native vegetation	33.33%	9
Zone flood prone areas for open space and recreation	48.15%	13
Implement road improvements to prevent washouts	48.15%	13
Disseminate public education materials explaining wetland protection measures and benefits	29.63%	8
Enforce stream and wetland dumping/fill regulations	29.63%	8
Identify community roads that area susceptible to flooding during times of heavy rainfall	51.85%	14
Encourage acceptable land use densities, coverage, and planning for soil types and capacities based upon runoff and absorption capabilities	33.33%	9
Acquire, relocate, or condemn structures within floodplain or floodway areas	37.04%	10
Require/encourage communities to join the National Flood Insurance Program (NFIP)	29.63%	8
Require/encourage communities to participate in the Community Rating System (CRS)	29.63%	8
Develop drainage easements for planned and regulated public use of private land for temporary water detention and drainage	25.93%	7
Provide backup generators and other measures (e.g., alarms, meters, etc.) for pump and lift stations in sanitary sewer systems, to ensure that drainage infrastructure is not impeded	51.85%	14
Establish a "green infrastructure" plan/program to link, manage, and expand existing parks, preserves, greenways, etc.	33.33%	9
Develop an open space acquisition and/or land bank program for preserving flood hazard areas	40.74%	11
Establish watershed-based planning initiatives to address flood hazards with neighboring communities	25.93%	7
Limited allowable impervious surface within new development	25.93%	7
Develop a stream buffer ordinance to protect water resources and limit flood hazards	25.93%	7
Link flood hazard mitigation objectives with U.S. EPA/MDEQ MS4 Stormwater Initiatives	25.93%	7
Encourage the use of Low Impact Development (LID) techniques	40.74%	11
Conduct cumulative impact analyses for multiple development projects within the same watershed/sub watershed	25.93%	7
Verify FEMA's repetitive loss inventory and develop a tracking database	29.63%	8
Develop a dam failure study and emergency action plan	40.74%	11
Inspect and repair dams on a regular basis	37.04%	10
Develop real estate disclosure laws that identify homes located within the hydraulic shadows of dams	25.93%	7
Regulate development within the hydraulic shadows of dams	22.22%	6

Automate/install pumps and floodgates at dam sites	14.81%	4
Conduct NFIP community workshops to provide information and incentives for property owners to purchase flood insurance	37.04%	10
Establish impact fees to help fund public projects mitigating impacts of land development	18.52%	5
Install, reroute, or increase the capacity of storm drainage and/or flood storage systems	48.15%	13
Build earthen dikes around flood threatened critical facilities	29.63%	8
Ask residents to keep storm drains free of debris during storms (to reduce burden on Public Works crews)	44.44%	12
Total Respondents: 27		

Q30 The following Criminal Acts - Mass Shootings/Active Assailant(s) Mitigation Strategies are outlined in the State of Michigan Hazard Mitigation Plan or other local plans. These strategies are suggested to be considered in the Grand Rapids, Kent County, and Ottawa County Regional Hazard Mitigation Plan. Possible mitigation strategies are listed under this high priority hazard selected in the initial Advisory Committee Workshop in April 2021. Please identify any additional strategies that should be considered in the updated plan.

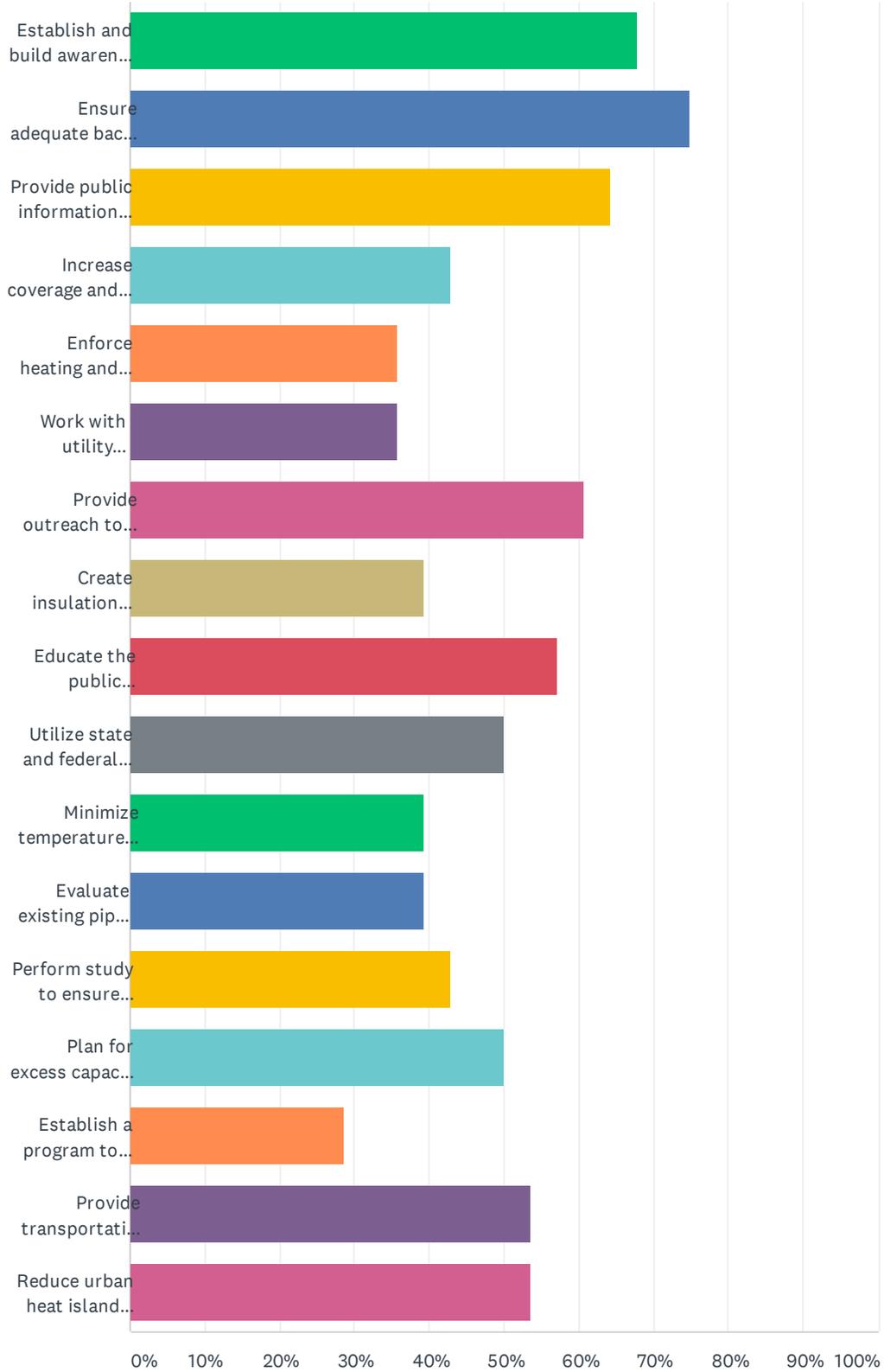
Answered: 30 Skipped: 6



ANSWER CHOICES	RESPONSES	
Work with public and private location managers to post signage for emergency entry and exist points, first aid stations, and shelter locations	46.67%	14
Define perimeters and areas that require access control, identify particularly sensitive or critical areas that require special access controls	53.33%	16
Conduct periodic background checks on all staff assigned to critical or sensitive areas	46.67%	14
Review terminated employees' personnel files to determine if they pose a security risk; ensure they are removed from access systems	50.00%	15
Devise credential systems indicating areas of access and purpose of activity on premises	43.33%	13
Develop response plans for key locations and conduct training exercises	86.67%	26
Develop/employ text or Amber-Alert-like communication systems to notify public when an incident occurs or is suspected	73.33%	22
Develop and disseminate education programs so that public learns warning signs, knows how to report suspicious behavior, and knows how to respond in the event of an active assailant incident	66.67%	20
Total Respondents: 30		

Q31 The following Extreme Temperatures Mitigation Strategies are outlined in the State of Michigan Hazard Mitigation Plan or other local plans. These strategies are suggested to be considered in the Grand Rapids, Kent County, and Ottawa County Regional Hazard Mitigation Plan. Possible mitigation strategies are listed under this high priority hazard selected in the initial Advisory Committee Workshop in April 2021. Please identify any additional strategies that should be considered in the updated plan.

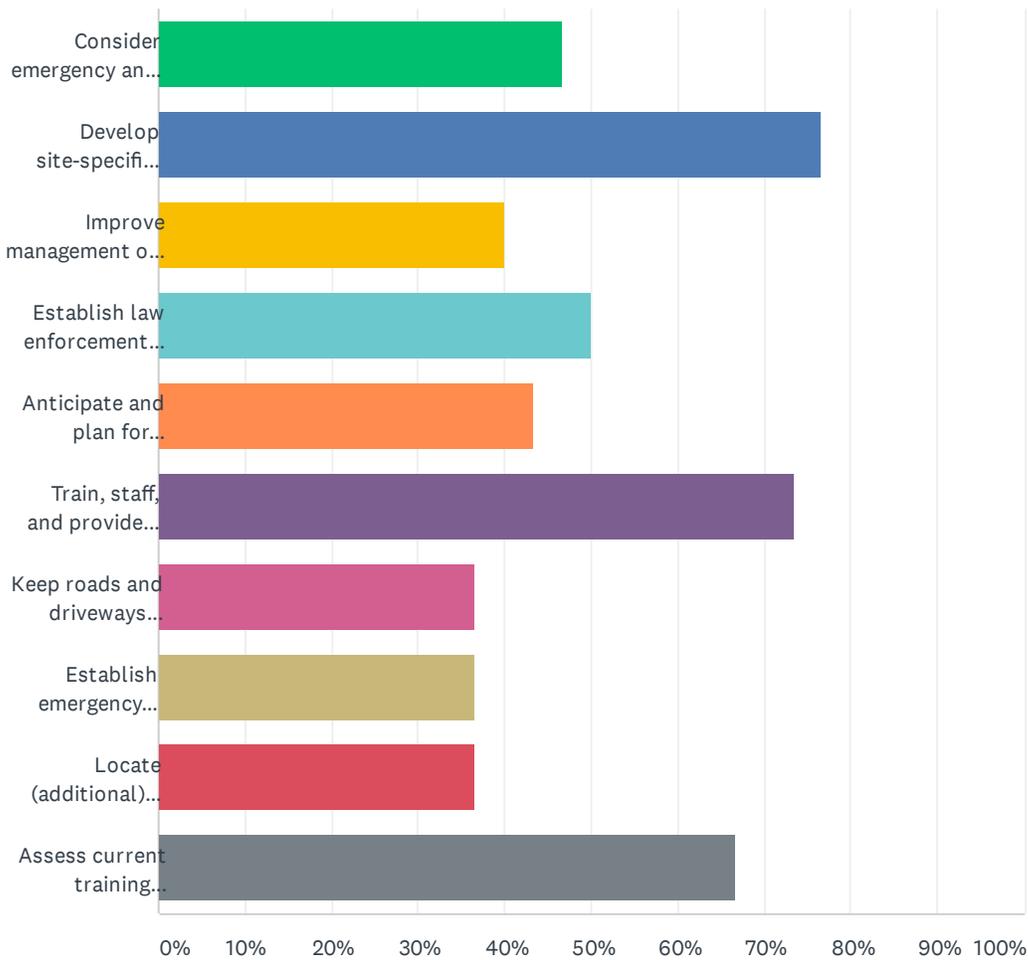
Answered: 28 Skipped: 8



ANSWER CHOICES	RESPONSES	
Establish and build awareness of accessible heating/cooling centers in the community	67.86%	19
Ensure adequate backup power generators for warming and cooling centers	75.00%	21
Provide public information before extreme temperatures occur (i.e., spring & fall)	64.29%	18
Increase coverage and use of NOAA weather radios (public notification)	42.86%	12
Enforce heating and cooling requirements for landlords, especially those serving vulnerable populations	35.71%	10
Work with utility companies to allow special arrangements for those unable to pay heating bills	35.71%	10
Provide outreach to vulnerable populations during extreme temperature events	60.71%	17
Create insulation standards to protect from extreme temperatures and increase efficiency (especially in buildings housing vulnerable populations)	39.29%	11
Educate the public regarding safe use of office and home space heaters	57.14%	16
Utilize state and federal programs that assist low-income families in home improvements that protect from extreme temperatures and increase efficiency	50.00%	14
Minimize temperature impacts on utilities and infrastructure (including substations)	39.29%	11
Evaluate existing pipes for brittleness and replace as necessary and prudent	39.29%	11
Perform study to ensure redundancies in water systems	42.86%	12
Plan for excess capacity at area shelters	50.00%	14
Establish a program to address pavement buckling due to extreme temperatures	28.57%	8
Provide transportation to shelters for elderly or disabled	53.57%	15
Reduce urban heat island effects by planting trees around buildings, to shade parking lots, and along public rights-of-way	53.57%	15
Total Respondents: 28		

Q32 The following Civil Unrest Mitigation Strategies are outlined in the State of Michigan Hazard Mitigation Plan or other local plans. These strategies are suggested to be considered in the Grand Rapids, Kent County, and Ottawa County Regional Hazard Mitigation Plan. Possible mitigation strategies are listed under this high priority hazard selected in the initial Advisory Committee Workshop in April 2021. Please identify any additional strategies that should be considered in the updated plan.

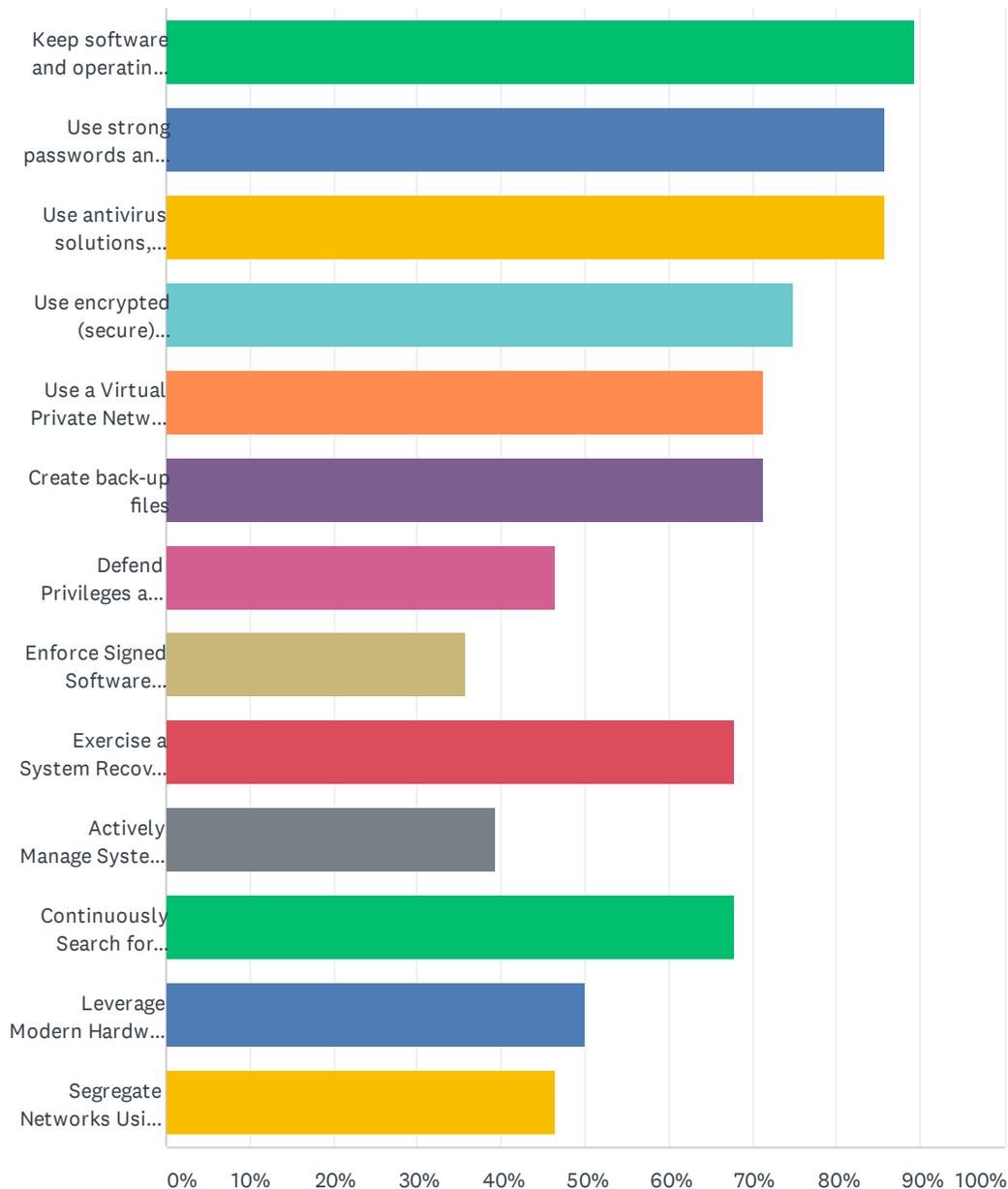
Answered: 30 Skipped: 6



ANSWER CHOICES	RESPONSES	
Consider emergency and security needs in new development	46.67%	14
Develop site-specific emergency plans for high risk and surrounding facilities	76.67%	23
Improve management of high-risk areas using Crime Prevention Environmental Design (CPTED)	40.00%	12
Establish law enforcement mutual aid, including state police and national guard	50.00%	15
Anticipate and plan for incidents, including video documentation (where authorized) of events for later study/use	43.33%	13
Train, staff, and provide resources for law enforcement	73.33%	22
Keep roads and driveways accessible to vehicles and fire equipment—bridges should be able to support emergency vehicles, roads should be adequate for vehicles to turn around and cross both ways	36.67%	11
Establish emergency routing procedures for emergency vehicles to avoid road or bridge closures due to construction or emergency	36.67%	11
Locate (additional) response facilities at prescribed distances in order to standardize response time	36.67%	11
Assess current training programs to determine adequate knowledge and capacity of teams to respond to civil disturbances	66.67%	20
Total Respondents: 30		

Q33 The following Cyber Security Intrusion Mitigation Strategies are outlined in the State of Michigan Hazard Mitigation Plan or other local plans. These strategies are suggested to be considered in the Grand Rapids, Kent County, and Ottawa County Regional Hazard Mitigation Plan. Possible mitigation strategies are listed under this high priority hazard selected in the initial Advisory Committee Workshop in April 2021. Please identify any additional strategies that should be considered in the updated plan.

Answered: 28 Skipped: 8



ANSWER CHOICES	RESPONSES	
Keep software and operating systems up to date	89.29%	25
Use strong passwords and two-factor authentication (two methods of verification)	85.71%	24
Use antivirus solutions, anti-malware, and firewalls to block threats	85.71%	24
Use encrypted (secure) internet communications	75.00%	21
Use a Virtual Private Network (VPN) that creates a secure connection	71.43%	20
Create back-up files	71.43%	20
Defend Privileges and Accounts	46.43%	13
Enforce Signed Software Execution Policies	35.71%	10
Exercise a System Recovery Plan	67.86%	19
Actively Manage Systems and Configurations	39.29%	11
Continuously Search for Network Intrusions	67.86%	19
Leverage Modern Hardware Security Features	50.00%	14
Segregate Networks Using Application-Aware Defenses	46.43%	13
Total Respondents: 28		

Q34 Natural Hazards: Please use the space below to suggest any other hazard mitigation strategies and/or to suggest specific locations in your community or at the county or city level where mitigation is needed. A list of hazards is provided below for your reference.

Answered: 9 Skipped: 27

ANSWER CHOICES	RESPONSES	
Drought	55.56%	5
Earthquake	22.22%	2
Extreme Temperatures - Extreme Cold	44.44%	4
Extreme Temperatures - Extreme Heat	55.56%	5
Fire - Wildfires	44.44%	4
Flooding - Riverine	44.44%	4
Flooding - Shoreline & Erosion	33.33%	3
Fog	33.33%	3
Invasive Species	44.44%	4
Subsidence - Natural	33.33%	3
Thunderstorms - Hail	33.33%	3
Thunderstorms - Lightning	22.22%	2
Thunderstorms - Severe Wind	44.44%	4
Tornadoes	44.44%	4
Winter Hazards - Ice and Sleet	33.33%	3
Winter Hazards - Snowstorms	22.22%	2
Unpredictable Weather	22.22%	2
Landslides	22.22%	2
Other	22.22%	2

Q35 Technological Hazards: Please use the space below to suggest any other hazard mitigation strategies and/or to suggest specific locations in your community or at the county or city level where mitigation is needed. A list of hazards is provided below for your reference.

Answered: 8 Skipped: 28

ANSWER CHOICES	RESPONSES	
Fire - General	37.50%	3
Fire - Urban and Structural	37.50%	3
Flooding - Dam Failure	37.50%	3
Flooding - Urban	50.00%	4
Hazmat Incidents - Fixed Site	62.50%	5
Hazmat Incidents - Transportation	37.50%	3
Infrastructure Failure - Bridges, Roads, Overpasses	12.50%	1
Infrastructure Failure – Communications/ Cyber	50.00%	4
Infrastructure Failure - Electrical Systems	37.50%	3
Infrastructure Failure - Sanitary Sewer System	25.00%	2
Infrastructure Failure - Storm Sewer System	12.50%	1
Infrastructure Failure - Structural Collapse	25.00%	2
Infrastructure Failure - Water System	37.50%	3
Nuclear Power Plant Accidents	25.00%	2
Oil and Gas Well Accidents	12.50%	1
Petroleum and Natural Gas Pipeline Accidents	25.00%	2
Subsidence - Mining	12.50%	1
Other	0.00%	0

Q36 Human Hazards: Please use the space below to suggest any other hazard mitigation strategies and/or to suggest specific locations in your community or at the county or city level where mitigation is needed. A list of hazards is provided below for your reference.

Answered: 9 Skipped: 27

ANSWER CHOICES	RESPONSES	
Civil Disturbance	44.44%	4
Intentional/ Criminal Acts - Vandalism and Arson	22.22%	2
Criminal Acts - Due to Economic Collapse	33.33%	3
Intentional/ Criminal Acts - Mass Shootings	33.33%	3
Centralized Planning in Lansing & Washington, DC	22.22%	2
Unemployment and Underemployment	55.56%	5
Information Technology Intrusion	22.22%	2
Gas/Oil Shortages or Supply Disruptions	22.22%	2
Public Health Emergencies - Pandemics and Epidemics	33.33%	3
Public Health Emergencies - Contaminated Food/Water	44.44%	4
Electromagnetic Pulse	33.33%	3
Transportation Accidents - Air	22.22%	2
Transportation Accidents - Highway	33.33%	3
Transportation Accidents - Marine	22.22%	2
Transportation Accidents - Rail	33.33%	3
Transportation Accidents - Rail/Highway Crossings	33.33%	3
Transportation Accidents - Surface Roads	22.22%	2
Weapons of Mass Destruction	22.22%	2
Other	0.00%	0

Agenda

Date: September 23, 2021

RE: **Second Advisory Committee Meeting
Kent / Ottawa County Hazard Mitigation Plan Update (ASTI File No. 11772)**

Overview – 9:00 A.M.

1. **Hazard Identification Review**
 - Results of Surveys / Workshop
 - Hazards Ranking Criteria
 - Top Hazards for Consideration
2. **Mitigation Goals and Objectives**
 - Results of Survey
 - Strategies Ranking Criteria
 - Top Strategies
 - Discussion of Additional Mitigation Strategies
3. **Action Plan Selection**
 - Specific Strategies to Address
 - Development of Action Plan (see example worksheet)
 - Critical Assets
 - Roles and Responsibilities

Homework

- Action Plans due **October 22, 2021**
- Comments on DRAFT HMP due **February 1, 2021** (Draft sent January 3, 2022)
- Public meetings for comment on Draft in February

Second Advisory Committee Meeting

Kent and Ottawa County, City of Grand Rapids Hazard Mitigation Plan Update

September 23, 2021



Meeting Agenda

Hazard Identification Review
Mitigation Goals and Objectives
Action Plan Selection

Meeting Objectives

Identify acceptable mitigation strategies/actions

Provide sufficient information to prepare Action Plans

Meeting Objectives

On average, every \$1 spent on mitigation results in a \$6 return of avoided future losses.

Hazard Identification Review

Kent and Ottawa County,
City of Grand Rapids
Hazard Mitigation Plan Update



Hazard Identification

1. Prioritized Hazards (Survey)
2. Prioritized Criteria (Workshop)
3. Risk Index
4. State Hazard Rank

Prioritized Hazards

First Survey

March 19, 2021

2021 Survey Rank	% VI or Important
Public Health Emergencies (Pan, Epi, Con F&W)	90.1
Infrastructure Failure (Electric, Gas/Oil, Pipeline)	90.0
Infrastructure Failure (Water)	89.9
Infrastructure Failure (Communications)	89.8
Flooding [& Erosion] (Riverine/Shoreline)	87.6
Winter Weather (Snow, Ice, Sleet)	87.5
Cyber Security Intrusion	87.5
Severe Thunderstorms (Hail, Lightning, High Winds)	85.0
Infrastructure Failure (Bridges, Roads, Structures)	84.0
Supply Chain Disruption (Gas/Oil, PPE, etc.)	82.9
Criminal Acts (Mass Shootings/Active Assailant)	81.4
Infrastructure Failure (Sanitary/Storm Sewers)	79.8

Prioritized Criteria

First Workshop

April 19, 2021

Ranking Criteria For Hazards

2021 Plan Update- First Workshop Results

	Response & Recovery Difficulty	Infrastructure Failure	Loss of Life and Injury	# of People Impacted	Sum
Response & Recovery Difficulty		4	1	2	7
Infrastructure Failure	2		1	2	5
Loss of Life and Injury	5	5		4	14
# of People Impacted	4	4	2		10

With respect to the criterion, the importance of one item to the other is;

5 = much greater

4 = greater than

3 = the same as

2 = lower than

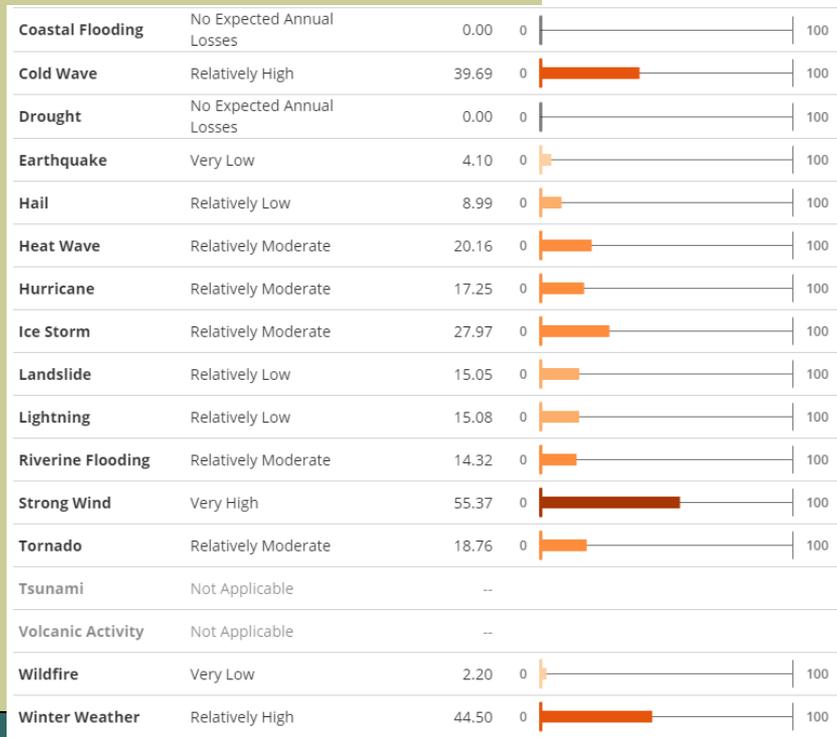
1 = much lower

Hazard Ranking Criteria

<u>Criteria</u>	<u>Weighting</u>
Loss of Life and Injury	14
# of People Impacted	10
Difficulty of Response	7
Infrastructure Failure	5

FEMA National Risk Index*

Ottawa County



Kent County



* Based on Expected Annual Loss, Social Vulnerability, and Community Resilience

Top Hazards

Other Consideration: State Hazard Rank

It is strategic to align your plan's goals to the State's plan

Public Health Emergencies

Infrastructure Failure

Flooding and Erosion

Severe Weather

Questions?

Mitigation Goals and Objectives

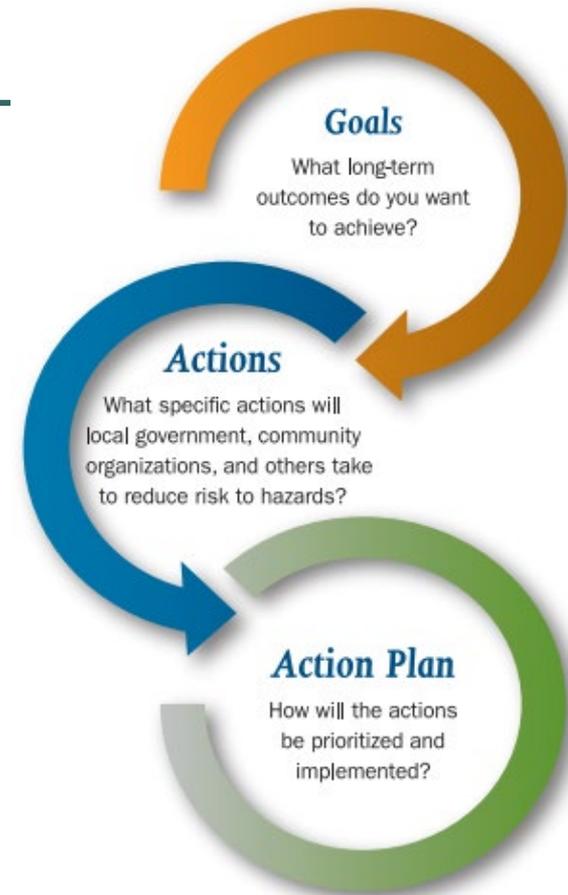
Kent and Ottawa County, City of
Grand Rapids
Hazard Mitigation Plan Update



The Mitigation Strategy

Goal / Objective (2017)

The goal of the regional Hazard Mitigation Plan is to reduce the impact of hazards on citizen life, health and economic well-being based on a continuing hazard risk and vulnerability analysis.



Question #1

Existing Goal/ Objective for Kent and
Ottawa County, City of Grand Rapids

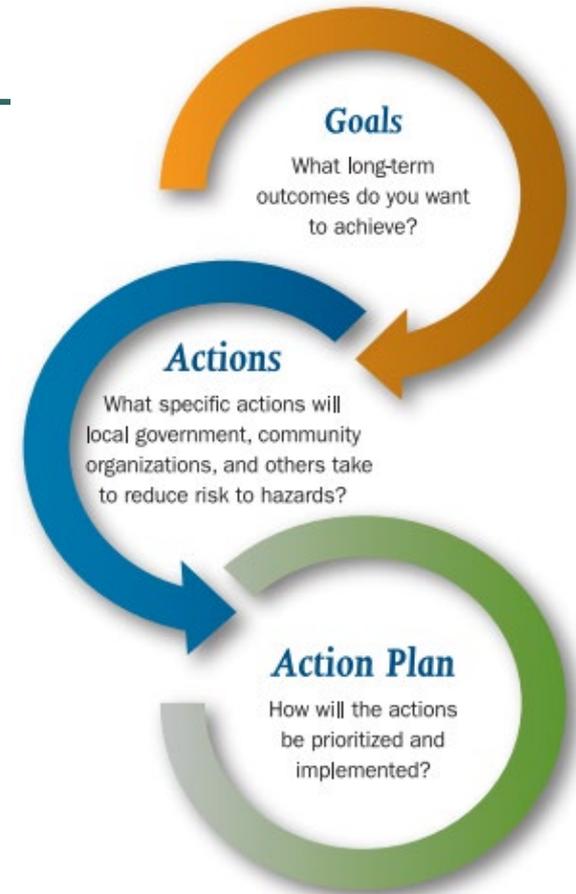
Determine whether we need any changes

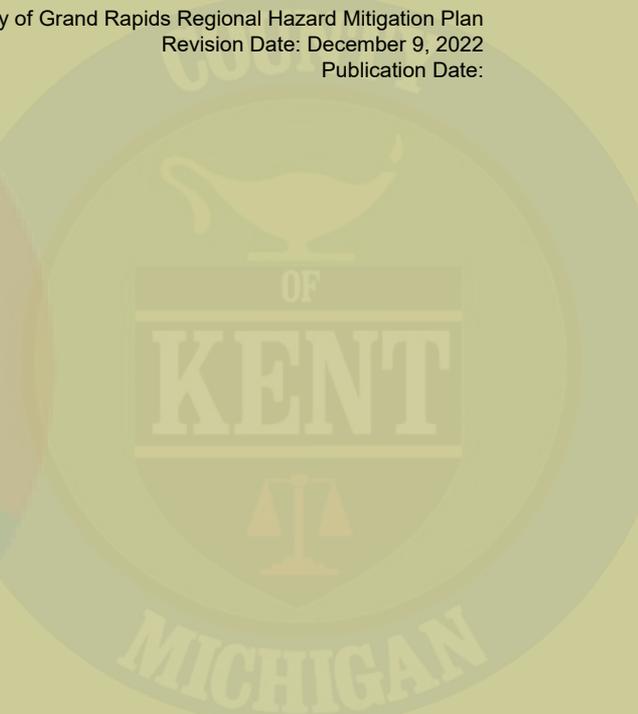
5 minute break

The Mitigation Strategy

Actions

- Benefit- Cost Review (cost effective)
- Substantially reduce risk of future damage, hardship, loss or suffering resulting from a major disaster
- Technically feasible
- Environmentally Friendly - Nature-based
- Inclusive





Mitigation Selection

Kent and Ottawa County, City of
Grand Rapids
Hazard Mitigation Plan Update



Question #2

Top actions for Public Health Emergency mitigation

Question # 2

Top actions/strategies for Public Health Emergency mitigation

- (Communications) Utilization of technology to communicate credible information with the public efficiently and to track exposures effectively. Improve and unify communications regarding public awareness.
- (Emergency Management) Education and training for local businesses, community organizations, and the general public on business continuity planning, emergency action planning, local and regional coordination planning, and other emergency management topics.
- (Vulnerable Populations) Education and notification strategies for communicating with non-English speakers and people with disabilities and vulnerabilities. Making sure areas and facilities with higher populations of vulnerable people are properly prepared to serve vulnerable populations.
- (Coordination) Improved coordination and collaboration for public health crises between cities, counties, health departments, service providers, hospitals/clinics/doctors, pharmacies, and the general public. Implement liaisons employed by the health department to assist the community with compliance and mitigation efforts to reduce disease spread.
- (PPE) Ensure the region has an adequate supply of non-expired PPE available.
- (Environmentally Friendly- mitigate climate crisis) Climate change threatens the health and well-being of the community and worsens health inequities—from extreme weather disasters, to air quality, to the transmission of disease through insects and pests, to food and water shortages. Include a climate impact assessment in all future policies

Question #3

Top actions for Infrastructure Failure mitigation

Question #3

Top actions/strategies for Infrastructure Failure mitigation

- (Communications) Ensure communication systems are resilient, promote interoperability, and employ redundancies. Work with carriers/suppliers to plan for contingencies.
- (Security vulnerabilities) Identify utility/communication/cyber vulnerabilities and ensure security is adequate.
- (Backup generators and fuel) Ensure critical infrastructure has backup generators and fuel; have a stockpile of emergency generators to utilize around the region; identify points of distribution for emergency generators and fuel. Evaluate and provide funds to repair and replace generators.
- (Security Breach) Develop action plans for cybersecurity incidents.
- (Environmentally Friendly- alternative energy) Utilize alternative sources of energy (e.g. solar, wind sources) for key functions.

Question #4

Top actions for Flooding and Erosion mitigation

Question #4

Top actions/strategies for Flooding and Erosion mitigation

- (Environmentally Friendly: Ecological controls- Floodwater Diversion) Develop ecological controls to promote floodwater diversion. Encouraging or requiring neighborhood- and site-scale nature-based solutions like bioretention systems. Bioretention systems include practices such as rain gardens, rainwater harvesting, green roofs, and more. These practices soak up runoff from hard surfaces and reduce the amount of stormwater flowing into the storm sewer system. Communities can mitigate riverine flooding by investing in watershed-scale practices. Land conservation, floodplain restoration, and waterfront parks can keep development out of harm's way. They also store and slow floodwaters. Rebuilding/adding wetlands,
- (Engineering controls- Floodwater Diversion) Develop engineering controls to promote floodwater diversion. Minimizing structures in floodplains, building reservoirs to catch/contain floodwaters, permeable pavement, removal of obstacles to natural drainage/water flow, widen floodways, and storm water check valves to prevent backflow into the storm water pipes
- (Policies) Develop policies regarding at-risk properties. For example, acquire repetitive loss properties and turn into green space, develop building policies that provide information on past flooding events on the property/floodplain information at point of sale, ensure facilities are not built on floodplains, identify vulnerable properties, and develop mitigation strategies to protect the loss of life and minimize property damage.
- (Shoreline infrastructure) Invest in shoreline and seawall infrastructure, maintenance, and enhancements. Smart redevelopment along the waterfront. Study shoreline damage and create mitigation strategies for Lake Michigan property owners.

Question #5

Top actions for Severe Weather mitigation

Question #5

Top actions/strategies for Severe Weather mitigation

- (Environmentally Friendly- Green Spaces) Prioritize green spaces in areas that are most vulnerable to heat island effect. Encourage and support increased tree canopy, safe waterfront access, and cooling stations. Invest in water features in public spaces (splash pads, parks, fountains, etc.)
- (Environmentally Friendly- Living snow fences) Using snow fences or "living snow fences" (rows of trees or vegetation) to limit blowing and drifting of snow over critical roadway segments.
- (Emergency Notifications) Evaluate and improve early warning emergency notifications, emphasizing digital methods of outreach. Provide education on emergency notifications to community members, especially focusing on strategies for communicating with non-English speakers and people with disabilities.
- (Siren Systems) Assess the capabilities of the siren system: ensure the system is up to date with modern technology and is connected to NWS weather warnings, ensure siren system is able to be activated solely in areas under warning by NWS. Continue to test and expand the siren system.
- (Mitigation Education) Develop an outreach program to educate community members on how to mitigate severe weather impacts on homes and how to implement mitigation measures to minimize damage. Buildings, utilities, signs, outdoor lighting, etc. need to be designed and constructed to withstand higher wind speeds and severe weather. Encourage and support improvements in buildings and infrastructure through improved construction standards, debris removal, and tree trimming. Educate people to plan ahead and educate them on expectations during different situations.

Question #5

Top actions/strategies for Severe Weather mitigation

- (Underground Power Lines) Work to install power lines =underground to prevent outages and hazards.
- (Expand Shelter Capabilities) Assess the community’s capability to shelter during extreme temperatures. Expand sheltering capabilities and identify existing facilities to pre-plan operations for better success when necessary. Develop mass care/feeding programs to ensure community members are able to receive basic necessities.
- (Community Resource Education) Make sure the public, especially the non-English speaking and vulnerable population, are aware of resources available during extreme temperature events. Provide public information on a continuous basis to allow for individuals to prepare for severe weather events and identify options to take action.
- (Backup Systems) Maintain power infrastructure, backup systems, and generators so home, business, school, etc. HVAC systems can run during extreme temperature events.
- (Emergency Response Supplies) Work with local Community Emergency Response Teams, snowmobile clubs and others with access to snowmobiles, ATVs, boats, etc. to provide supplies and access to isolated areas in the county to supplement first responder capabilities

10 Minute Break

Mitigation Survey Results

Kent and Ottawa County, City of
Grand Rapids
Hazard Mitigation Plan Update



Items Funded By FEMA

Projects may be of any nature that will result in protection to public or private property. Eligible projects under the HMGP include, but are not limited to:

1. **Property Acquisition** and **Structure Demolition/Relocation** for floodplain protection;
2. **Structure Elevation** in compliance with federal, state, and local ordinances;
3. **Mitigation Reconstruction** of damaged buildings, outside of the floodway or high-risk erosion areas, to minimize future damage;
4. **Dry Floodproofing** of residential and non-residential buildings;
5. **Minor Flood Control** projects to reduce the frequency or severity of flooding (e.g., modification of culverts or creation of storm water detention/retention);
6. **Localized Flood Control** projects to protect specific critical facilities;;
7. **Structural and Nonstructural Retrofitting** of facilities to eliminate the risk of future damage and to protect inhabitants;
8. **Safe Room Construction** for protection from tornadoes, hurricanes, or other high wind events;
9. **Infrastructure Retrofits** to reduce risks to utilities, roads and bridges;
10. **Vegetative Management** and programs such as: Defensible space for wildlife; Ignition-resistant construction; Hazardous fuels reduction;
11. **Post-Disaster Code Enforcement** that supports reconstruction efforts;
12. **State discretionary projects** (5% set aside funding), that fund mitigation actions consistent state goals and objectives and local mitigation plans

Items Funded By FEMA

Additional Discussion

State discretionary projects

Research and development,
Hazard early warning systems,
Generators for critical facilities,
Development of codes and
standards, and
Education / public awareness
programs with mitigation as a
central feature.

Focus Group

5 Minute
Group
Workshop

Identify any additional mitigation strategies for consideration

Core Mitigation List

Review Results

Criteria for Top Actions

Four types of FEMA Actions

Mitigation Type	Description	Example
Local Plans and Regulations	Government authorities, policies, or codes that influence the way land and buildings are developed and built.	Land use ordinances Development review Building codes
Structure and Infrastructure Projects	Modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area.	Acquisitions and elevations of structures in flood prone areas
Natural Systems Protection	Minimize damage and losses and preserve or restore the functions of natural systems.	Erosion control Forest management Wetland restoration and preservation
Education and Awareness Programs	Inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them.	Radio or television spots Websites Presentations

Discussion

Included
Unless
Specifically
Excluded

Final mitigation list

Subject to modification during plan
implementation

Any exclusions?

5 Minute Break

Action Plans

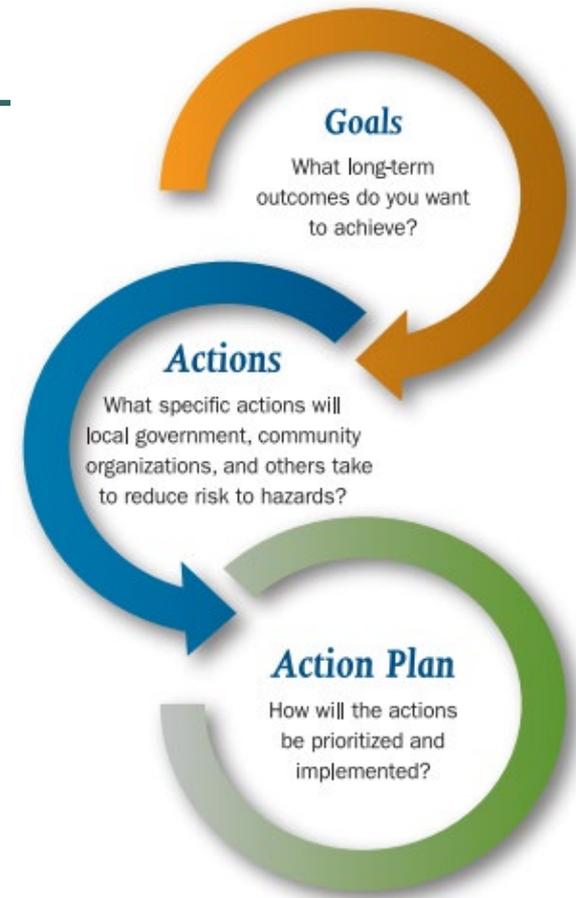
Kent and Ottawa County, City of Grand Rapids Hazard Mitigation Plan Update



The Mitigation Strategy

Action Plan

The action plan describes how the mitigation actions will be implemented. This includes an estimated budget, who is responsible for which actions, what funding mechanisms and other resources are available or will be pursued, and when the actions will be completed.



Action Plan Preparation

Selected Mitigation Actions/
Strategies

At risk and recently impacted
locations

No mention of Non-English speaking
members of the community in 2017

Previous Action Plans

Implementation

2017 Kent County Action Plan #2

Investigate and acquire new warning technology as it becomes available.

High Priority Severe Weather Hazards

Strategy: Primary Responsibility: Kent County

Initiatives Needed: Funding Source

Implementation: By 2022 or sooner, if funding is available.

Cost(s): Reverse 911 system \$100,000

6 Short-range AM/FM Transmitter Systems @ \$50,000 \$300,000

Benefit(s): Lessened potential for personal injury.

Anticipated Funding: Federal mitigation grants as well as other funding sources if available.

2021 Status: Completed and ongoing

2017 Kent County Action Plan #7

800 MHz radio system

High Priority: **Communication Disruption**

Primary Responsibility: Kent County

Initiatives Needed: This project is currently underway

Implementation: This project is scheduled for completion before the next HMP update.

Cost(s): Already funded

Benefit(s): Higher security through less potential for long term interruption of communication.

Anticipated Funding: Grant funding and millage

2021 Status: Completed

2017 Grand Rapids Action Plan #11

Consideration of additional fire-related public awareness activities

Low Priority: **Fire- Urban and Structural**

Primary Responsibility: Kent County

Implementation: By 2022 or sooner

Benefit(s): Less potential for personal injury

2021 Status: Completed and ongoing

2017 Ottawa County Action Plan #6

A communication tower is needed in some portions of the county

High Priority: **Sanitary Sewer Failure**

Primary Responsibility: Ottawa County Central Dispatch

Initiatives Needed: Funding source

Implementation: By 2016 or sooner if funding is available.

Cost(s): Unknown

Benefit(s): Higher security through less potential for long term interruption of communications.

Anticipated Funding: Grants as well as other funding sources, if available.

2021 Status: Completed

Complete Action Plan

Action Plan Template

Specific Action Plans

Assign to Specific Members

Refer to Worksheet

Homework

Action Plan

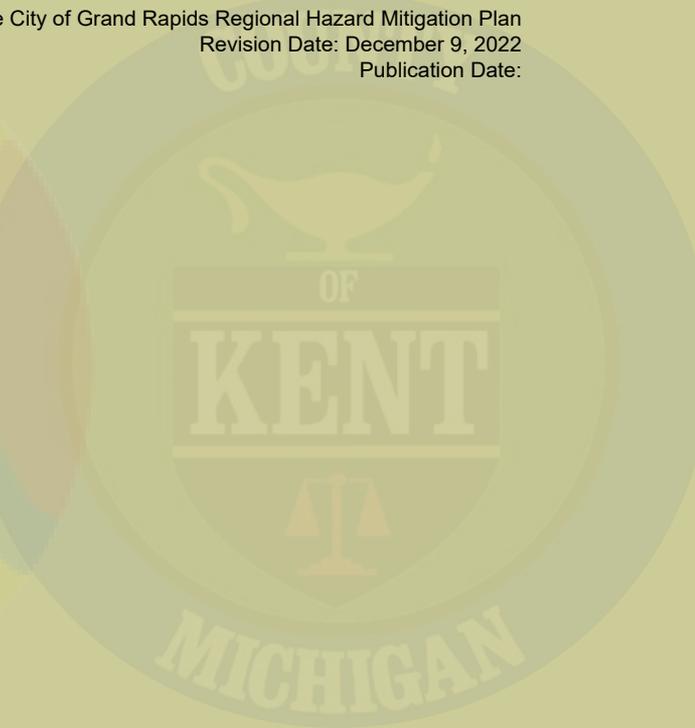
Draft due by December 2021

Draft Completed

ASTI mitigation plan draft completed
~ January 2022

Draft Comments Due

Advisory team draft review
Comments Due: Mid-February 2022



Questions?

Kent and Ottawa County, City of
Grand Rapids
Hazard Mitigation Plan Update



Facility Name	Location	Risk 1	Risk 2
North Kent Sewer Authority	4621 Coit Avenue, Grand Rapids, MI	Dam Failure	
Plainfield Charter Township Water Plant & Wellhead	5220 Woodfield Court, Grand Rapids, MI	Dam Failure	
Plainfield Charter Township Water System	5220 Woodfield Court, Grand Rapids, MI	Extreme Hot/Cold Temps	
Plainfield Charter Township Fire Department	4343 Plainfield Avenue, Grand Rapids, MI	Extreme Hot/Cold Temps	Public Health Emergencies
Mercy Health Rockford - Urgent Care	6050 Northland Drive, Rockford, MI	Extreme Hot/Cold Temps	Public Health Emergencies
Doctor's Office	2894 Thornapple River Drive, Grand Rapids, MI	Dam Failure	
Sunrise Assisted Living	3041 Charlevoix Dr. SE, Grand Rapids, MI	Public Health Emergencies	
Sentinel Pointe Retirement Community	2900 Thornhills Ave. SE, Grand Rapids, MI	Public Health Emergencies	
Emereld Meadows Assisted Living	6117 Charlevoix Woods Ct. SE, Grand Rapids, MI	Public Health Emergencies	
Kent ISD Buildings	2930 Knapp NE, Grand Rapids, MI	Extreme Hot/Cold Temps	Public Health Emergencies
Vicinity Energy Grand Rapids, LLC (Steam Plant)	156 Fulton St. W, Grand Rapids, MI	Public Health Emergencies	
Villa Maria	1305 Walker NW, Grand Rapids, MI	Extreme Hot/Cold Temps	
Grand Rapids Fire Department	38 LaGrave SE, Grand Rapids, MI	Public Health Emergencies	
Holland Hospital	602 Michigan Ave., Holland, MI	Public Health Emergencies	
University of Michigan West Hospital	5900 Byron Center SW, Wyoming, MI	Public Health Emergencies	
Mercy Health St. Mary's	200 Jefferson Ave., Grand Rapids, MI	Public Health Emergencies	
Grand Valley State University	1 Campus Drive, Allendale, MI	Public Health Emergencies	
The Laurels of Hudsonville	3650 Van Buren St., Hudsonville, MI	Public Health Emergencies	
Gerald R. Ford International Airport	5500 44th St. SE, Grand Rapids, MI	Public Health Emergencies	
Kent County Jail	703 Ball Ave. NE, Grand Rapids, MI	Public Health Emergencies	
Feeding America West Michigan	864 West River Center, Comstock Park, MI	Public Health Emergencies	

REDACTED FOR PUBLIC VIEW

Facility Name	Location	Impact
Versluis Park	3650 Versluis Park Drive NE, Grand Rapids, MI	Storm Drainage or Urban Flooding
Brookcrest Long Term Care	3400 Wilson Ave. SW, Grandville, MI	Storm Drainage or Urban Flooding
Vicinity Energy Grand Rapids, LLC	Steam main below Fulton St. bridge	Storm Drainage or Urban Flooding
Grand Valley State University	140 Front St., Grand Rapids, MI	Storm Drainage or Urban Flooding
Gary Byker Memorial Library of Hudsonville	3338 Van Buren St., Hudsonville, MI	Storm Drainage or Urban Flooding
Grandville Clean Water Plant	15 Baldwin St., Jenison, MI	Storm Drainage or Urban Flooding
Knapp's Corner Drain County Drain	1950 East Beltline NE, Grand Rapids, MI	Storm Drainage or Urban Flooding
City Office Building	509 Wealthy SW, Grand Rapids, MI	Storm Drainage or Urban Flooding
City of Grand Rapids Impound Lot	1300 Market St., Grand Rapids, MI	Storm Drainage or Urban Flooding
Plaza Towers	11 Monroe Ave. NW, Grand Rapids, MI	Storm Drainage or Urban Flooding
Road	US-31 between Lincoln Avenue & East 32nd Street, Holland	Storm Drainage or Urban Flooding
Holland Hospital	602 Michigan Ave., Holland, MI	Storm Drainage or Urban Flooding
Village of Sparta	Village of Sparta	Storm Drainage or Urban Flooding
Village of Sand Lake	Village of Sand Lake	Storm Drainage or Urban Flooding
Wyoming Water Treatment Plant	16700 New Holland St., Holland, MI	Storm Drainage or Urban Flooding
Lake Drive & Beach Drive	Near shore areas of Lake Macatawa in South Shore/Central Park area, Holland, MI	Riverine or Lakeshore Erosion
Bayview Drive	Bayview Drive, Holland, MI	Riverine or Lakeshore Erosion
Kouw Park	5591 Lakeshore Dr., Holland, MI	Riverine or Lakeshore Erosion
Windsnest Park	7905 Margaret Ave., West Olive, MI	Riverine or Lakeshore Erosion
GVSU Eberhard Center & Blue Bridge	301 Fulton St. W, Grand Rapids, MI	Subsidence or Sinkholes
Residence with a buried county drain pipe through their property	[REDACTED]	Subsidence or Sinkholes
Emmons St.	Village of Caledonia	Subsidence or Sinkholes

REDACTED FOR PUBLIC VIEW

Draft Regional Hazard Mitigation Strategies

Public Health Emergencies

- Utilization of technology to communicate credible information with the public efficiently and to track exposures effectively. Improve and unify communications regarding public awareness.
- Education and training for local businesses, community organizations, and the general public on business continuity planning, emergency action planning, local and regional coordination planning, and other emergency management topics.
- Education and notification strategies for communicating with non-English speakers and people with disabilities and vulnerabilities. Making sure areas and facilities with higher populations of vulnerable people are properly prepared to serve vulnerable populations.
- Improved coordination and collaboration for public health crises between cities, counties, health departments, service providers, hospitals/clinics/doctors, pharmacies, and the general public. Implement liaisons employed by the health department to assist the community with compliance and mitigation efforts to reduce disease spread.
- Ensure the region has an adequate supply of non-expired PPE available.

Infrastructure Failure

- Ensure communication systems are resilient, promote interoperability, and employ redundancies. Work with carriers/suppliers to plan for contingencies.
- Identify utility/communication/cyber vulnerabilities and ensure security is adequate.
- Ensure critical infrastructure has backup generators and fuel; have a stockpile of emergency generators to utilize around the region; identify points of distribution for emergency generators and fuel. Evaluate and provide funds to repair and replace generators.
- Develop action plans for cybersecurity incidents.

Flooding and Erosion

- Develop engineering and ecological controls to promote floodwater diversion, such as, rebuilding/adding wetlands, minimizing structures in floodplains, building reservoirs to catch/contain floodwaters, permeable pavement, green roofs, removal of obstacles to natural drainage/water flow, widen floodways, drought and flood resistant vegetation, and storm water check valves to prevent backflow into the storm

- water pipes.
- Develop policies regarding at-risk properties. For example, acquire repetitive loss properties and turn into green space, develop building policies that provide information on past flooding events on the property/floodplain information at point of sale, ensure facilities are not built on floodplains, identify vulnerable properties, and develop mitigation strategies to protect the loss of life and minimize property damage.
- Invest in shoreline and seawall infrastructure, maintenance, and enhancements. Smart redevelopment along the waterfront. Study shoreline damage and create mitigation strategies for Lake Michigan property owners.

Severe Summer Weather

- Evaluate and improve early warning emergency notifications, emphasizing digital methods of outreach. Provide education on emergency notifications to community members, especially focusing on strategies for communicating with non-English speakers and people with disabilities.
- Assess the capabilities of the siren system: ensure the system is up to date with modern technology and is connected to NWS weather warnings, ensure siren system is able to be activated solely in areas under warning by NWS. Continue to test and expand the siren system.
- Develop an outreach program to educate community members on how to mitigate severe weather impacts on homes and how to implement mitigation measures to minimize damage. Buildings, utilities, signs, outdoor lighting, etc. need to be designed and constructed to withstand higher wind speeds and severe weather. Encourage and support improvements in buildings and infrastructure through improved construction standards, debris removal, and tree trimming.
- Work to install power lines = underground to prevent outages and hazards.

Extreme Temperatures

- Assess the community's capability to shelter during extreme temperatures. Expand sheltering capabilities and identify existing facilities to pre-plan operations for better success when necessary. Develop mass care/feeding programs to ensure community members are able to receive basic necessities.
- Make sure the public, especially the non-English speaking and vulnerable population, are aware of resources available during extreme temperature events. Provide public information on continuous basis to allow for individuals to prepare for severe weather events and identify options to take action. Educate people to plan ahead and educate them on expectations during different situations.

- Prioritize green spaces in areas that are most vulnerable to heat island effect. Encourage and support increased tree canopy, safe waterfront access, and cooling stations. Invest in water features in public spaces (splash pads, parks, fountains, etc.)
- Maintain power infrastructure, backup systems, and generators so home, business, school, etc. HVAC systems can run during extreme temperature events.

09:01:35 From Alison Sutter (she/her) Grand Rapids to Everyone:
Alison Sutter - City of GR (will be here for the first hour)

09:06:59 From ASTI: Megan Salazar to ASTI- Kera Sharpe(Direct Message):
please communicate here! yeah I would get started? haven't heard anything from Tom schedule-wise either

09:17:37 From Annabelle Wilkinson (she/her), Grand Rapids to Everyone:
Agreed with all suggestions, Thank you!

09:17:47 From Lance Corey to Everyone:
I like the updated language.

09:32:54 From Annabelle Wilkinson (she/her), Grand Rapids to Everyone:
Agree with Allison F. Would like to see those topics throughout.

09:33:12 From Michael Morrow to Everyone:
I 2nd that.

09:35:28 From ASTI: Megan Salazar to ASTI- Kera Sharpe(Direct Message):
only 40% (8 people) participated in this one so far btw. let me know when to show results

09:36:50 From Annabelle Wilkinson (she/her), Grand Rapids to Everyone:
Communities of color are also not mentioned in vulnerable populations.

09:42:24 From Jennifer Sorek to Everyone:
thank you for that

09:44:47 From Alison Sutter (she/her) Grand Rapids to Everyone:
People often become part of a vulnerable population because of inequities / systemic racism and vulnerable populations continue to experience inequitable outcomes. I support the term "vulnerable populations" with a broader definition that includes people of color; low income populations; people with health conditions; age (youth and elderly).

09:46:01 From Annabelle Wilkinson (she/her), Grand Rapids to Everyone:
Agreed with Alison.

10:31:34 From Annabelle Wilkinson (she/her), Grand Rapids to Everyone:
We discussed vulnerable populations being pulled through as a strategy for multiple events correct? Something with stormwater infrastructure we see in GR is a need for better communication/understanding/ an information gap and reaching populations like non English speakers to engage.

10:32:46 From Annabelle Wilkinson (she/her), Grand Rapids to Everyone:
On those floodwater diversion tactics

10:43:21 From Annabelle Wilkinson (she/her), Grand Rapids to Everyone:
One thing of note for the City of Grand Rapids for green spaces the Forestry Committee has mentioned that there are few public spaces left to increase tree canopy - needs to focus more on private property education on residents to increase the canopy.

10:48:20 From Joe Wallace to Everyone:
Joe Wallace at OCRC filling in for Pat Staskiewicz... I know we have moved past the infrastructure topic but since back up systems were brought up again I just wanted to chime in that OCRC-PU has a mobile generator that we use for emergency power loss, so thankfully we have not needed to request assistance from the County to provide generators for sites without permanent backups. Lou, I'll ask Pat to contact you about that wording going forward.

10:48:58 From Lou Hunt-Ottawa Emer. Mgt. to Everyone:
Excellent, thanks Joe

11:00:30 From Annabelle Wilkinson (she/her), Grand Rapids to Everyone:

REDACTED FOR PUBLIC VIEW

Poll Report		9/22/2021 14:36	
Report Generated:			
Topic	Meeting ID	Actual Start Time	Actual Duration (minutes)
Kent/Ottawa/Grand Rapids Hazard Mitigation Plan Workshop 1	928 4960 8115	4/19/2021 8:38	208
Poll Details			
#	User Name	User Email	Submitted Date/Time
1	Tim Burkman - City of Grand Rapids		4/19/2021 10:15
Please select all of the following that you feel should be goals of the Hazard Mitigation Plan			
Protect the lives and property of Kent & Ottawa County residents and visitors;Preserve and protect the area's environment and economy;Preserve and maintain the area's essential services and quality of life;Provide a basis for identifying & prioritizing hazards (existing & emerging) that affect the Counties and their communities;Retain access to FEMA funding for the Counties and their communities by complying with Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165)			
1	Karla Black		4/19/2021 10:14
Protect the lives and property of Kent & Ottawa County residents and visitors;Preserve and protect the area's environment and economy;Preserve and maintain the area's essential services and quality of life;Provide a basis for identifying & prioritizing hazards (existing & emerging) that affect the Counties and their communities;Develop a method(s) to incorporate hazard identification and mitigation into county & municipal planning processes;Retain access to FEMA funding for the Counties and their communities by complying with Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165)			
1	Lou Hunt-Ottawa Emer. Mgt.		4/19/2021 10:15
1	epayne		4/19/2021 10:15
Protect the lives and property of Kent & Ottawa County residents and visitors;Preserve and protect the area's environment and economy;Preserve and maintain the area's essential services and quality of life;Provide a basis for identifying & prioritizing hazards (existing & emerging) that affect the Counties and their communities;Retain access to FEMA funding for the Counties and their communities by complying with Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165)			
1	Jason Kelley		4/19/2021 10:15
Protect the lives and property of Kent & Ottawa County residents and visitors;Preserve and protect the area's environment and economy;Preserve and maintain the area's essential services and quality of life;Retain access to FEMA funding for the Counties and their communities by complying with Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165)			
1	Allison Farole City of Grand Rapids		4/19/2021 10:14
Protect the lives and property of Kent & Ottawa County residents and visitors;Preserve and protect the area's environment and economy;Preserve and maintain the area's essential services and quality of life;Provide a basis for identifying & prioritizing hazards (existing & emerging) that affect the Counties and their communities;Develop a method(s) to incorporate hazard identification and mitigation into county & municipal planning processes;Retain access to FEMA funding for the Counties and their communities by complying with Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165)			
1	Mark Rambo		4/19/2021 10:14
Protect the lives and property of Kent & Ottawa County residents and visitors;Preserve and protect the area's environment and economy;Preserve and maintain the area's essential services and quality of life;Provide a basis for identifying & prioritizing hazards (existing & emerging) that affect the Counties and their communities;Develop a method(s) to incorporate hazard identification and mitigation into county & municipal planning processes;Retain access to FEMA funding for the Counties and their communities by complying with Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165)			
1	Deb Alderink		4/19/2021 10:15
Protect the lives and property of Kent & Ottawa County residents and visitors;Preserve and protect the area's environment and economy;Preserve and maintain the area's essential services and quality of life;Provide a basis for identifying & prioritizing hazards (existing & emerging) that affect the Counties and their communities;Develop a method(s) to incorporate hazard identification and mitigation into county & municipal planning processes;Retain access to FEMA funding for the Counties and their communities by complying with Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165)			
1	Lance Corey		4/19/2021 10:14
Protect the lives and property of Kent & Ottawa County residents and visitors;Preserve and protect the area's environment and economy;Preserve and maintain the area's essential services and quality of life;Provide a basis for identifying & prioritizing hazards (existing & emerging) that affect the Counties and their communities;Develop a method(s) to incorporate hazard identification and mitigation into county & municipal planning processes;Retain access to FEMA funding for the Counties and their communities by complying with Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165)			
1	Jenny Kimball James		4/19/2021 10:15
Protect the lives and property of Kent & Ottawa County residents and visitors;Preserve and protect the area's environment and economy;Preserve and maintain the area's essential services and quality of life;Provide a basis for identifying & prioritizing hazards (existing & emerging) that affect the Counties and their communities;Develop a method(s) to incorporate hazard identification and mitigation into county & municipal planning processes;Retain access to FEMA funding for the Counties and their communities by complying with Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165)			
1	Joe Bush		4/19/2021 10:14
Protect the lives and property of Kent & Ottawa County residents and visitors;Preserve and protect the area's environment and economy;Provide a basis for identifying & prioritizing hazards (existing & emerging) that affect the Counties and their communities;Develop a method(s) to incorporate hazard identification and mitigation into county & municipal planning processes;Retain access to FEMA funding for the Counties and their communities by complying with Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165)			
1	gmadura		4/19/2021 10:15
Protect the lives and property of Kent & Ottawa County residents and visitors;Provide a basis for identifying & prioritizing hazards (existing & emerging) that affect the Counties and their communities			
1	Jehman		4/19/2021 10:16
Protect the lives and property of Kent & Ottawa County residents and visitors;Preserve and protect the area's environment and economy;Preserve and maintain the area's essential services and quality of life;Provide a basis for identifying & prioritizing hazards (existing & emerging) that affect the Counties and their communities;Retain access to FEMA funding for the Counties and their communities by complying with Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165)			
1	Pat Staskiewicz		4/19/2021 10:14
Protect the lives and property of Kent & Ottawa County residents and visitors;Preserve and protect the area's environment and economy;Preserve and maintain the area's essential services and quality of life;Provide a basis for identifying & prioritizing hazards (existing & emerging) that affect the Counties and their communities;Develop a method(s) to incorporate hazard identification and mitigation into county & municipal planning processes;Retain access to FEMA funding for the Counties and their communities by complying with Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165)			
1	Alison City Grand Rapids (she/her)		4/19/2021 10:14
Protect the lives and property of Kent & Ottawa County residents and visitors;Provide a basis for identifying & prioritizing hazards (existing & emerging) that affect the Counties and their communities;Develop a method(s) to incorporate hazard identification and mitigation into county & municipal planning processes;Retain access to FEMA funding for the Counties and their communities by complying with Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165)			
1	Chris Tinney		4/19/2021 10:14
Protect the lives and property of Kent & Ottawa County residents and visitors;Preserve and protect the area's environment and economy;Preserve and maintain the area's essential services and quality of life;Provide a basis for identifying & prioritizing hazards (existing & emerging) that affect the Counties and their communities;Develop a method(s) to incorporate hazard identification and mitigation into county & municipal planning processes;Retain access to FEMA funding for the Counties and their communities by complying with Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165)			
1	Matt Groesser - Kent County		4/19/2021 10:14
Protect the lives and property of Kent & Ottawa County residents and visitors;Preserve and protect the area's environment and economy;Preserve and maintain the area's essential services and quality of life;Provide a basis for identifying & prioritizing hazards (existing & emerging) that affect the Counties and their communities;Develop a method(s) to incorporate hazard identification and mitigation into county & municipal planning processes;Retain access to FEMA funding for the Counties and their communities by complying with Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165)			
1	Mike's iPhone		4/19/2021 10:14
1	Paul Sachs (Ottawa Co. MI)		4/19/2021 10:16
Protect the lives and property of Kent & Ottawa County residents and visitors			
1	Annabelle Spencer Wilkinson		4/19/2021 10:15
1	Wayne Jernberg		4/19/2021 10:14
Preserve and maintain the area's essential services and quality of life			
1	Michael Morrow		4/19/2021 10:14
Protect the lives and property of Kent & Ottawa County residents and visitors;Preserve and protect the area's environment and economy;Preserve and maintain the area's essential services and quality of life;Provide a basis for identifying & prioritizing hazards (existing & emerging) that affect the Counties and their communities;Develop a method(s) to incorporate hazard identification and mitigation into county & municipal planning processes;Retain access to FEMA funding for the Counties and their communities by complying with Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165)			
1	Matthew Woolford		4/19/2021 10:15
Protect the lives and property of Kent & Ottawa County residents and visitors;Preserve and protect the area's environment and economy;Preserve and maintain the area's essential services and quality of life;Provide a basis for identifying & prioritizing hazards (existing & emerging) that affect the Counties and their communities;Develop a method(s) to incorporate hazard identification and mitigation into county & municipal planning processes;Retain access to FEMA funding for the Counties and their communities by complying with Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165)			
1	Tom Byle Video only		4/19/2021 10:14
communities;Develop a method(s) to incorporate hazard identification and mitigation into county & municipal planning processes;Retain access to FEMA funding for the Counties and their communities by complying with Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165)			
#	User Name	User Email	Submitted Date/Time
2	Josiah Timmermans - Deputy# Ottawa		4/19/2021 11:29
2	Lou Hunt-Ottawa Emer. Mgt.		4/19/2021 11:29
2	Al Jano		4/19/2021 11:29
2	Ken Yonker		4/19/2021 11:29
2	Jason Kelley		4/19/2021 11:29
2	Allison Farole City of Grand Rapids		4/19/2021 11:29
2	Mark Rambo		4/19/2021 11:29
2	Lance Corey		4/19/2021 11:29
2	Jenny Kimball James		4/19/2021 11:29
2	Joe Bush		4/19/2021 11:29
2	Pat Staskiewicz		4/19/2021 11:29
2	Chris Tinney		4/19/2021 11:29
2	Matt Groesser - Kent County		4/19/2021 11:29
2	Mike's iPhone		4/19/2021 11:29
2	Paul Sachs (Ottawa Co. MI)		4/19/2021 11:29
2	Annabelle Spencer Wilkinson		4/19/2021 11:29
2	Wayne Jernberg		4/19/2021 11:29
2	Michael Morrow		4/19/2021 11:29
2	Tom Byle Video only		4/19/2021 11:29
#	User Name	User Email	Submitted Date/Time
3	Lou Hunt-Ottawa Emer. Mgt.		4/19/2021 11:34
3	Jason Kelley		4/19/2021 11:34
3	Allison Farole City of Grand Rapids		4/19/2021 11:33
3	epayne		4/19/2021 11:33
3	Lance Corey		4/19/2021 11:33
Please select your top 4 criteria for evaluating hazards from the combined list below:			
Loss of Life or Injury;Number of people impacted;Ability to recover from disaster/incident;Existing gaps/lack of preparedness			
Loss of Life or Injury;Number of people impacted;Ability to recover from disaster/incident;Infrastructure Failure/Other Collateral Damage			
Loss of Life or Injury;Number of people impacted;Infrastructure Failure/Other Collateral Damage;Existing gaps/lack of preparedness			
Loss of Life or Injury			
Loss of Life or Injury;Number of people impacted;Disproportionately impacts BIPOC and/or low-income populations;Existing gaps/lack of preparedness			

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

Poll Report		9/22/2021 14:36			
Report Generated:					
Topic	Meeting ID	Actual Start Time	Actual Duration (minutes)		
Kent/Ottawa/Grand Rapids Hazard Mitigation Plan Workshop 1	928 4960 8115	4/19/2021 8:38	208		
Poll Details					
#	User Name	User Email	Submitted Date/Time	Please select all of the following that you feel should be goals of the Hazard Mitigation Plan	
3	Jenny Kimball James		4/19/2021 11:34	Loss of Life or Injury;Number of people impacted;Ability to recover from disaster/incident;Existing gaps/lack of preparedness	
3	Joe Bush		4/19/2021 11:33	Loss of Life or Injury;Number of people impacted;Ability to recover from disaster/incident;Infrastructure Failure/Other Collateral Damage	
3	Jennifer Sorek# OGDPH		4/19/2021 11:34	Loss of Life or Injury;Number of people impacted;Disproportionately impacts BIPOC and/or low-income populations;Existing gaps/lack of preparedness	
3	Pat Staskiewicz		4/19/2021 11:33	Loss of Life or Injury;Number of people impacted;Ability to recover from disaster/incident;Infrastructure Failure/Other Collateral Damage	
3	Chris Tinney		4/19/2021 11:34	Loss of Life or Injury;Number of people impacted;Infrastructure Failure/Other Collateral Damage;Information availability/Communication	
3	Matt Groesser - Kent County		4/19/2021 11:33	Loss of Life or Injury;Number of people impacted;Infrastructure Failure/Other Collateral Damage;Existing gaps/lack of preparedness	
3	Mike's iPhone		4/19/2021 11:34	Loss of Life or Injury;Ability to recover from disaster/incident;Infrastructure Failure/Other Collateral Damage;Information availability/Communication	
3	Annabelle Spencer Wilkinson		4/19/2021 11:33	Loss of Life or Injury;Ability to recover from disaster/incident;Disproportionately impacts BIPOC and/or low-income populations;Existing gaps/lack of preparedness	
3	Wayne Jernberg		4/19/2021 11:33	Loss of Life or Injury;Ability to recover from disaster/incident;Infrastructure Failure/Other Collateral Damage;Existing gaps/lack of preparedness	
3	Michael Morrow		4/19/2021 11:34	Loss of Life or Injury;Number of people impacted;Infrastructure Failure/Other Collateral Damage;Information availability/Communication	
3	Tom Byle Video only		4/19/2021 11:33	Loss of Life or Injury;Number of people impacted;Ability to recover from disaster/incident;Infrastructure Failure/Other Collateral Damage	

REDACTED FOR PUBLIC VIEW

APPENDIX C

Example Community Resolution for Plan Adoption

Community	County	Items Adopted [Insert "Full Plan" or Section #s]	Date Adopted
Ada Township	Kent		
Algoma Township	Kent		
Alpine Township	Kent		
Bowne (Alto) Township	Kent		
Byron Township	Kent		
Caledonia Township	Kent		
Village of Caledonia	Kent		
Cannon Township	Kent		
Cascade Township	Kent		
Village of Casnovia	Kent		
City of Cedar Springs	Kent		
Courtland Township	Kent		
City of East Grand Rapids	Kent		
Gaines Township	Kent		
City of Grand Rapids	Kent		
Grand Rapids Township	Kent		
City of Grandville	Kent		
Grattan Township	Kent		
Village of Kent City	Kent		
City of Kentwood	Kent		
City of Lowell	Kent		
Lowell Township	Kent		
Nelson Township	Kent		
Oakfield Township	Kent		
Plainfield Township	Kent		
City of Rockford	Kent		
Village of Sand Lake	Kent		
Solon Township	Kent		
Sparta Township	Kent		

Village of Sparta	Kent		
Spencer Township	Kent		
Tyrone Township	Kent		
Vergennes Township	Kent		
City of Walker	Kent		
City of Wyoming	Kent		
Allendale Township/GVSU	Ottawa		
Blendon Township	Ottawa		
Chester Township	Ottawa		
City of Coopersville	Ottawa		
Crockery Township	Ottawa		
City of Ferrysburg	Ottawa		
Georgetown Township	Ottawa		
City of Grand Haven	Ottawa		
Grand Haven Township	Ottawa		
City of Holland	Ottawa		
Holland Township	Ottawa		
City of Hudsonville	Ottawa		
Jamestown Township	Ottawa		
Olive Township	Ottawa		
Park Township	Ottawa		
Polkton Township	Ottawa		
Port Sheldon Township	Ottawa		
Robinson Township	Ottawa		
Spring Lake Township	Ottawa		
Village of Spring Lake	Ottawa		
Tallmadge Township	Ottawa		
Wright Township	Ottawa		
City of Zeeland	Ottawa		
Zeeland Township	Ottawa		

SAMPLE Resolution No. _____

**ADOPTION OF THE KENT COUNTY, OTTAWA COUNTY, AND CITY OF
GRAND RAPIDS 2022 REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, the mission of **(insert community name here)** includes the charge to protect the health, safety, and general welfare of the people of **(insert name of community here)**; and

WHEREAS, **(insert community name)**, Michigan is subject to flooding, tornadoes, winter storms, and other natural, technological, and human hazards; and

WHEREAS, and the Kent and Ottawa Counties Department of Homeland Security and Emergency Management and the Kent and Ottawa Counties Local Emergency Planning Committee, comprised of representatives from the County, municipalities, and stakeholder organizations, have prepared a recommended Hazard Mitigation Plan that reviews the options to protect people and reduce damage from these hazards; and

WHEREAS, **(insert community name)** has participated in the planning process for development of this Plan, providing information specific to local hazard priorities, encouraging public participation, identifying desired hazard mitigation strategies, and reviewing the draft Plan; and

WHEREAS, the Kent and Ottawa Counties Department of Homeland Security and Emergency Management, with the Kent and Ottawa Counties Local Emergency Planning Committee (LEPC), has developed the 2022 REGIONAL HAZARD MITIGATION PLAN (the “Plan”) as an official document of the County and establishing a County Hazard Mitigation Coordinating Committee, pursuant to the Disaster Mitigation Act of 2000 (PL-106-390) and associated regulations (44 CFR 210.6); and

WHEREAS, the Plan has been widely circulated for review by the County’s residents, municipal officials, and state, federal, and local review agencies and has been revised to reflect their concerns; and

NOW THEREFORE BE IT RESOLVED by the **(insert community name and governing body here)** that:

1. The 2022 Regional Hazard Mitigation Plan (or section(s) of the Plan specific to the affected community) is/are hereby adopted as an official plan of **(insert Community name here)**.
2. The **(insert name of position)** is charged with supervising the implementation of the Plan’s recommendations, as they pertain to **(insert community name here)** and within the funding limitations as provided by the **(insert community governing body)** or other sources.
3. The **(insert name of position)** shall give priority attention to the following action items recommended in portions of the Plan specific to **(insert community name)**:
 - a. _____ (Recommendation _____, Section _____, page _____)
 - b. _____ (Recommendation _____, Section _____, page _____)
 - c. _____ (Recommendation _____, Section _____, page _____)

Passed by the **(insert community name and governing body here)** on **(insert date)**.

Signature

Vote:

Signature

Yes _____

No _____

APPENDIX D

Supplemental Hazard Data

Warming and Cooling Centers
Lower Grand River Subwatershed
High Erosion Areas
Traffic Crash Data Reports
Ottawa County Mobile Home Map

ALANO CLUB OF KENT COUNTY – 1020 College Ave NE

Daily 8am-9pm

DEGAGE MINISTRIES - 144 S. Division ave

EXODUS PLACE – 322 Front Ave SW

GOD’S KITCHEN – 303 S. Division Ave

AYA YOUTH COLLECTIVE – 320 State St SE

GUIDING LIGHT MISSION – 255 S. Division Ave

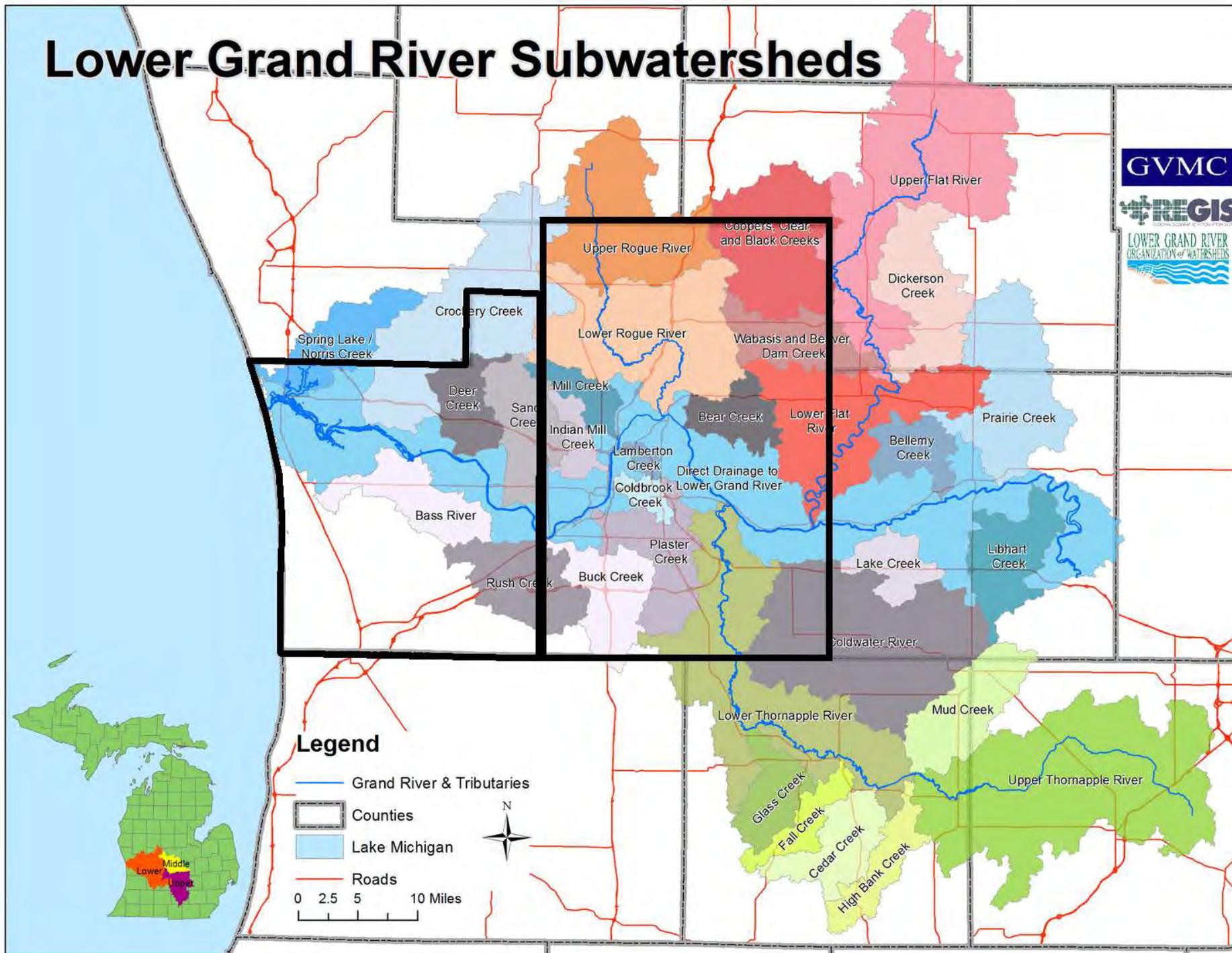
HEARTSIDE MINISTRY – 54 S. Division Ave

MEL TROTTER MINISTRIES – 225 Commerce Ave SW

PARK CHURCH – 10 E. Park Place NE

WESTMINSTER PRESBYTERIAN CHURCH – 47 Jefferson Ave SE

Lower Grand River Subwatersheds



P.J. HOFFMASTER
 STATE PARK

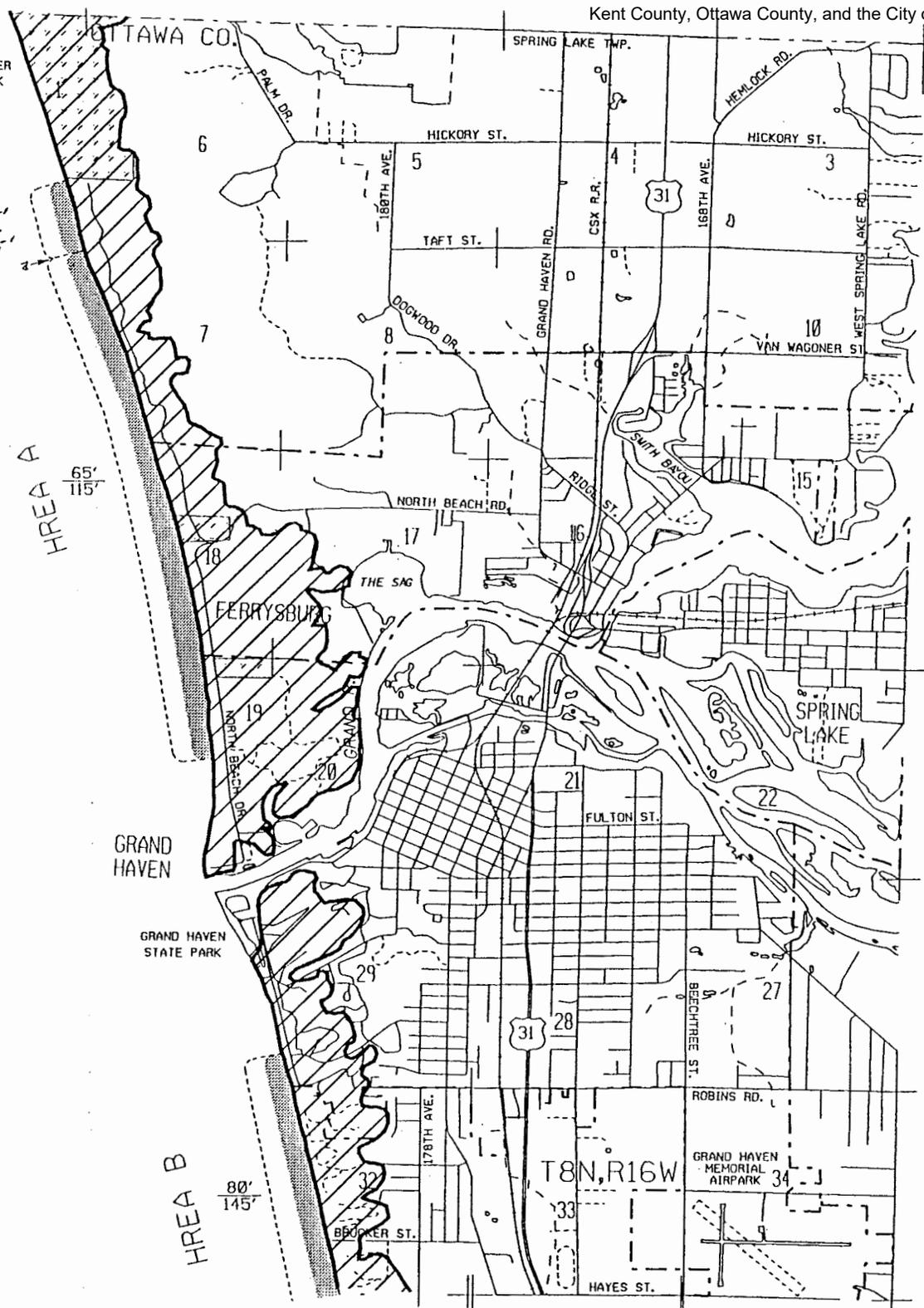
105'
 195'

HREA A
 65'
 115'

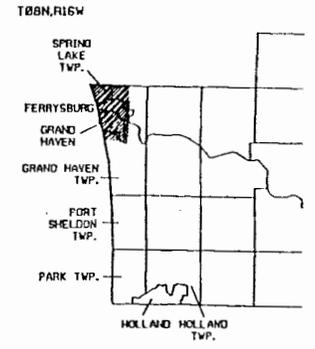
GRAND HAVEN

GRAND HAVEN STATE PARK

HREA B
 80'
 145'



OTTAWA COUNTY



HIGH RISK EROSION AREAS

THE NUMBER REPRESENTS, IN FEET, THE 30 YEAR PROJECTED RECESSION DISTANCE.
 65' THE NUMBER REPRESENTS, IN FEET, THE 60 YEAR PROJECTED RECESSION DISTANCE.
 HIGH RISK EROSION AREA (shading alongshore)

THESE AREAS ARE LEGALLY DEFINED BY THE SHORELANDS PROTECTION AND MANAGEMENT ACT, 1970 P.A. 245, AS AMENDED, AS BEING GREAT LAKES SHORELAND AREAS DOCUMENTED TO RECEDE AN AVERAGE OF ONE FOOT OR MORE PER YEAR.

CRITICAL DUNE AREAS

- BARRIER DUNES
BARRIER DUNE FORMATIONS DESIGNATED PURSUANT TO 1976 P.A. 222
- AREAS NOT INCLUDED IN DESIGNATED BARRIER DUNE FORMATIONS THAT ARE COMPOSED PRIMARILY OF DUNE SAND AND EXHIBIT SEVERAL DUNE-LIKE CHARACTERISTICS.
- EXEMPLARY DUNE ASSOCIATED PLANT COMMUNITIES OUTSIDE DESIGNATED DUNE FORMATIONS, MICHIGAN NATURAL FEATURES INVENTORY REFERENCE CODE INDICATED.

SOURCE

STATE OF MICHIGAN ACT 245 RECESSION RATE MAPS & ATLAS OF CRITICAL DUNE AREAS

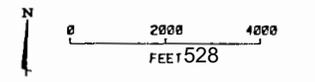
INFORMATION

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
 LAND AND WATER MANAGEMENT DIVISION
 P.O. BOX 30828
 LANSING, MI 48909
 (517) 373-1950



GREAT LAKES INFORMATION SYSTEM
 MICHIGAN DEPARTMENT OF NATURAL RESOURCES
 LAND AND WATER MANAGEMENT DIVISION

11-10-94
 Amended 11-94, 4-97



Parcels in High Risk Erosion Areas of City of Ferrysburg, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A2	1	70-03-18-201-001	1.7	65	115
A2	3	70-03-18-202-001	1.7	65	115
A2	4	70-03-18-202-002	1.7	65	115
A2	5	70-03-18-202-003	1.7	65	115
A2	6	70-03-18-202-004	1.7	65	115
A2	7	70-03-18-202-005	1.7	65	115
A2	9	70-03-18-203-001	1.7	65	115
A2	10	70-03-18-203-002	1.7	65	115
A2	11	70-03-18-203-003	1.7	65	115
A2	12	70-03-18-203-004	1.7	65	115
A2	13	70-03-18-203-005	1.7	65	115
A2	14	70-03-18-203-006	1.7	65	115
A2	15	70-03-18-203-007	1.7	65	115
A2	16	70-03-18-203-012	1.7	65	115
A2	17	70-03-18-203-011	1.7	65	115
A2	19	70-03-18-260-001	1.7	65	115
A2	20	70-03-18-260-002	1.7	65	115
A2	21	70-03-18-260-003	1.7	65	115
A2	22	70-03-18-260-004	1.7	65	115

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of City of Ferrysburg, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A2	23	70-03-18-260-007 North Beach Park	1.7	65	115
A2	24	70-03-18-420-030	1.7	65	115
A2	25	70-03-18-420-002	1.7	65	115
A2	26	70-03-18-420-003	1.7	65	115
A2	27	70-03-18-420-028	1.7	65	115
A2	28	70-03-18-420-031	1.7	65	115
A2	29	70-03-18-420-010	1.7	65	115
A2	30	70-03-18-420-011	1.7	65	115
A2	31	70-03-18-420-012	1.7	65	115
A2	32	70-03-18-420-013	1.7	65	115
A2	33	70-03-18-420-014	1.7	65	115
A2	34	70-03-18-420-015	1.7	65	115
A2	35	70-03-18-420-016	1.7	65	115
A2	36	70-03-18-420-017	1.7	65	115
A2	37	70-03-18-420-018	1.7	65	115
A2	38	70-03-18-420-019	1.7	65	115
A2	39	70-03-18-420-033	1.7	65	115
A2	40	70-03-18-420-034	1.7	65	115
A2	41	70-03-18-420-022	1.7	65	115

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of City of Ferrysburg, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A2	42	70-03-18-420-023	1.7	65	115
A2	43	70-03-18-420-024	1.7	65	115
A2	44	70-03-18-420-025	1.7	65	115
A2	45	70-03-18-420-026	1.7	65	115
A2	46	70-03-18-420-027	1.7	65	115
A2	47	70-03-18-474-001	1.7	65	115
A2	48	70-03-18-474-002	1.7	65	115
A2	49	70-03-18-474-003	1.7	65	115
A2	50	70-03-18-474-004	1.7	65	115
A2	51	70-03-18-474-005	1.7	65	115
A2	52	70-03-18-474-006	1.7	65	115
A2	53	70-03-18-474-007	1.7	65	115
A2	54	70-03-18-474-008	1.7	65	115
A2	55	70-03-18-474-009	1.7	65	115
A2	56	70-03-18-474-010	1.7	65	115
A2	57	70-03-18-474-011	1.7	65	115
A2	58	70-03-18-474-012	1.7	65	115
A2	59	70-03-18-474-013	1.7	65	115
A2	60	70-03-18-474-014	1.7	65	115
A2	61	70-03-18-474-015	1.7	65	115

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of City of Ferrysburg, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A2	62	70-03-18-474-018	1.7	65	115
A2	63	70-03-18-475-001 across from Maryland Ct.	1.7	65	115
A2	64	70-03-18-475-002	1.7	65	115
A2	65	70-03-18-475-003	1.7	65	115

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

P.J. HOFFMASTER
 STATE PARK

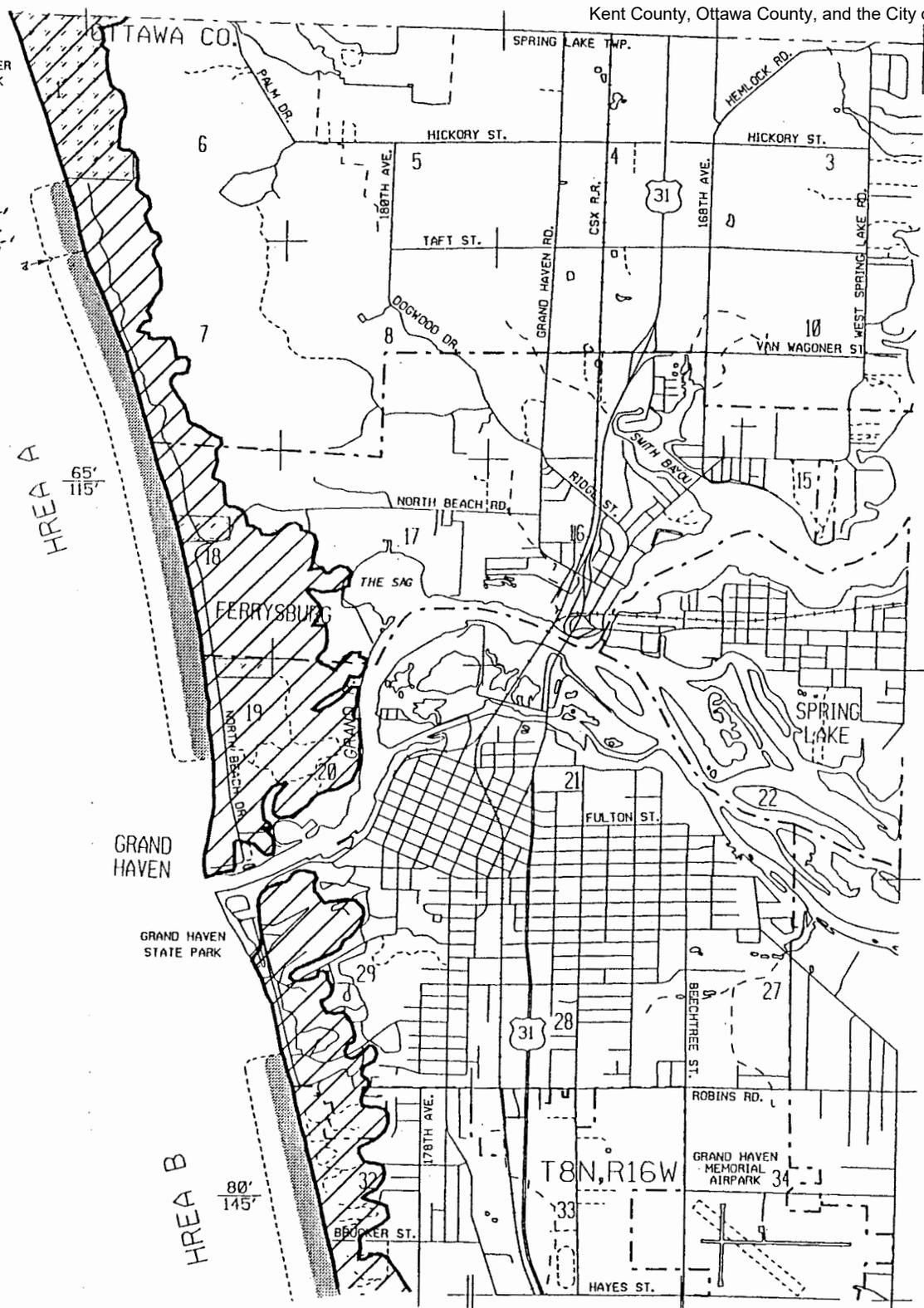
105'
 195'

HREA A
 65'
 115'

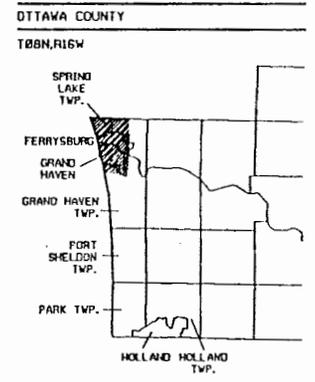
GRAND HAVEN

GRAND HAVEN STATE PARK

HREA B
 80'
 145'



HIGH RISK EROSION AREAS & CRITICAL DUNE AREAS



HIGH RISK EROSION AREAS

THE NUMBER REPRESENTS, IN FEET, THE 30 YEAR PROJECTED RECESSION DISTANCE.
 65' THE NUMBER REPRESENTS, IN FEET, THE 60 YEAR PROJECTED RECESSION DISTANCE.

HIGH RISK EROSION AREA (shading alongshore)

THESE AREAS ARE LEGALLY DEFINED BY THE SHORELANDS PROTECTION AND MANAGEMENT ACT, 1970 P.A. 245, AS AMENDED, AS BEING GREAT LAKES SHORELAND AREAS DOCUMENTED TO RECEDE AN AVERAGE OF ONE FOOT OR MORE PER YEAR.

- CRITICAL DUNE AREAS**
- BARRIER DUNES
BARRIER DUNE FORMATIONS DESIGNATED PURSUANT TO 1976 P.A. 222
 - AREAS NOT INCLUDED IN DESIGNATED BARRIER DUNE FORMATIONS THAT ARE COMPOSED PRIMARILY OF DUNE SAND AND EXHIBIT SEVERAL DUNE-LIKE CHARACTERISTICS.
 - EXEMPLARY DUNE ASSOCIATED PLANT COMMUNITIES OUTSIDE DESIGNATED DUNE FORMATIONS, MICHIGAN NATURAL FEATURES INVENTORY REFERENCE CODE INDICATED.

SOURCE

STATE OF MICHIGAN ACT 245 RECESSION RATE MAPS & ATLAS OF CRITICAL DUNE AREAS

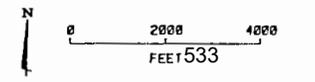
INFORMATION

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
 LAND AND WATER MANAGEMENT DIVISION
 P.O. BOX 30828
 LANSING, MI 48909
 (517) 373-1950

Gis

GREAT LAKES INFORMATION SYSTEM
 MICHIGAN DEPARTMENT OF NATURAL RESOURCES
 LAND AND WATER MANAGEMENT DIVISION

11-10-94
 Amended 11-94, 4-97



Parcels in High Risk Erosion Areas of Spring Lake Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A1	5	70-03-06-352-025	3.0	105	195
A1	5.2	70-03-06-352-020	3.0	105	195
A1	6	70-03-06-351-018	3.0	105	195
A1	9	70-03-06-351-005	3.0	105	195
A1	10	70-03-06-351-006	3.0	105	195
A1	11	70-03-06-351-007	3.0	105	195
A1	12	70-03-06-351-008	3.0	105	195
A1	13	70-03-06-351-009	3.0	105	195
A1	14	70-03-06-351-010	3.0	105	195
A1	15	70-03-06-351-011	3.0	105	195
A1	16	70-03-06-351-012	3.0	105	195
A1	17	70-03-06-351-013	3.0	105	195
A1	18	70-03-06-351-014	3.0	105	195
A1	19.2	70-03-06-352-004	3.0	105	195
A1	19.21	70-03-06-352-005	3.0	105	195
A1	19.22	70-03-06-352-006	3.0	105	195
A1	19.23	70-03-06-352-007	3.0	105	195
A1	19.24	70-03-06-352-008	3.0	105	195
A1	19.25	70-03-06-352-009	3.0	105	195

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Spring Lake Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A1	19.26	70-03-06-352-010	3.0	105	195
A1	19.27	70-03-06-352-023	3.0	105	195
A1	19.28	70-03-06-352-024	3.0	105	195
A1	20	70-03-07-126-011	3.0	105	195
A1	20.2	70-03-07-127-026	3.0	105	195
A1	21	70-03-07-126-001	3.0	105	195
A2	22	70-03-07-126-002	1.7	65	115
A2	23	70-03-07-126-003	1.7	65	115
A2	24	70-03-07-126-013	1.7	65	115
A2	26	70-03-07-126-006	1.7	65	115
A2	27	70-03-07-126-007	1.7	65	115
A2	28	70-03-07-126-008	1.7	65	115
A2	29	70-03-07-126-009	1.7	65	115
A2	30	70-03-07-126-010	1.7	65	115
A2	31	70-03-07-126-012	1.7	65	115
A2	32	70-03-07-175-001	1.7	65	115
A2	33	70-03-07-175-002	1.7	65	115
A2	34	70-03-07-175-003	1.7	65	115
A2	35	70-03-07-175-004	1.7	65	115
A2	36	70-03-07-175-005	1.7	65	115

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Spring Lake Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A2	37	70-03-07-175-006	1.7	65	115
A2	38	70-03-07-175-013	1.7	65	115
A2	39	70-03-07-175-008	1.7	65	115
A2	40	70-03-07-175-010	1.7	65	115
A2	41	70-03-07-177-006	1.7	65	115
A2	41.2	70-03-07-178-007	1.7	65	115
A2	42	70-03-07-177-001	1.7	65	115
A2	43	70-03-07-177-002	1.7	65	115
A2	44	70-03-07-177-003	1.7	65	115
A2	45	70-03-07-177-004	1.7	65	115
A2	46	70-03-07-177-005	1.7	65	115
A2	46.2	70-03-07-178-006	1.7	65	115
A2	46.21	70-03-07-178-003	1.7	65	115
A2	46.22	70-03-07-178-004	1.7	65	115
A2	46.23	70-03-07-178-005	1.7	65	115
A2	48	70-03-07-326-001	1.7	65	115
A2	49	70-03-07-326-002	1.7	65	115
A2	50	70-03-07-326-003	1.7	65	115
A2	50.2	70-03-07-327-003	1.7	65	115
A2	51	70-03-07-326-004	1.7	65	115

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Spring Lake Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A2	51.2	70-03-07-327-004	1.7	65	115
A2	52	70-03-07-326-005	1.7	65	115
A2	53	70-03-07-326-006	1.7	65	115
A2	54	70-03-07-326-008	1.7	65	115
A2	55	70-03-07-376-001	1.7	65	115
A2	56	70-03-07-376-002	1.7	65	115
A2	57	70-03-07-376-003	1.7	65	115
A2	58	70-03-07-376-004	1.7	65	115
A2	59	70-03-07-376-005	1.7	65	115
A2	60	70-03-07-376-006	1.7	65	115
A2	61	70-03-07-376-007	1.7	65	115
A2	62	70-03-07-376-008	1.7	65	115
A2	63	70-03-07-376-009	1.7	65	115
A2	64	70-03-07-376-010	1.7	65	115
A2	65	70-03-07-376-011	1.7	65	115
A2	66	70-03-07-376-012	1.7	65	115
A2	67	70-03-07-376-013	1.7	65	115
A2	68	70-03-07-376-014	1.7	65	115
A2	69	70-03-07-376-015	1.7	65	115
A2	70	70-03-07-376-016	1.7	65	115

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Spring Lake Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A2	71	70-03-07-376-017	1.7	65	115
A2	72	70-03-07-376-018	1.7	65	115

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Publication Date:
HIGH RISK EROSION AREAS & CRITICAL DUNE AREAS

80'
145'

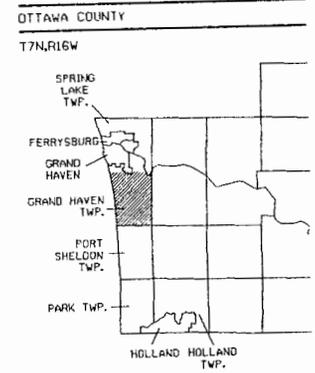
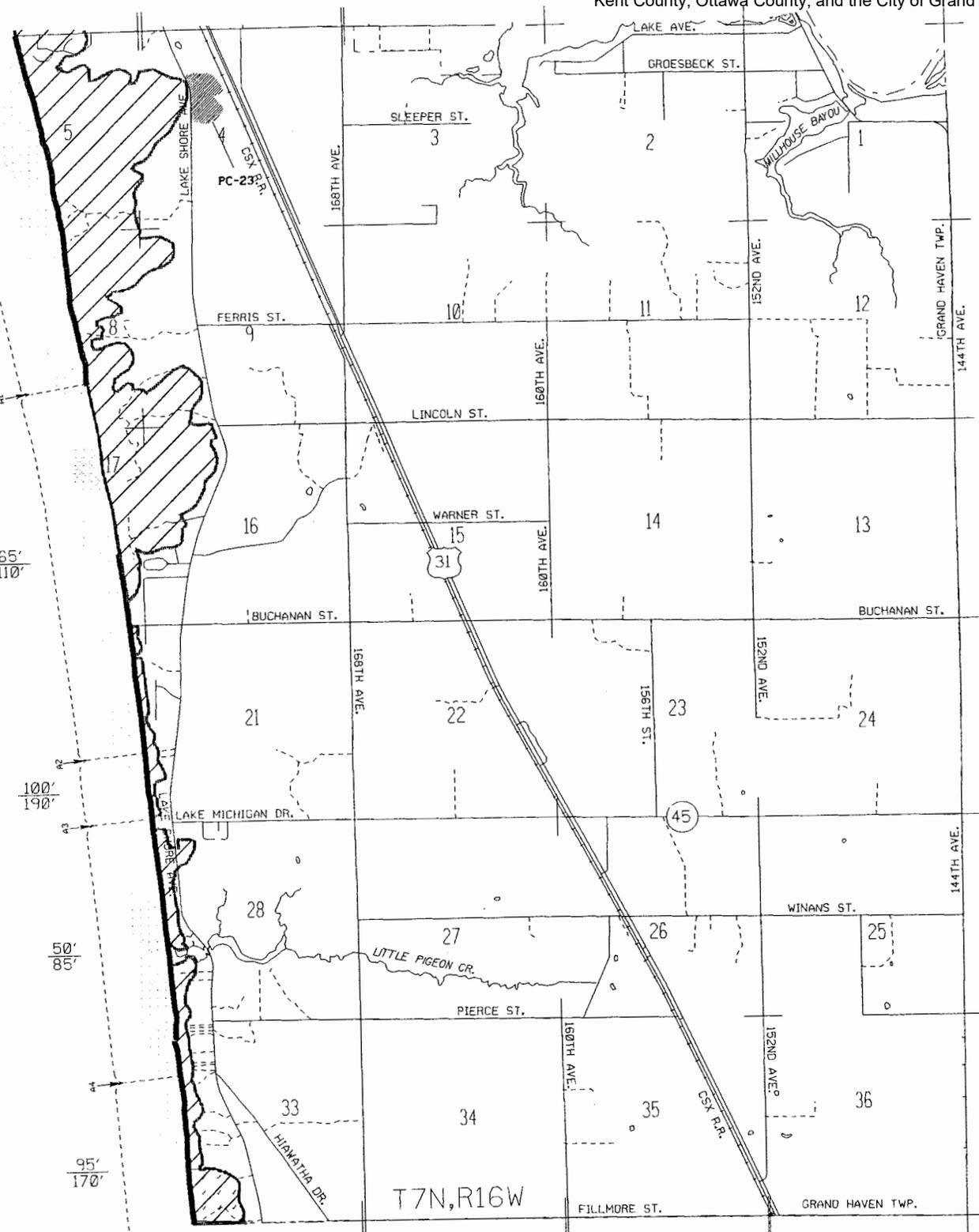
HREA A

65'
110'

100'
190'

50'
85'

95'
170'



HIGH RISK EROSION AREAS

THE NUMBER REPRESENTS, IN FEET, THE 30 YEAR PROJECTED RECESSION DISTANCE.
 60' THE NUMBER REPRESENTS, IN FEET, THE 60 YEAR PROJECTED RECESSION DISTANCE.
 105' THE NUMBER REPRESENTS, IN FEET, THE 60 YEAR PROJECTED RECESSION DISTANCE.
 HIGH RISK EROSION AREA (shading alongshore)

THESE AREAS ARE LEGALLY DEFINED BY THE SHORELANDS PROTECTION AND MANAGEMENT ACT, 1978 P.A. 245, AS AMENDED, AS BEING GREAT LAKES SHORELAND AREAS DOCUMENTED TO RECEDE AN AVERAGE OF ONE FOOT OR MORE PER YEAR.

CRITICAL DUNE AREAS

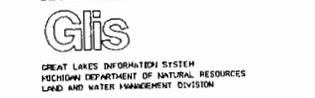
- BARRIER DUNES**
 BARRIER DUNE FORMATIONS DESIGNATED PURSUANT TO 1976 P.A. 222
- AREAS NOT INCLUDED IN DESIGNATED BARRIER DUNE FORMATIONS THAT ARE COMPOSED PRIMARILY OF DUNE SAND AND EXHIBIT SEVERAL DUNE-LIKE CHARACTERISTICS.**
- EXEMPLARY DUNE ASSOCIATED PLANT COMMUNITIES OUTSIDE DESIGNATED DUNE FORMATIONS, MICHIGAN NATURAL FEATURES INVENTORY REFERENCE CODE INDICATED.**

SOURCE

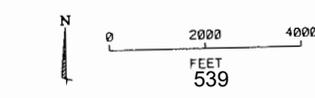
STATE OF MICHIGAN ACT 245 RECESSION RATE MAPS & ATLAS OF CRITICAL DUNE AREAS

INFORMATION

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
 LAND AND WATER MANAGEMENT DIVISION
 P.O. BOX 30028
 LANSING, MI 48909
 (517) 373-1958



11-10-94
 Amended 05-95



T7N, R16W

GRAND HAVEN TWP.

Parcels in High Risk Erosion Areas of Grand Haven Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A1	1	70-03-32-129-011 south of city beach	2.2	80	145
A1	2	70-03-32-129-012	2.2	80	145
A1	3	70-03-32-130-027	2.2	80	145
A1	4	70-03-32-130-028	2.2	80	145
A1	4.2	70-03-32-130-002	2.2	80	145
A1	5	70-03-32-130-009	2.2	80	145
A1	5.2	70-03-32-130-010	2.2	80	145
A1	5.21	70-03-32-130-011	2.2	80	145
A1	5.22	70-03-32-130-025	2.2	80	145
A1	6	70-03-32-130-013	2.2	80	145
A1	6.2	70-03-32-130-014	2.2	80	145
A1	6.21	70-03-32-130-015	2.2	80	145
A1	6.22	70-03-32-130-016	2.2	80	145
A1	7	70-03-32-130-017	2.2	80	145
A1	7.2	70-03-32-130-018	2.2	80	145
A1	8	70-03-32-130-019	2.2	80	145
A1	8.2	70-03-32-130-020	2.2	80	145
A1	9	70-03-32-130-021	2.2	80	145
A1	10	70-03-32-130-022	2.2	80	145

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Grand Haven Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A1	10.2	70-03-32-130-023	2.2	80	145
A1	11	70-03-32-131-022	2.2	80	145
A1	12	70-03-32-131-025	2.2	80	145
A1	12.2	70-03-32-131-006	2.2	80	145
A1	13	70-03-32-131-029	2.2	80	145
A1	13.01	70-03-32-131-031	2.2	80	145
A1	13.2	70-03-32-131-032	2.2	80	145
A1	13.21	70-03-32-131-024	2.2	80	145
A1	14	70-03-32-131-013	2.2	80	145
A1	15	70-03-32-131-014	2.2	80	145
A1	16	70-03-32-132-027	2.2	80	145
A1	17	70-03-32-132-005	2.2	80	145
A1	17.2	70-03-32-132-006	2.2	80	145
A1	18	70-03-32-132-047	2.2	80	145
A1	19	70-03-32-132-045	2.2	80	145
A1	20	70-03-32-132-031	2.2	80	145
A1	21	70-03-32-132-035	2.2	80	145
A1	21.2	70-03-32-132-032	2.2	80	145
A1	22	70-03-32-132-039	2.2	80	145
A1	23	70-03-32-132-017	2.2	80	145

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Grand Haven Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A1	23.2	70-03-32-132-036	2.2	80	145
A1	24	70-03-32-132-037	2.2	80	145
A1	25	70-03-32-132-028	2.2	80	145
A1	26	70-03-32-132-022	2.2	80	145
A1	26.21	70-03-32-132-029	2.2	80	145
A1	27	70-03-32-132-015	2.2	80	145
A1	27.01	70-03-32-132-038	2.2	80	145
A1	28	70-03-32-176-001	2.2	80	145
A1	29	70-03-32-176-002	2.2	80	145
A1	30	70-03-32-176-003	2.2	80	145
A1	31	70-03-32-176-004	2.2	80	145
A1	32	70-03-32-176-013	2.2	80	145
A1	32.2	70-03-32-177-001	2.2	80	145
A1	32.21	70-03-32-177-002	2.2	80	145
A1	32.22	70-03-32-177-010	2.2	80	145
A1	32.23	70-03-32-177-011	2.2	80	145
A1	32.24	70-03-32-177-015	2.2	80	145
A1	33	70-03-32-176-007	2.2	80	145
A1	33.2	70-03-32-180-001	2.2	80	145
A1	34	70-03-32-176-008	2.2	80	145

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Grand Haven Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A1	34.2	70-03-32-180-013	2.2	80	145
A1	35	70-03-32-176-010	2.2	80	145
A1	36	70-03-32-176-011	2.2	80	145
A1	36.2	70-03-32-180-010	2.2	80	145
A1	36.3	70-03-32-180-009	2.2	80	145
A1	36.4	70-03-32-180-007	2.2	80	145
A1	37	70-03-32-176-012	2.2	80	145
A1	38	70-03-32-176-014	2.2	80	145
A1	39	70-03-32-184-009	2.2	80	145
A1	40	70-03-32-184-003	2.2	80	145
A1	41	70-03-32-184-011	2.2	80	145
A1	42	70-03-32-184-007	2.2	80	145
A1	43	70-03-32-184-012	2.2	80	145
A1	44	70-03-32-187-002	2.2	80	145
A1	47	70-03-32-187-008	2.2	80	145
A1	47.01	70-03-32-187-009	2.2	80	145
A1	48	70-03-32-330-002	2.2	80	145
A1	49	70-03-32-330-013	2.2	80	145
A1	50	70-03-32-330-017	2.2	80	145
A1	51	70-03-32-330-004	2.2	80	145

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Grand Haven Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A1	52	70-03-32-330-016	2.2	80	145
A1	53	70-03-32-331-018	2.2	80	145
A1	53.01	70-03-32-331-017	2.2	80	145
A1	54	70-03-32-331-002	2.2	80	145
A1	55	70-03-32-335-007	2.2	80	145
A1	56	70-03-32-335-008	2.2	80	145
A1	57	70-03-32-335-003	2.2	80	145
A1	58	70-03-32-335-004	2.2	80	145
A1	59	70-03-32-335-009	2.2	80	145
A1	60	70-03-32-335-012	2.2	80	145
A1	63	70-03-32-390-002	2.2	80	145
A1	64	70-03-32-390-041	2.2	80	145
A1	65	70-03-32-390-010	2.2	80	145
A1	66	70-03-32-390-011	2.2	80	145
A1	67	70-03-32-390-012	2.2	80	145
A1	68	70-03-32-390-042	2.2	80	145
A1	68.1	70-03-32-390-014	2.2	80	145
A1	68.2	70-03-32-390-043	2.2	80	145
A1	68.9	70-03-32-390-015	2.2	80	145
A1	69	70-03-32-390-038	2.2	80	145

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Grand Haven Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A1	70	70-03-32-390-020	2.2	80	145
A1	71	70-03-32-390-039	2.2	80	145
A1	72	70-03-32-390-036	2.2	80	145
A1	73	70-03-32-390-026	2.2	80	145
A1	74	70-03-32-390-027	2.2	80	145
A1	75	70-03-32-390-029	2.2	80	145
A1	76	70-03-32-390-032	2.2	80	145
A1	77	70-03-32-390-033	2.2	80	145
A1	78	70-03-32-390-034	2.2	80	145
A1	79	70-07-05-201-019	2.2	80	145
A1	80	70-07-05-201-003	2.2	80	145
A1	81	70-07-05-201-009	2.2	80	145
A1	82	70-07-05-201-010	2.2	80	145
A1	83	70-07-05-201-020	2.2	80	145
A1	84	70-07-05-201-021	2.2	80	145
A1	85	70-07-05-201-015	2.2	80	145
A1	86	70-07-05-201-016	2.2	80	145
A1	87	70-07-05-201-017	2.2	80	145
A1	88	70-07-05-201-018	2.2	80	145

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Grand Haven Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A1	89	70-07-05-400-011 Rosy Mound	2.2	80	145
A1	93	70-07-05-400-007	2.2	80	145
A1	94	70-07-05-400-008	2.2	80	145
A1	95	70-07-05-400-009	2.2	80	145
A1	96	70-07-08-200-014	2.2	80	145
A1	97	70-07-08-200-015	2.2	80	145
A1	98	70-07-08-200-018	2.2	80	145
A1	99	70-07-08-200-004	2.2	80	145
A1	100	70-07-08-200-006	2.2	80	145
A1	101	70-07-08-200-007	2.2	80	145
A1	102	70-07-08-200-008	2.2	80	145
A1	103	70-07-08-200-009	2.2	80	145
A1	104	70-07-08-200-027	2.2	80	145
A1	105	70-07-08-200-024	2.2	80	145
A1	106	70-07-08-200-025	2.2	80	145
A1	107	70-07-08-400-045	2.2	80	145
A1	108	70-07-08-400-043	2.2	80	145
A1	109	70-07-08-400-035	2.2	80	145
A2	110	70-07-08-400-018	1.6	65	110

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Grand Haven Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A2	111	70-07-08-400-019	1.6	65	110
A2	112	70-07-08-400-020	1.6	65	110
A2	113	70-07-08-400-021	1.6	65	110
A2	114	70-07-08-400-032	1.6	65	110
A2	115	70-07-08-400-003	1.6	65	110
A2	116	70-07-08-400-006	1.6	65	110
A2	117	70-07-08-400-008	1.6	65	110
A2	118	70-07-08-400-009	1.6	65	110
A2	119	70-07-08-400-010	1.6	65	110
A2	120	70-07-08-400-023	1.6	65	110
A2	121	70-07-08-400-024	1.6	65	110
A2	122	70-07-17-200-001	1.6	65	110
A2	123	70-07-17-200-023	1.6	65	110
A2	124	70-07-17-200-038	1.6	65	110
A2	125	70-07-17-200-039	1.6	65	110
A2	126	70-07-17-200-004	1.6	65	110
A2	127	70-07-17-200-007	1.6	65	110
A2	128	70-07-17-200-040	1.6	65	110
A2	128.01	70-07-17-200-041	1.6	65	110
A2	129	70-07-17-200-006	1.6	65	110

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Grand Haven Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A2	130	70-07-17-200-037	1.6	65	110
A2	131	70-07-17-200-035	1.6	65	110
A2	132	70-07-17-200-033	1.6	65	110
A2	133	70-07-17-200-030	1.6	65	110
A2	134	70-07-17-200-016	1.6	65	110
A2	135	70-07-17-200-017	1.6	65	110
A2	136	70-07-17-200-018	1.6	65	110
A2	137	70-07-17-200-022	1.6	65	110
A2	138	70-07-17-298-001	1.6	65	110
A2	139	70-07-17-298-002	1.6	65	110
A2	140	70-07-17-298-003	1.6	65	110
A2	141	70-07-17-298-004	1.6	65	110
A2	142	70-07-17-298-005	1.6	65	110
A2	143	70-07-17-298-006	1.6	65	110
A2	144	70-07-17-450-001	1.6	65	110
A2	145	70-07-17-450-002	1.6	65	110
A2	146	70-07-17-450-003	1.6	65	110
A2	147	70-07-17-450-004	1.6	65	110
A2	148	70-07-17-450-005	1.6	65	110
A2	149	70-07-17-450-006	1.6	65	110

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Grand Haven Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A2	150	70-07-17-450-007	1.6	65	110
A2	151	70-07-17-450-008	1.6	65	110
A2	152	70-07-17-450-009	1.6	65	110
A2	153	70-07-17-450-012	1.6	65	110
A2	154	70-07-16-300-027	1.6	65	110
A2	155	70-07-17-498-016	1.6	65	110
A2	156	70-07-17-498-003	1.6	65	110
A2	157	70-07-17-498-004	1.6	65	110
A2	158	70-07-17-498-005	1.6	65	110
A2	159	70-07-17-498-006	1.6	65	110
A2	160	70-07-17-498-015	1.6	65	110
A2	161	70-07-17-498-017	1.6	65	110
A2	162	70-07-17-498-011	1.6	65	110
A2	163	70-07-17-498-012	1.6	65	110
A2	164	70-07-17-498-018	1.6	65	110
A2	165	70-07-17-498-020	1.6	65	110
A2	166	70-07-20-200-001 Buchanan Street	1.6	65	110
A2	167	70-07-20-200-002	1.6	65	110
A2	168	70-07-20-200-003	1.6	65	110

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Grand Haven Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A2	169	70-07-20-200-004	1.6	65	110
A2	170	70-07-20-200-005	1.6	65	110
A2	171	70-07-20-200-006	1.6	65	110
A2	172	70-07-21-102-019	1.6	65	110
A2	174	70-07-21-102-011	1.6	65	110
A2	175	70-07-21-102-012	1.6	65	110
A2	176	70-07-21-102-013	1.6	65	110
A2	177	70-07-21-102-014	1.6	65	110
A2	178	70-07-21-102-015	1.6	65	110
A2	179	70-07-21-102-016	1.6	65	110
A2	180	70-07-20-299-012	1.6	65	110
A2	180.01	70-07-20-299-013	1.6	65	110
A2	181	70-07-20-299-003	1.6	65	110
A2	182	70-07-20-299-004	1.6	65	110
A2	183	70-07-20-299-005	1.6	65	110
A2	184	70-07-20-299-006	1.6	65	110
A2	185	70-07-20-299-007	1.6	65	110
A2	186	70-07-20-299-008	1.6	65	110
A2	187	70-07-20-299-009	1.6	65	110
A2	188	70-07-20-299-010	1.6	65	110

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Grand Haven Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A2	189	70-07-21-301-031	1.6	65	110
A2	190	70-07-21-301-030	1.6	65	110
A2	191	70-07-21-301-037	1.6	65	110
A2	192	70-07-21-301-036	1.6	65	110
A2	194	70-07-21-301-007	1.6	65	110
A2	195	70-07-21-301-008	1.6	65	110
A2	196	70-07-21-301-009	1.6	65	110
A2	197	70-07-21-301-010	1.6	65	110
A3	198	70-07-21-301-011	2.9	100	190
A3	199	70-07-21-301-012	2.9	100	190
A3	200	70-07-21-301-013	2.9	100	190
A3	201	70-07-21-301-014	2.9	100	190
A3	202	70-07-21-301-015	2.9	100	190
A3	203	70-07-21-301-016	2.9	100	190
A3	204	70-07-21-301-017	2.9	100	190
A3	205	70-07-21-301-032	2.9	100	190
A3	206	70-07-21-301-033	2.9	100	190
A3	207	70-07-21-301-020	2.9	100	190
A3	208	70-07-21-301-021	2.9	100	190
A3	209	70-07-21-301-022	2.9	100	190

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Grand Haven Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A3	210	70-07-21-301-023	2.9	100	190
A3	211	70-07-21-301-024	2.9	100	190
A4	212	70-07-21-301-026	1.2	50	85
A4	213	70-07-28-100-011 Lake Michigan Drive	1.2	50	85
A4	214	70-07-28-151-002	1.2	50	85
A4	215	70-07-28-151-003	1.2	50	85
A4	216	70-07-28-151-004	1.2	50	85
A4	217	70-07-28-151-005	1.2	50	85
A4	218	70-07-28-151-006	1.2	50	85
A4	219	70-07-28-151-007	1.2	50	85
A4	220	70-07-28-151-032	1.2	50	85
A4	221	70-07-28-151-033	1.2	50	85
A4	222	70-07-28-151-037	1.2	50	85
A4	223	70-07-28-151-038	1.2	50	85
A4	223.01	70-07-28-151-039	1.2	50	85
A4	223.02	70-07-28-151-040	1.2	50	85
A4	223.03	70-07-28-151-041	1.2	50	85
A4	224	70-07-28-151-029	1.2	50	85
A4	225	70-07-28-151-030	1.2	50	85

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Grand Haven Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A4	226	70-07-28-151-014	1.2	50	85
A4	227	70-07-28-151-015	1.2	50	85
A4	228	70-07-28-151-016	1.2	50	85
A4	229	70-07-28-151-017	1.2	50	85
A4	230	70-07-28-151-018	1.2	50	85
A4	231	70-07-28-151-019	1.2	50	85
A4	232	70-07-28-151-020	1.2	50	85
A4	233	70-07-28-151-021	1.2	50	85
A4	234	70-07-28-151-022	1.2	50	85
A4	235	70-07-28-151-023	1.2	50	85
A4	236	70-07-28-151-024	1.2	50	85
A4	237	70-07-28-151-025	1.2	50	85
A4	238	70-07-28-151-026	1.2	50	85
A4	239	70-07-28-151-027	1.2	50	85
A4	240	70-07-28-300-051	1.2	50	85
A4	241	70-07-28-300-052	1.2	50	85
A4	243	70-07-28-300-053	1.2	50	85
A4	244	70-07-28-300-059	1.2	50	85
A4	245	70-07-28-300-060	1.2	50	85
A4	246	70-07-28-300-008	1.2	50	85

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Grand Haven Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A4	248	70-07-28-300-032	1.2	50	85
A4	249	70-07-28-300-012	1.2	50	85
A4	250	70-07-28-300-013	1.2	50	85
A4	251	70-07-28-300-017	1.2	50	85
A4	252	70-07-28-300-029	1.2	50	85
A4	253	70-07-28-300-019	1.2	50	85
A4	254	70-07-28-300-020	1.2	50	85
A4	255	70-07-28-300-036	1.2	50	85
A4	256	70-07-28-300-050	1.2	50	85
A4	257	70-07-28-300-021	1.2	50	85
A4	258	70-07-28-300-022	1.2	50	85
A4	260	70-07-28-300-027	1.2	50	85
A4	261	70-07-33-125-036	1.2	50	85
A4	262	70-07-33-125-039 Pierce Street	1.2	50	85
A4	263	70-07-33-125-004	1.2	50	85
A4	264	70-07-33-125-034	1.2	50	85
A4	266	70-07-33-125-007	1.2	50	85
A4	267	70-07-33-125-008	1.2	50	85
A4	268	70-07-33-125-009	1.2	50	85

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Grand Haven Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A4	269	70-07-33-125-010	1.2	50	85
A4	270	70-07-33-125-011	1.2	50	85
A4	271	70-07-33-125-012	1.2	50	85
A4	272	70-07-33-125-033	1.2	50	85
A4	274	70-07-33-125-029	1.2	50	85
A4	275	70-07-33-125-030	1.2	50	85
A4	276	70-07-33-125-019	1.2	50	85
A4	277	70-07-33-125-020	1.2	50	85
A4	278	70-07-33-125-021	1.2	50	85
A4	279	70-07-33-125-022	1.2	50	85
A5	280	70-07-33-125-023	2.6	95	170
A5	281	70-07-33-125-024	2.6	95	170
A5	282	70-07-33-125-025	2.6	95	170
A5	283	70-07-33-125-026	2.6	95	170
A5	284	70-07-33-125-027	2.6	95	170
A5	285	70-07-33-125-028	2.6	95	170
A5	286	70-07-33-100-007	2.6	95	170
A5	287	70-07-33-100-010	2.6	95	170
A5	288	70-07-33-100-020	2.6	95	170
A5	288.1	70-07-33-100-021	2.6	95	170

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Grand Haven Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A5	289	70-07-33-303-002	2.6	95	170
A5	289.01	70-07-33-303-001	2.6	95	170
A5	289.02	70-07-33-300-043	2.6	95	170
A5	290	70-07-33-300-002	2.6	95	170
A5	292	70-07-33-300-004	2.6	95	170
A5	293	70-07-33-300-013	2.6	95	170
A5	294	70-07-33-300-017	2.6	95	170
A5	295	70-07-33-300-019 Kirk Park	2.6	95	170

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

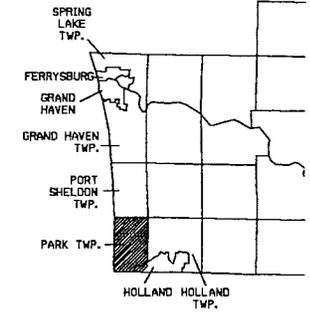
60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

HIGH RISK EROSION AREAS & CRITICAL DUNE AREAS

OTTAWA COUNTY

T25N,R16W



HIGH RISK EROSION AREAS

THE NUMBER REPRESENTS, IN FEET, THE 30 YEAR PROJECTED RECESSION DISTANCE.
 60' THE NUMBER REPRESENTS, IN FEET, THE 60 YEAR PROJECTED RECESSION DISTANCE.

HIGH RISK EROSION AREA (shading alongshore)

THESE AREAS ARE LEGALLY DEFINED BY PART 323, SHORELANDS PROTECTION AND MANAGEMENT, OF THE NATURAL RESOURCE & ENVIRONMENTAL PROTECTION ACT 1994 PA 451 BEING GREAT LAKES SHORELAND AREAS DOCUMENTED TO REcede AN AVERAGE OF ONE FOOT OR MORE PER YEAR.

CRITICAL DUNE AREAS

- BARRIER DUNES
BARRIER DUNE FORMATIONS DESIGNATED PURSUANT TO PART 353, SAND DUNE PROTECTION & MANAGEMENT, OF THE NATURAL RESOURCE & ENVIRONMENTAL PROTECTION ACT 1994 PA 451.
- AREAS NOT INCLUDED IN DESIGNATED BARRIER DUNE FORMATIONS THAT ARE COMPOSED PRIMARILY OF DUNE SAND AND EXHIBIT SEVERAL DUNE-LIKE CHARACTERISTICS.
- EXEMPLARY DUNE ASSOCIATED PLANT COMMUNITIES OUTSIDE DESIGNATED DUNE FORMATIONS. MICHIGAN NATURAL FEATURES INVENTORY REFERENCE CODE INDICATED.

SOURCE

STATE OF MICHIGAN RECESSION RATE MAPS & ATLAS OF CRITICAL DUNE AREAS

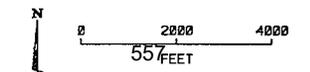
INFORMATION

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
 LAND AND WATER MANAGEMENT DIVISION
 P.O. BOX 30458
 LANSING, MI 48909-7958
 (517) 373-1950



GREAT LAKES INFORMATION SYSTEM
 MICHIGAN DEPARTMENT OF NATURAL RESOURCES
 LAND AND WATER MANAGEMENT DIVISION

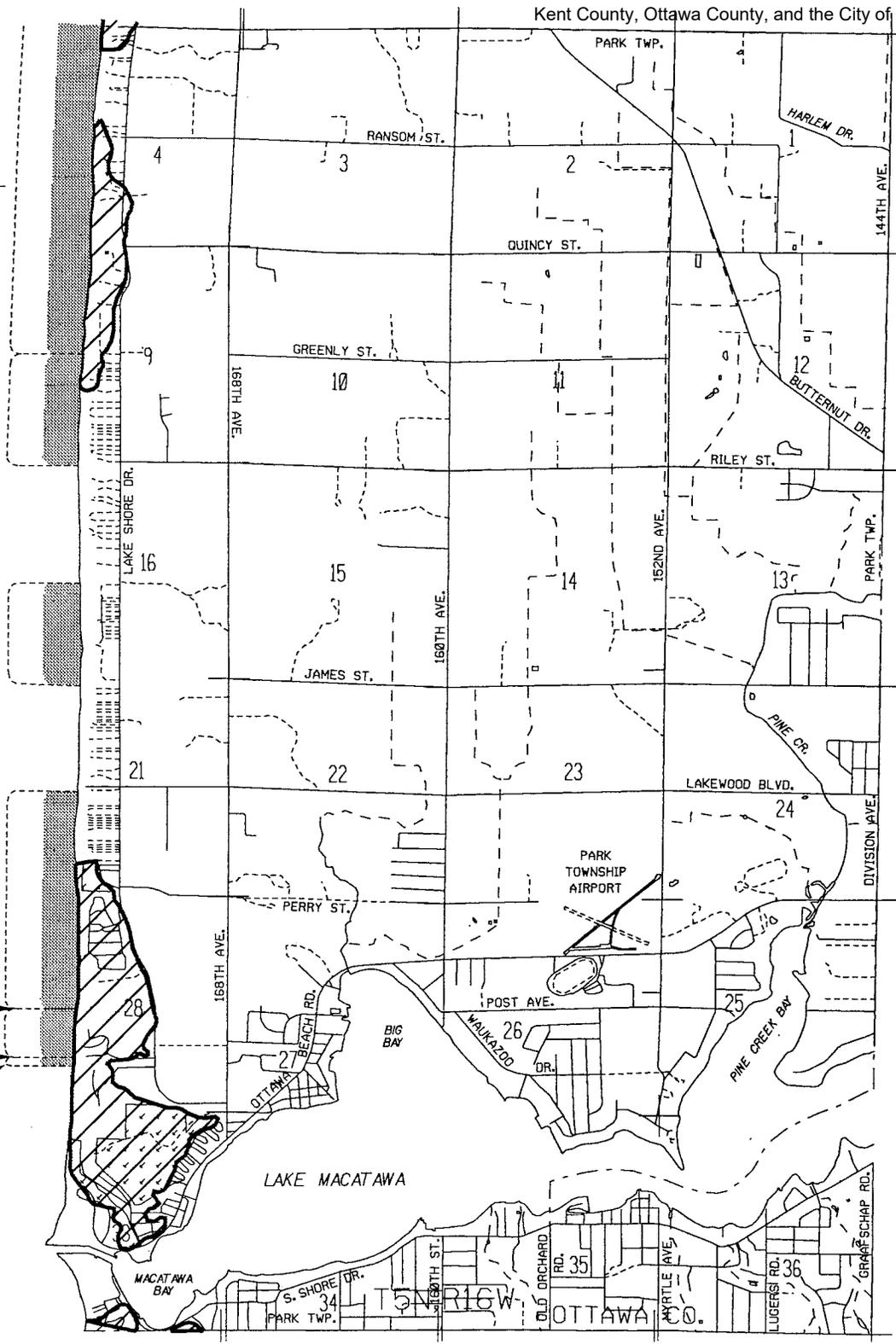
11-15-94
 Amended 08-15-96



HREA A
 90' / 165'
 60' / 105'

HREA B
 65' / 110'

HREA C
 60' / 105'
 75' / 135'
 50' / 80'





Parcels in High Risk Erosion Areas of Park Township, Ottawa County

Date of Designation: November 23, 1994

Parcel Identification No.	Address	HREA*	Rate (feet/year)	30 yr PRD*	60 yr PRD*
70-15-04-100-001	4789 N Lakeshore Dr	A1	2.5	90	165
70-15-04-100-002	4775 N Lakeshore Dr	A1	2.5	90	165
70-15-04-100-003	4759 N Lakeshore Dr	A1	2.5	90	165
70-15-04-100-004	4733 N Lakeshore Dr	A1	2.5	90	165
70-15-04-100-005	4711 N Lakeshore Dr	A1	2.5	90	165
70-15-04-100-032	4707 N Lakeshore Dr	A1	2.5	90	165
70-15-04-100-008	4673 N Lakeshore Dr	A1	2.5	90	165
70-15-04-100-019		A1	2.5	90	165
70-15-04-100-020		A1	2.5	90	165
70-15-04-100-025	4627 N Lakeshore Dr	A1	2.5	90	165
70-15-04-100-026	4623 N Lakeshore Dr	A1	2.5	90	165
70-15-04-100-011	4597 N Lakeshore Dr	A1	2.5	90	165
70-15-04-100-012	4585 N Lakeshore Dr	A1	2.5	90	165
70-15-04-100-013	4541 N Lakeshore Dr	A1	2.5	90	165
70-15-04-100-014	4511 N Lakeshore Dr	A1	2.5	90	165
70-15-04-100-015	4489 N Lakeshore Dr	A1	2.5	90	165
70-15-04-100-023	4461 N Lakeshore Dr	A1	2.5	90	165
70-15-04-100-031	4455 N Lakeshore Dr	A1	2.5	90	165
70-15-04-100-017	4433 N Lakeshore Dr	A1	2.5	90	165
70-15-04-100-029	4413 N Lakeshore Dr	A1	2.5	90	165

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact Great Lakes Shorelands staff, Water Resources Division, EGLE in Lansing or the local EGLE field office for assistance.



Parcels in High Risk Erosion Areas of Park Township, Ottawa County

Date of Designation: November 23, 1994

Parcel Identification No.	Address	HREA*	Rate (feet/year)	30 yr PRD*	60 yr PRD*
70-15-04-100-030	4411 N Lakeshore Dr	A1	2.5	90	165
70-15-04-348-026	4386 Lakes Edge Dr	A1	2.5	90	165
70-15-04-347-032	4385 Lakes Edge Dr	A1	2.5	90	165
70-15-04-347-002	4373 Lakes Edge Dr	A1	2.5	90	165
70-15-04-347-003	4363 Lakes Edge Dr	A1	2.5	90	165
70-15-04-347-004	4347 Lakes Edge Dr	A1	2.5	90	165
70-15-04-347-005	4335 Lakes Edge Dr	A1	2.5	90	165
70-15-04-347-006	4329 Lakes Edge Dr	A1	2.5	90	165
70-15-04-347-007	4311 Lakes Edge Dr	A1	2.5	90	165
70-15-04-347-024	4293 N Lakeshore Dr	A1	2.5	90	165
70-15-04-347-035	4277 N Lakeshore Dr	A1	2.5	90	165
70-15-04-347-036	4263 N Lakeshore Dr	A1	2.5	90	165
70-15-04-347-027	4235 N Lakeshore Dr	A1	2.5	90	165
70-15-04-347-015	4223 N Lakeshore Dr	A1	2.5	90	165
70-15-04-347-018	4217 N Lakeshore Dr	A1	2.5	90	165
70-15-04-399-001	4199 N Lakeshore Dr	A1	2.5	90	165
70-15-04-399-002	4191 N Lakeshore Dr	A1	2.5	90	165
70-15-04-399-017	4187 N Lakeshore Dr	A1	2.5	90	165
70-15-04-399-005	4181 N Lakeshore Dr	A1	2.5	90	165
70-15-04-399-006	4171 N Lakeshore Dr	A1	2.5	90	165

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact Great Lakes Shorelands staff, Water Resources Division, EGLE in Lansing or the local EGLE field office for assistance.



Parcels in High Risk Erosion Areas of Park Township, Ottawa County

Date of Designation: November 23, 1994

Parcel Identification No.	Address	HREA*	Rate (feet/year)	30 yr PRD*	60 yr PRD*
70-15-04-399-007	4153 N Lakeshore Dr	A1	2.5	90	165
70-15-04-399-019	4133 N Lakeshore Dr	A1	2.5	90	165
70-15-04-399-020		A1	2.5	90	165
70-15-04-399-009	4117 N Lakeshore Dr	A1	2.5	90	165
70-15-04-399-010	4101 N Lakeshore Dr	A1	2.5	90	165
70-15-04-399-011	4093 N Lakeshore Dr	A1	2.5	90	165
70-15-04-399-012	4081 N Lakeshore Dr	A1	2.5	90	165
70-15-04-399-013	4073 N Lakeshore Dr	A1	2.5	90	165
70-15-04-399-014	4061 N Lakeshore Dr	A1	2.5	90	165
70-15-04-399-015		A1	2.5	90	165
70-15-04-148-028 Camp Geneva	3995 N Lakeshore Dr	A1	2.5	90	165
70-15-09-148-033	3861 N Lakeshore Dr	A1	2.5	90	165
70-15-09-148-034	3847 N Lakeshore Dr	A1	2.5	90	165
70-15-09-148-024	3839 N Lakeshore Dr	A1	2.5	90	165
70-15-09-148-007	3821 N Lakeshore Dr	A1	2.5	90	165
70-15-09-148-030	3801 Lake Court	A1	2.5	90	165
70-15-09-148-031	3793 Lake Court	A1	2.5	90	165
70-15-09-148-032		A1	2.5	90	165
70-15-09-148-010	3787 Lake Court	A1	2.5	90	165

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact Great Lakes Shorelands staff, Water Resources Division, EGLE in Lansing or the local EGLE field office for assistance.



Parcels in High Risk Erosion Areas of Park Township, Ottawa County

Date of Designation: November 23, 1994

Parcel Identification No.	Address	HREA*	Rate (feet/year)	30 yr PRD*	60 yr PRD*
70-15-09-184-001	3769 Lake Court	A1	2.5	90	165
70-15-09-184-002	3767 Lake Court	A1	2.5	90	165
70-15-09-184-003	3755 Lake Court	A1	2.5	90	165
70-15-09-184-013	3745 N Lakeshore Dr	A1	2.5	90	165
70-15-09-184-014	3735 N Lakeshore Dr	A1	2.5	90	165
70-15-09-184-015	3721 N Lakeshore Dr	A1	2.5	90	165
70-15-09-184-016	3699 N Lakeshore Dr	A1	2.5	90	165
70-15-09-184-017	3689 N Lakeshore Dr	A1	2.5	90	165
70-15-09-184-018	3677 N Lakeshore Dr	A1	2.5	90	165
70-15-09-184-019	3667 N Lakeshore Dr	A1	2.5	90	165
70-15-09-184-028	3659 N Lakeshore Dr	A1	2.5	90	165
70-15-09-184-030	3651 N Lakeshore Dr	A1	2.5	90	165
70-15-09-184-021	3645 N Lakeshore Dr	A1	2.5	90	165
70-15-09-184-022	3639 N Lakeshore Dr	A1	2.5	90	165
70-15-09-184-023	3635 N Lakeshore Dr	A1	2.5	90	165
70-15-09-184-024	3617 N Lakeshore Dr	A1	2.5	90	165
70-15-09-184-025	3603 N Lakeshore Dr	A1	2.5	90	165
70-15-09-184-026	3599 N Lakeshore Dr	A1	2.5	90	165
70-15-09-184-027	3593 N Lakeshore Dr	A1	2.5	90	165
70-15-09-348-001	3591 N Lakeshore Dr	A1	2.5	90	165

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact Great Lakes Shorelands staff, Water Resources Division, EGLE in Lansing or the local EGLE field office for assistance.



Parcels in High Risk Erosion Areas of Park Township, Ottawa County

Date of Designation: November 23, 1994

Parcel Identification No.	Address	HREA*	Rate (feet/year)	30 yr PRD*	60 yr PRD*
70-15-09-348-038	3569 N Lakeshore Dr	A2	1.5	60	105
70-15-09-348-039	3567 N Lakeshore Dr	A2	1.5	60	105
70-15-09-348-004	3559 N Lakeshore Dr	A2	1.5	60	105
70-15-09-348-005	3545 N Lakeshore Dr	A2	1.5	60	105
70-15-09-348-044		A2	1.5	60	105
70-15-09-348-045	3535 N Lakeshore Dr	A2	1.5	60	105
70-15-09-348-007	3529 N Lakeshore Dr	A2	1.5	60	105
70-15-09-348-034	3521 N Lakeshore Dr	A2	1.5	60	105
70-15-09-348-035	3529 N Lakeshore Dr	A2	1.5	60	105
70-15-09-348-009	3515 N Lakeshore Dr	A2	1.5	60	105
70-15-09-348-010	3501 N Lakeshore Dr	A2	1.5	60	105
70-15-09-348-011	3485 N Lakeshore Dr	A2	1.5	60	105
70-15-09-348-041	3469 N Lakeshore Dr	A2	1.5	60	105
70-15-09-348-042	3461 N Lakeshore Dr	A2	1.5	60	105
70-15-09-348-014	3451 N Lakeshore Dr	A2	1.5	60	105
70-15-09-348-015	3443 N Lakeshore Dr	A2	1.5	60	105
70-15-09-348-016	3433 N Lakeshore Dr	A2	1.5	60	105
70-15-09-348-017	3421 N Lakeshore Dr	A2	1.5	60	105
70-15-09-348-018	3411 Maple Ave	A2	1.5	60	105
70-15-09-348-031	3399 Maple Ave	A2	1.5	60	105

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact Great Lakes Shorelands staff, Water Resources Division, EGLE in Lansing or the local EGLE field office for assistance.



Parcels in High Risk Erosion Areas of Park Township, Ottawa County

Date of Designation: November 23, 1994

Parcel Identification No.	Address	HREA*	Rate (feet/year)	30 yr PRD*	60 yr PRD*
70-15-09-348-032	3391 Maple Ave	A2	1.5	60	105
70-15-09-348-033	3381 Maple Ave	A2	1.5	60	105
70-15-09-385-033	3375 Maple Ave	A2	1.5	60	105
70-15-09-385-034	3371 Maple Ave	A2	1.5	60	105
70-15-09-385-002	3353 Maple Ave	A2	1.5	60	105
70-15-09-385-003		A2	1.5	60	105
70-15-09-385-014	3335 N Lakeshore Dr	A2	1.5	60	105
70-15-09-385-015	3327 N Lakeshore Dr	A2	1.5	60	105
70-15-09-385-016	3317 N Lakeshore Dr	A2	1.5	60	105
70-15-09-385-017	3309 N Lakeshore Dr	A2	1.5	60	105
70-15-09-385-018	3303 N Lakeshore Dr	A2	1.5	60	105
70-15-09-385-019	3293 N Lakeshore Dr	A2	1.5	60	105
70-15-09-385-020	3283 N Lakeshore Dr	A2	1.5	60	105
70-15-09-385-021	3273 N Lakeshore Dr	A2	1.5	60	105
70-15-09-385-022	3263 N Lakeshore Dr	A2	1.5	60	105
70-15-09-385-023	3253 N Lakeshore Dr	A2	1.5	60	105
70-15-09-385-024	3247 N Lakeshore Dr	A2	1.5	60	105
70-15-09-385-025	3241 N Lakeshore Dr	A2	1.5	60	105
70-15-09-385-026	3233 N Lakeshore Dr	A2	1.5	60	105
70-15-09-385-027	17335 Riley St	A2	1.5	60	105

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact Great Lakes Shorelands staff, Water Resources Division, EGLE in Lansing or the local EGLE field office for assistance.



Parcels in High Risk Erosion Areas of Park Township, Ottawa County

Date of Designation: November 23, 1994

Parcel Identification No.	Address	HREA*	Rate (feet/year)	30 yr PRD*	60 yr PRD*
70-15-16-150-001	17334 Riley St	A2	1.5	60	105
70-15-16-300-004	2757 N Lakeshore Dr	B1	1.6	65	110
70-15-16-300-005	2753 N Lakeshore Dr	B1	1.6	65	110
70-15-16-349-002	2743 N Lakeshore Dr	B1	1.6	65	110
70-15-16-349-021	2737 N Lakeshore Dr	B1	1.6	65	110
70-15-16-349-004	2729 N Lakeshore Dr	B1	1.6	65	110
70-15-16-349-005		B1	1.6	65	110
70-15-16-349-006	2713 N Lakeshore Dr	B1	1.6	65	110
70-15-16-349-007	2705 N Lakeshore Dr	B1	1.6	65	110
70-15-16-349-008	2697 N Lakeshore Dr	B1	1.6	65	110
70-15-16-349-023	2679 N Lakeshore Dr	B1	1.6	65	110
70-15-16-349-024	2673 N Lakeshore Dr	B1	1.6	65	110
70-15-16-349-012	2667 N Lakeshore Dr	B1	1.6	65	110
70-15-16-349-013	2659 N Lakeshore Dr	B1	1.6	65	110
70-15-16-349-014	2651 N Lakeshore Dr	B1	1.6	65	110
70-15-16-349-015	2643 N Lakeshore Dr	B1	1.6	65	110
70-15-16-349-016	2631 N Lakeshore Dr	B1	1.6	65	110
70-15-16-349-022	2625 N Lakeshore Dr	B1	1.6	65	110
70-15-16-349-018	2617 N Lakeshore Dr	B1	1.6	65	110
70-15-16-349-019	2609 N Lakeshore Dr	B1	1.6	65	110

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact Great Lakes Shorelands staff, Water Resources Division, EGLE in Lansing or the local EGLE field office for assistance.



Parcels in High Risk Erosion Areas of Park Township, Ottawa County

Date of Designation: November 23, 1994

Parcel Identification No.	Address	HREA*	Rate (feet/year)	30 yr PRD*	60 yr PRD*
70-15-16-349-020	2601 N Lakeshore Dr	B1	1.6	65	110
70-15-16-398-027	2591 N Lakeshore Dr	B1	1.6	65	110
70-15-16-398-028	2581 N Lakeshore Dr	B1	1.6	65	110
70-15-16-398-032	2567 N Lakeshore Dr	B1	1.6	65	110
70-15-16-398-029	2563 N Lakeshore Dr	B1	1.6	65	110
70-15-16-398-030	2555 N Lakeshore Dr	B1	1.6	65	110
70-15-16-398-031	2549 N Lakeshore Dr	B1	1.6	65	110
70-15-16-398-008	2541 Lakefront Dr	B1	1.6	65	110
70-15-16-398-009	2529 Lakefront Dr	B1	1.6	65	110
70-15-16-398-010	2521 Lakefront Dr	B1	1.6	65	110
70-15-16-398-011	2517 Lakefront Dr	B1	1.6	65	110
70-15-16-398-012	2505 Lakefront Dr	B1	1.6	65	110
70-15-16-398-013	2503 Lakefront Dr	B1	1.6	65	110
70-15-16-398-014	2497 Lakefront Dr	B1	1.6	65	110
70-15-16-398-015	2489 Lakefront Dr	B1	1.6	65	110
70-15-16-398-016	2481 Lakefront Dr	B1	1.6	65	110
70-15-16-398-017	2473 Lakefront Dr	B1	1.6	65	110
70-15-16-398-018	2459 Lakefront Dr	B1	1.6	65	110
70-15-16-398-019	2451 Lakefront Dr	B1	1.6	65	110
70-15-16-398-020	2443 Lakefront Dr	B1	1.6	65	110

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact Great Lakes Shorelands staff, Water Resources Division, EGLE in Lansing or the local EGLE field office for assistance.



Parcels in High Risk Erosion Areas of Park Township, Ottawa County

Date of Designation: November 23, 1994

Parcel Identification No.	Address	HREA*	Rate (feet/year)	30 yr PRD*	60 yr PRD*
70-15-16-398-021	2435 Lakefront Dr	B1	1.6	65	110
70-15-16-398-022	2427 Lakefront Dr	B1	1.6	65	110
70-15-16-398-023	2421 Lakefront Dr	B1	1.6	65	110
70-15-16-398-024	2413 Lakefront Dr	B1	1.6	65	110
70-15-16-398-025	2405 Lakefront Dr	B1	1.6	65	110
70-15-21-150-001	470 N Lakeshore Dr	B1	1.6	65	110
70-15-21-150-002	462 N Lakeshore Dr	B1	1.6	65	110
70-15-21-150-003	456 N Lakeshore Dr	B1	1.6	65	110
70-15-21-340-013	220 N Lakeshore Dr	C1	1.5	60	105
70-15-21-340-003	216 N Lakeshore Dr	C1	1.5	60	105
70-15-21-340-004	208 N Lakeshore Dr	C1	1.5	60	105
70-15-21-340-005	198 N Lakeshore Dr	C1	1.5	60	105
70-15-21-340-006	192 N Lakeshore Dr	C1	1.5	60	105
70-15-21-340-007	180 N Lakeshore Dr	C1	1.5	60	105
70-15-21-340-008	176 N Lakeshore Dr	C1	1.5	60	105
70-15-21-340-009	170 N Lakeshore Dr	C1	1.5	60	105
70-15-21-340-010	164 N Lakeshore Dr	C1	1.5	60	105
70-15-21-340-011	158 N Lakeshore Dr	C1	1.5	60	105
70-15-21-390-001	152 N Lakeshore Dr	C1	1.5	60	105
70-15-21-390-002	146 N Lakeshore Dr	C1	1.5	60	105

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact Great Lakes Shorelands staff, Water Resources Division, EGLE in Lansing or the local EGLE field office for assistance.



Parcels in High Risk Erosion Areas of Park Township, Ottawa County

Date of Designation: November 23, 1994

Parcel Identification No.	Address	HREA*	Rate (feet/year)	30 yr PRD*	60 yr PRD*
70-15-21-390-003	132 N Lakeshore Dr	C1	1.5	60	105
70-15-21-390-004	126 N Lakeshore Dr	C1	1.5	60	105
70-15-21-390-005	120 N Lakeshore Dr	C1	1.5	60	105
70-15-21-390-006	114 N Lakeshore Dr	C1	1.5	60	105
70-15-21-390-007	106 N Lakeshore Dr	C1	1.5	60	105
70-15-21-390-008	100 N Lakeshore Dr	C1	1.5	60	105
70-15-21-390-009	94 N Lakeshore Dr	C1	1.5	60	105
70-15-21-390-010	86 N Lakeshore Dr	C1	1.5	60	105
70-15-21-390-011	76 N Lakeshore Dr	C1	1.5	60	105
70-15-21-300-001	50 N Lakeshore Dr (Tunnel Park)	C1	1.5	60	105
70-15-28-130-001	16 Lake St	C1	1.5	60	105
70-15-28-130-002	18 Lake St	C1	1.5	60	105
70-15-28-130-003	20 Lake St	C1	1.5	60	105
70-15-28-130-004	24 Lake St	C1	1.5	60	105
70-15-28-130-005	28 Lake St	C1	1.5	60	105
70-15-28-130-006	34 Lake St	C1	1.5	60	105
70-15-28-130-007	40 Lake St	C1	1.5	60	105
70-15-28-130-008		C1	1.5	60	105
70-15-28-135-001	48 Michigan Ave	C1	1.5	60	105

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact Great Lakes Shorelands staff, Water Resources Division, EGLE in Lansing or the local EGLE field office for assistance.



Parcels in High Risk Erosion Areas of Park Township, Ottawa County

Date of Designation: November 23, 1994

Parcel Identification No.	Address	HREA*	Rate (feet/year)	30 yr PRD*	60 yr PRD*
70-15-28-135-002	54 Michigan Ave	C1	1.5	60	105
70-15-28-135-003	64 Michigan Ave	C1	1.5	60	105
70-15-28-135-004	68 Michigan Ave	C1	1.5	60	105
70-15-28-135-005	72 Michigan Ave	C1	1.5	60	105
70-15-28-135-006	74 Michigan Ave	C1	1.5	60	105
70-15-28-135-007	78 Michigan Ave	C1	1.5	60	105
70-15-28-135-008	82 Michigan Ave	C1	1.5	60	105
70-15-28-135-009	86 Michigan Ave	C1	1.5	60	105
70-15-28-135-010	90 Michigan Ave	C1	1.5	60	105
70-15-28-135-020	98 Michigan Ave	C1	1.5	60	105
70-15-28-135-018	104 Michigan Ave	C1	1.5	60	105
70-15-28-135-019	108 Michigan Ave	C1	1.5	60	105
70-15-28-135-014	112 Michigan Ave	C1	1.5	60	105
70-15-28-135-015	116 Michigan Ave	C1	1.5	60	105
70-15-28-135-016	118 Michigan Ave	C1	1.5	60	105
70-15-28-135-017	122 Michigan Ave	C1	1.5	60	105
70-15-28-180-011	133 Michigan Ave	C1	1.5	60	105
70-15-28-180-003	155 Michigan Ave	C1	1.5	60	105
70-15-28-180-004	123 Michigan Ave	C1	1.5	60	105
70-15-28-180-012	128 Heights Ave	C1	1.5	60	105

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact Great Lakes Shorelands staff, Water Resources Division, EGLE in Lansing or the local EGLE field office for assistance.



Parcels in High Risk Erosion Areas of Park Township, Ottawa County

Date of Designation: November 23, 1994

Parcel Identification No.	Address	HREA*	Rate (feet/year)	30 yr PRD*	60 yr PRD*
70-15-28-180-010		C1	1.5	60	105
70-15-28-181-016		C1	1.5	60	105
70-15-28-181-014	2361 Sunset Bluff Dr	C1	1.5	60	105
70-15-28-181-015	2363 Sunset Bluff Dr	C1	1.5	60	105
70-15-28-190-001	2490 Sunset Bluff Dr	C1	1.5	60	105
70-15-28-190-008	2480 Sunset Bluff Dr	C1	1.5	60	105
70-15-28-190-009	2474 Sunset Bluff Dr	C1	1.5	60	105
70-15-28-190-010	2460 Sunset Bluff Dr	C1	1.5	60	105
70-15-28-302-001		C2	2.0	75	135
70-15-28-303-001	260 Sunset Bluff Ct	C2	2.0	75	135
70-15-28-303-002	274 Sunset Bluff Ct	C2	2.0	75	135
70-15-28-303-003	280 Sunset Bluff Ct	C2	2.0	75	135
70-15-28-303-015	288 Sunset Bluff Ct	C2	2.0	75	135
70-15-28-340-029	430 Crest Dr	C2	2.0	75	135
70-15-28-340-030	418 Crest Dr	C2	2.0	75	135
70-15-28-340-003	414 Crest Dr	C2	2.0	75	135
70-15-28-340-004	406 Crest Dr	C2	2.0	75	135
70-15-28-340-005	402 Crest Dr	C2	2.0	75	135
70-15-28-340-006	2511 Oriole Ln	C2	2.0	75	135
70-15-28-340-007	2506 Oriole Ln	C2	2.0	75	135

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact Great Lakes Shorelands staff, Water Resources Division, EGLE in Lansing or the local EGLE field office for assistance.



Parcels in High Risk Erosion Areas of Park Township, Ottawa County

Date of Designation: November 23, 1994

Parcel Identification No.	Address	HREA*	Rate (feet/year)	30 yr PRD*	60 yr PRD*
70-15-28-340-008	2507 Eagle Ln	C2	2.0	75	135
70-15-28-340-010	2509 Eagle Ln	C2	2.0	75	135
70-15-28-340-011	2508 Eagle Ln	C3	1.1	50	80
70-15-28-380-001	2506 Eagle Ln	C3	1.1	50	80

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact Great Lakes Shorelands staff, Water Resources Division, EGLE in Lansing or the local EGLE field office for assistance.

Parcels in High Risk Erosion Areas of Port Sheldon Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A1	1	70-11-04-105-001	2.6	95	170
A1	2	70-11-04-105-002	2.6	95	170
A1	3	70-11-04-101-016	2.6	95	170
A1	4	70-11-04-101-017	2.6	95	170
A1	5	70-11-04-101-018	2.6	95	170
A1	6	70-11-04-101-028	2.6	95	170
A1	7	70-11-04-101-021	2.6	95	170
A1	8	70-11-04-101-022	2.6	95	170
A1	9	70-11-04-101-023	2.6	95	170
A1	10	70-11-04-101-024	2.6	95	170
A1	11	70-11-04-122-001	2.6	95	170
A1	12	70-11-04-122-002	2.6	95	170
A1	13	70-11-04-122-003	2.6	95	170
A1	14	70-11-04-122-004	2.6	95	170
A1	15	70-11-04-122-005	2.6	95	170
A1	16	70-11-04-122-006	2.6	95	170
A1	17	70-11-04-122-015	2.6	95	170
A1	18	70-11-04-122-016	2.6	95	170
A1	20	70-11-04-176-021	2.6	95	170

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Port Sheldon Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
A1	21	70-11-04-176-010	2.6	95	170
A1	22	70-11-04-176-016	2.6	95	170
A1	23	70-11-04-176-018	2.6	95	170
A1	24	70-11-04-176-014	2.6	95	170
A1	25	70-11-04-176-020	2.6	95	170
A1	26	70-11-04-176-003	2.6	95	170
A1	27	70-11-04-176-004	2.6	95	170
A1	28	70-11-04-176-005	2.6	95	170
A1	29	70-11-04-176-006	2.6	95	170
A1	30	70-11-04-176-007	2.6	95	170
A1	31	70-11-04-176-008	2.6	95	170
A1	32	70-11-04-185-008	2.6	95	170
A1	33	70-11-04-185-009	2.6	95	170
A1	34	70-11-04-185-002	2.6	95	170
A1	35	70-11-04-185-003	2.6	95	170
B1	72	70-11-09-100-038	1.2	50	85
B1	73	70-11-09-100-037	1.2	50	85
B1	74	70-11-09-100-022 Olive Shores	1.2	50	85
B1	75	70-11-09-100-033	1.2	50	85

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Port Sheldon Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
B1	76	70-11-09-100-032	1.2	50	85
B1	77	70-11-09-100-024	1.2	50	85
B1	78	70-11-09-100-025	1.2	50	85
B1	79	70-11-09-100-026	1.2	50	85
B1	80	70-11-09-300-001	1.2	50	85
B1	81	70-11-09-300-024	1.2	50	85
B1	82	70-11-09-300-051	1.2	50	85
B1	83	70-11-09-300-033	1.2	50	85
B1	84	70-11-09-300-036	1.2	50	85
B1	85	70-11-09-300-056	1.2	50	85
B1	86	70-11-09-300-040	1.2	50	85
B1	87	70-11-09-300-062	1.2	50	85
B1	88	70-11-09-300-010	1.2	50	85
B1	89	70-11-09-300-011	1.2	50	85
B1	90	70-11-09-300-064	1.2	50	85
B1	91	70-11-09-300-041	1.2	50	85
B1	92	70-11-09-300-066	1.2	50	85
B1	93	70-11-09-300-046	1.2	50	85
B1	94	70-11-09-300-017	1.2	50	85
B1	95	70-11-09-300-018	1.2	50	85

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Port Sheldon Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
B1	96	70-11-09-300-019	1.2	50	85
B1	97	70-11-09-300-052	1.2	50	85
B1	97.01	70-11-09-300-053	1.2	50	85
B1	97.02	70-11-09-300-054	1.2	50	85
B1	97.03	70-11-09-300-055	1.2	50	85
B1	99	70-11-09-300-050	1.2	50	85
B1	100	70-11-09-300-021	1.2	50	85
B1	101	70-11-16-100-001	1.2	50	85
B1	102	70-11-16-200-004 Windsnest Park	1.2	50	85
B1	103	70-11-16-176-019	1.2	50	85
B1	104	70-11-16-176-003	1.2	50	85
B1	105	70-11-16-176-004	1.2	50	85
C1	106	70-11-21-149-015	1.6	65	110
C1	108	70-11-21-149-007	1.6	65	110
C1	109	70-11-21-149-008	1.6	65	110
C1	110	70-11-21-149-009	1.6	65	110
C1	111	70-11-21-149-010	1.6	65	110
C1	112	70-11-21-149-011	1.6	65	110
C1	113	70-11-21-149-013	1.6	65	110

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Port Sheldon Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
C1	114	70-11-21-149-014	1.6	65	110
C1	115	70-11-21-194-001	1.6	65	110
C1	116	70-11-21-194-002	1.6	65	110
C1	117	70-11-21-194-003	1.6	65	110
C1	118	70-11-21-194-004	1.6	65	110
C1	119	70-11-21-194-005	1.6	65	110
C1	120	70-11-21-194-006	1.6	65	110
C1	121	70-11-21-194-007	1.6	65	110
C1	122	70-11-21-196-001	1.6	65	110
C1	123	70-11-21-196-012	1.6	65	110
C1	123	70-11-21-196-013	1.6	65	110
C2	124	70-11-21-196-003	3.7	125	235
C2	125	70-11-21-196-010	3.7	125	235
C2	126	70-11-21-196-011	3.7	125	235
C2	127	70-11-21-196-005	3.7	125	235
C2	128	70-11-21-196-006	3.7	125	235
C2	130	70-11-21-197-015	3.7	125	235
C2	130.2	70-11-21-197-006	3.7	125	235
C2	130.21	70-11-21-197-007	3.7	125	235
C2	130.22	70-11-21-197-009	3.7	125	235

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Port Sheldon Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
C2	130.23	70-11-21-197-010	3.7	125	235
C2	131	70-11-21-300-001	3.7	125	235
C2	132	70-11-21-400-103	3.7	125	235
C2	132.01	70-11-21-400-104	3.7	125	235
C2	134	70-11-21-390-052	3.7	125	235
C2	135	70-11-21-390-036	3.7	125	235
C2	136	70-11-21-390-003	3.7	125	235
C2	137	70-11-21-390-004	3.7	125	235
C2	138	70-11-21-390-005	3.7	125	235
C2	139	70-11-21-390-006	3.7	125	235
C2	140	70-11-21-390-007	3.7	125	235
C2	141	70-11-21-390-008	3.7	125	235
C2	142	70-11-21-390-009	3.7	125	235
C2	143	70-11-21-390-010	3.7	125	235
C2	144	70-11-21-390-011	3.7	125	235
C2	145	70-11-21-390-012	3.7	125	235
C2	146	70-11-21-390-013	3.7	125	235
C2	147	70-11-21-390-030	3.7	125	235
C2	148	70-11-21-390-031	3.7	125	235
C2	149	70-11-21-390-027	3.7	125	235

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Port Sheldon Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
C2	150	70-11-21-390-020	3.7	125	235
C2	151	70-11-21-390-040	3.7	125	235
C2	152	70-11-21-390-039	3.7	125	235
C2	153	70-11-21-390-049	3.7	125	235
C2	154	70-11-21-390-050	3.7	125	235
C2	154.01	70-11-21-390-054	3.7	125	235
C2	155	70-11-28-100-035	3.7	125	235
C2	156	70-11-28-100-003	3.7	125	235
C2	157	70-11-28-100-004	3.7	125	235
C2	158	70-11-28-100-033	3.7	125	235
C2	159	70-11-28-100-006	3.7	125	235
C2	160	70-11-28-100-007	3.7	125	235
C2	161	70-11-28-100-008	3.7	125	235
C2	162	70-11-28-100-009	3.7	125	235
C2	164	70-11-28-100-032	3.7	125	235
C2	165	70-11-28-100-044	3.7	125	235
C2	166	70-11-28-100-045	3.7	125	235
C2	167	70-11-28-100-012	3.7	125	235
C2	168	70-11-28-100-014	3.7	125	235
C2	169	70-11-28-100-041	3.7	125	235

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Port Sheldon Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
C2	169.01	70-11-28-100-042	3.7	125	235
C3	170	70-11-28-100-018	1.3	55	95
C3	171	70-11-28-100-019	1.3	55	95
C3	172	70-11-28-100-020	1.3	55	95
C3	173	70-11-28-100-021	1.3	55	95
C3	174	70-11-28-100-022	1.3	55	95
C3	175	70-11-28-100-023	1.3	55	95
C3	176	70-11-28-100-024	1.3	55	95
C3	177	70-11-28-100-025	1.3	55	95
C3	178	70-11-28-300-001	1.3	55	95
C3	179	70-11-28-300-032	1.3	55	95
C3	179.01	70-11-28-300-033	1.3	55	95
C3	179.02	70-11-28-300-034	1.3	55	95
C3	180	70-11-28-300-025	1.3	55	95
C3	181	70-11-28-300-036	1.3	55	95
C3	182	70-11-28-300-005	1.3	55	95
C3	183	70-11-28-300-006	1.3	55	95
C3	184	70-11-28-300-007	1.3	55	95
C3	185	70-11-28-300-008	1.3	55	95
C3	186	70-11-28-300-009	1.3	55	95

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Port Sheldon Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
C3	187	70-11-28-300-010	1.3	55	95
C3	188	70-11-28-300-011	1.3	55	95
C3	189	70-11-28-300-012	1.3	55	95
C3	190	70-11-28-300-013	1.3	55	95
C3	191	70-11-28-300-014	1.3	55	95
C3	192	70-11-28-300-015	1.3	55	95
C3	193	70-11-28-300-016	1.3	55	95
C3	194	70-11-28-300-017	1.3	55	95
C3	195	70-11-28-300-018	1.3	55	95
C3	196	70-11-28-300-019	1.3	55	95
C3	197	70-11-28-300-020	1.3	55	95
C3	198	70-11-28-300-035	1.3	55	95
C3	201	70-11-33-100-001 Koww Park	1.3	55	95
C3	202	70-11-33-100-002	1.3	55	95
C3	203	70-11-33-100-003	1.3	55	95
C3	204	70-11-33-100-004	1.3	55	95
C3	205	70-11-33-100-005	1.3	55	95
C3	206	70-11-33-100-007	1.3	55	95
C3	207	70-11-33-100-006	1.3	55	95

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Port Sheldon Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
C4	208	70-11-33-100-008	1.3	90	165
C4	209	70-11-33-100-009	1.3	90	165
C4	210	70-11-33-100-010	1.3	90	165
C4	211	70-11-33-100-043	1.3	90	165
C4	213	70-11-33-100-031	1.3	90	165
C4	214	70-11-33-100-044	1.3	90	165
C4	215	70-11-33-100-015	1.3	90	165
C4	216	70-11-33-100-016	1.3	90	165
C4	217	70-11-33-100-017	1.3	90	165
C4	218	70-11-33-100-018	1.3	90	165
C4	219	70-11-33-100-019	1.3	90	165
C4	220	70-11-33-100-020	1.3	90	165
C4	221	70-11-33-100-032	1.3	90	165
C4	222	70-11-33-100-033	1.3	90	165
C4	223	70-11-33-100-034	1.3	90	165
C4	224	70-11-33-100-047	1.3	90	165
C4	225	70-11-33-100-048	1.3	90	165
C4	226	70-11-33-100-046	1.3	90	165
C4	227	70-11-33-349-001	1.3	90	165
C4	228	70-11-33-349-002	1.3	90	165

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Port Sheldon Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
C4	229	70-11-33-349-003	1.3	90	165
C4	230	70-11-33-349-004	1.3	90	165
C4	231	70-11-33-349-005	1.3	90	165
C4	232	70-11-33-349-006	1.3	90	165
C4	233	70-11-33-349-007	1.3	90	165
C4	234	70-11-33-349-008	1.3	90	165
C4	235	70-11-33-349-009	1.3	90	165
C4	236	70-11-33-349-034	1.3	90	165
C4	237	70-11-33-349-012	1.3	90	165
C4	238	70-11-33-349-013	1.3	90	165
C4	239	70-11-33-349-032	1.3	90	165
C4	240	70-11-33-349-033	1.3	90	165
C4	241	70-11-33-349-015	1.3	90	165
C4	242	70-11-33-349-016	1.3	90	165
C4	243	70-11-33-349-017	1.3	90	165
C4	244	70-11-33-349-018	1.3	90	165
C4	245	70-11-33-349-019	1.3	90	165
C4	246	70-11-33-349-020	1.3	90	165
C4	247	70-11-33-349-021	1.3	90	165
C4	248	70-11-33-349-022	1.3	90	165

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

Parcels in High Risk Erosion Areas of Port Sheldon Township, Ottawa County

HREAs identified North to South Date of Designation: November 23, 1994

HREA*	Sequence No.	Parcel Identification Number	Rate (feet/year)	30 yr PRD*	60 yr PRD*
C4	249	70-11-33-349-023	1.3	90	165
C4	250	70-11-33-349-024	1.3	90	165
C4	251	70-11-33-349-025	1.3	90	165
C4	252	70-11-33-349-026	1.3	90	165
C4	253	70-11-33-349-035	1.3	90	165
C4	253.01	70-11-33-349-036	1.3	90	165
C4	254	70-11-33-349-028	1.3	90	165
C4	255	70-11-33-349-029	1.3	90	165
C4	256	70-11-33-349-030	1.3	90	165
C4	257	70-11-33-349-031	1.3	90	165

HREA* - Some parcels may be in multiple HREAs due to their large size.

30 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for readily moveable structures including those structures 3,500 square feet or less and built on a basement, crawlspace or pilings. Additional restrictions may apply per Administrative Rules 281.21-22.

60 yr PRD* is the Projected Recession Distance (feet) landward from the Erosion Hazard Line for non-readily moveable structures such as large structures and septic systems.

Designation runs with the land including subsequent splits. Absence of a property number does not guarantee the property is located outside of an HREA. Contact the Great Lakes Shorelands Unit, Water Resources Division, DEQ in Lansing or the local DEQ field office for assistance.

July 2021



Michigan Traffic Crash Facts

Reporting Criteria

Please pay particular attention to the wording when interpreting the three levels of data gathered for this report.

Crash

The Crash Level analyzes data related to crash events and returns one result per crash.

Examples: Time, weather, and location.

Units

The Units Level analyzes the experience of the units in the crash and returns one result per vehicle, driver, pedestrian, bicyclist, or train.

Examples: Vehicle type, driver condition, and unit events.

People

The People Level analyzes the experience of the people involved in the crash and returns one result per occupant/person/party.

Examples: Age, injury severity, and seat belt or helmet use.

KABCO Injury Indicator:

K = Killed

A = Suspected Serious Injury

B = Suspected Minor Injury

C = Possible Injury

O = No Injury

Property Damage Only (PDO)



Kent County

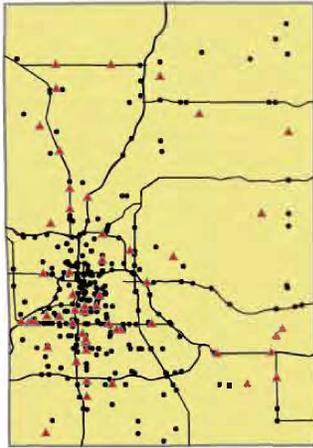
2020 Traffic Crash Data & 2016-2020 5-Year Trends



Sources:

The crashes in this report occurred on public roadways in Michigan and resulted in injuries, fatalities, or property damage (with \$1,000 as a reporting threshold). The information was gathered from Michigan Traffic Crash Report Forms (UD-10) submitted by local police departments, sheriff's offices, and the Michigan State Police. Other related information was obtained from the departments of Transportation, State, and Community Health.

Kent County



Crashes by most severe injury (mapped/actual)
 ▲ K - Fatal (55/55)
 ● A - Suspected Serious (327/327)

2020 - Crashes and Injuries by Month

Month	Crashes				Persons	
	Total	Fatal	Injury	Property Damage Only (PDO)	Fatalities	Injuries
January	1,678	4	256	1,418	4	318
February	1,695	6	291	1,398	6	394
March	958	2	153	803	2	194
April	676	2	122	552	2	169
May	1,025	8	209	808	8	286
June	1,352	6	296	1,050	6	389
July	1,472	6	308	1,158	6	421
August	1,521	6	356	1,159	6	497
September	1,617	4	314	1,299	4	399
October	1,904	3	314	1,587	3	409
November	1,637	6	274	1,357	6	355
December	1,521	2	269	1,250	2	357
Total	17,056	55	3,162	13,839	55	4,188

Kent County

In 2020:

There were 30,854 drivers involved in 17,056 motor vehicle crashes in Kent County. Of those crashes, 55 were classified as fatal, resulting in 55 fatalities. An additional 4,188 persons were injured.

Kent County experienced the highest number of motor vehicle crashes (1,904) in October, the highest number of fatal crashes (8) and the highest number of persons killed (8) in May.

Michigan driver statistics indicate 6.4 percent of licensed drivers in Kent County were age 16-20, and 10.7 percent of drivers in crashes were also in that age group.

2020 - Driver Statistics

Age Group	Kent County			Driver Rates	
	2019 Population*	Licensed Drivers	Drivers in Crashes	Per 10k Population	Per 10k Licensed
0 - 15	139,649	3,019	41	2.9	135.8
16 - 20	42,299	29,618	3,302	780.6	1,114.9
21 - 24	36,298	32,279	3,169	873.1	981.8
25 - 64	345,889	310,746	17,516	506.4	563.7
65 +	92,820	84,026	2,388	257.3	284.2
Unknown	0	0	4,438	--	--
Total	656,955	459,688	30,854	469.7	671.2

*2020 Population of Michigan Counties (by single-year of age) not yet available from U.S. Census Bureau

2020 - Vehicles in Crashes

Vehicle Type	Motor Vehicles		Fatal Crashes		Injury Crashes	PDO Crashes
	Number of Vehicles	% of Total	Number	% of Total	Number	Number
Passenger car, SUV, van	25,498	82.6	75	76.5	5,020	20,403
Motor home	38	0.1	0	0.0	6	32
Pickup truck	2,765	9.0	8	8.2	461	2,296
Small truck under 10,000 lbs. GVWR	100	0.3	0	0.0	15	85
Motorcycle	222	0.7	9	9.2	162	51
Moped / goped	41	0.1	0	0.0	36	5
Go-cart / golf cart	1	0.0	0	0.0	1	0
Snowmobile	0	0.0	0	0.0	0	0
Off-Road Vehicle - ORV / All-Terrain Vehicle - ATV	7	0.0	0	0.0	3	4
Other	75	0.2	0	0.0	11	64
Truck/bus over 10,000 lbs.	838	2.7	6	6.1	135	697
Unknown	1,269	4.1	0	0.0	103	1,166
Total	30,854	100.0	98	100.0	5,953	24,803

Kent County (continued)

5-Year Trend - Crashes by Month

Month	2016		2017		2018		2019		2020	
	Total Crashes	Fatal Crashes								
January	1,977	2	1,941	4	2,096	8	2,496		1,678	4
February	1,625	4	1,542	6	1,791	3	2,055	0	1,695	6
March	1,636	3	1,750	9	1,513	2	1,733	4	958	2
April	1,549	7	1,582	4	1,749	5	1,599	4	676	2
May	1,739	2	1,775	5	1,758	9	1,740	4	1,025	8
June	1,643	3	1,758	6	1,698	4	1,739	4	1,352	6
July	1,575	4	1,679	2	1,571	4	1,614	7	1,472	6
August	1,811	4	1,707	7	1,712	9	1,702	6	1,521	6
September	1,894	7	1,744	8	1,772	9	1,845	2	1,617	4
October	2,061	7	2,338	4	2,302	2	2,368	7	1,904	3
November	2,087	6	1,945	9	2,361	2	2,230	5	1,637	6
December	2,586	6	2,951		1,984	4	1,970	3	1,521	2
Total	22,183	55	22,712	65	22,307	61	23,091	47	17,056	55

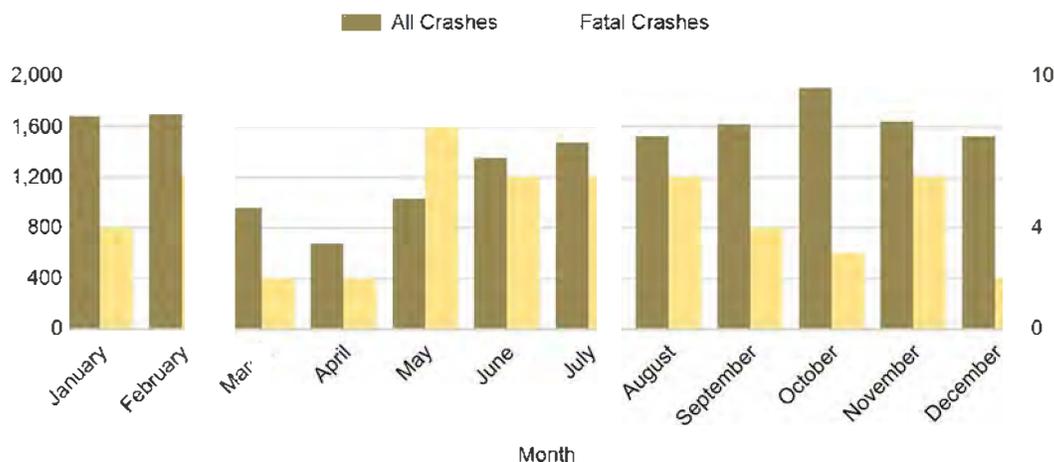
Note: † Indicates that the highest number of total crashes reported in the 5-year period occurred in the same month

5-Year Trend - Crashes by Day of Week

Day	2016		2017		2018		2019		2020	
	Total Crashes	Fatal Crashes								
Monday	3,081	7	3,209	5	3,465	6	3,378	6	2,409	5
Tuesday	3,270	6	3,415	13	3,561	8	3,952	4	2,384	4
Wednesday	3,534	9	3,588	11	3,473	9	3,703	8	2,621	9
Thursday	3,582	8	3,544	11	3,180	8	3,435	5	2,789	8
Friday	3,896	8	3,937	8	3,793	7	3,741	12	2,801	9
Saturday	2,726	9	2,985	12	2,695	7	2,618	8	2,290	11
Sunday	2,094	8	2,034	5	2,140	16	2,264	4	1,762	9
Total	22,183	55	22,712	65	22,307	61	23,091	47	17,056	55

Note: † Indicates that the highest number of total crashes reported in the 5-year period occurred on the same day of the week

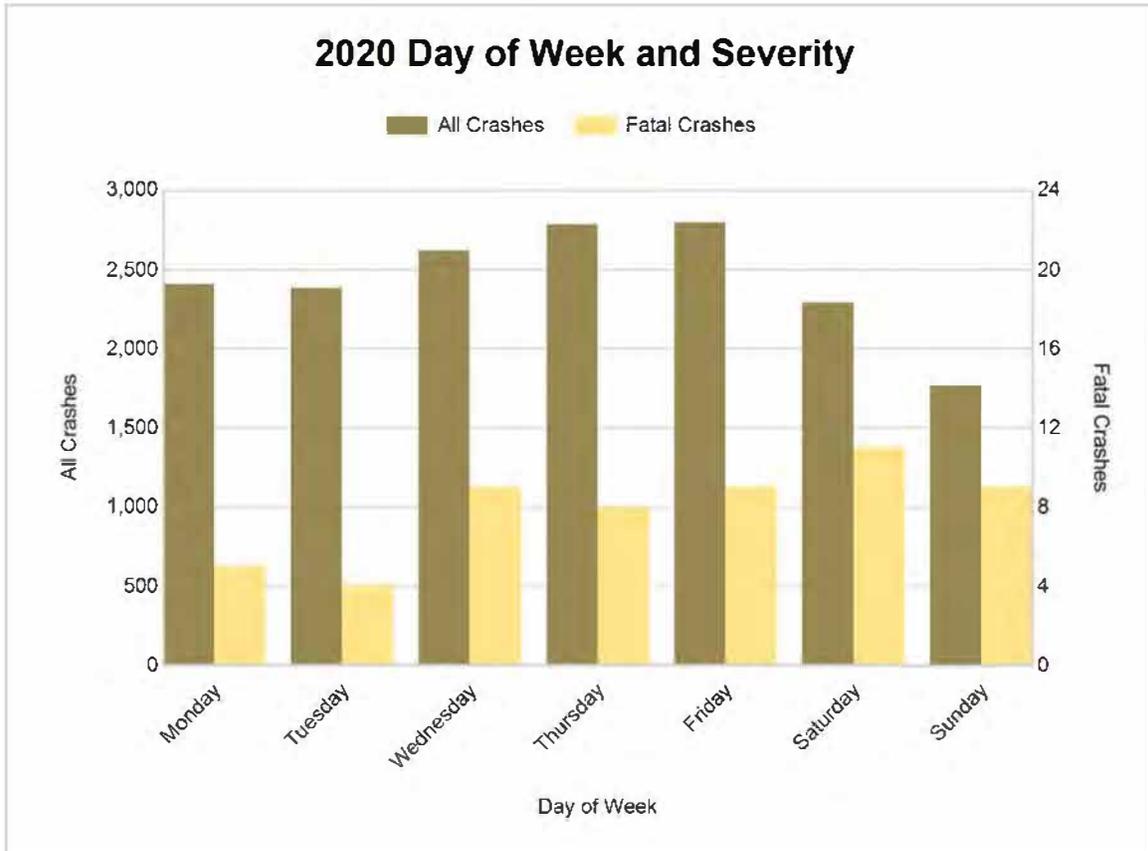
2020 Crashes by Month



Kent County (continued)

2020 - Crashes by Day of Week

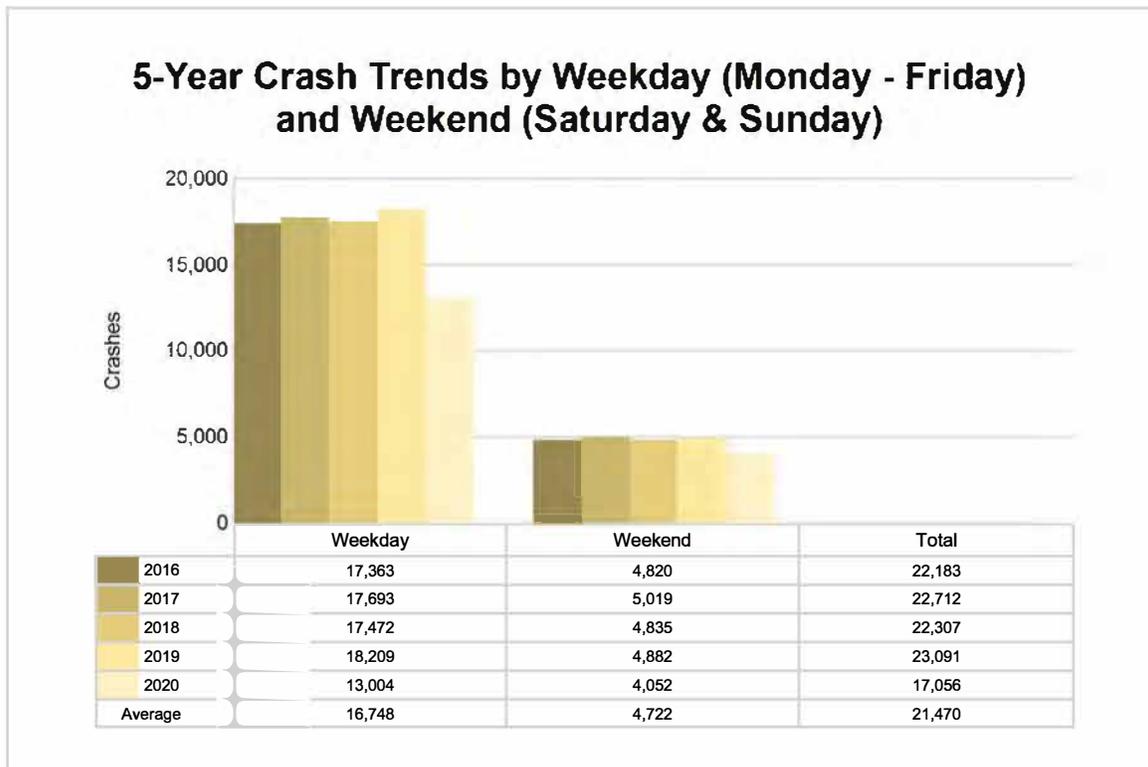
Day	All Crashes		Fatal Crashes		Injury Crashes			PDO Crashes
	Number	% of Total	Number	% of Fatal	A	B	C	Number
Monday	2,409	14.1	5	9.1	48	113	266	1,977
Tuesday	2,384	14.0	4	7.3	44	108	269	1,959
Wednesday	2,621	15.4	9	16.4	49	123	334	2,106
Thursday	2,789	16.4	8	14.5	38	118	369	2,256
Friday	2,801	16.4	9	16.4	61	144	307	2,280
Saturday	2,290	13.4	11	20.0	42	119	264	1,854
Sunday	1,762	10.3	9	16.4	45	87	214	1,407
Total	17,056	100.0	55	100.0	327	812	2,023	13,839



Kent County (continued)

5-Year Trend - Crashes by Weekday and Weekend

Portion of Week	2016		2017		2018		2019		2020	
	Total Crashes	Fatal Crashes								
Weekday	17,363	38	17,693	48	17,472	38	18,209	35	13,004	35
Weekend	4,820	17	5,019	17	4,835	23	4,882	12	4,052	20
Total	22,183	55	22,712	65	22,307	61	23,091	47	17,056	55

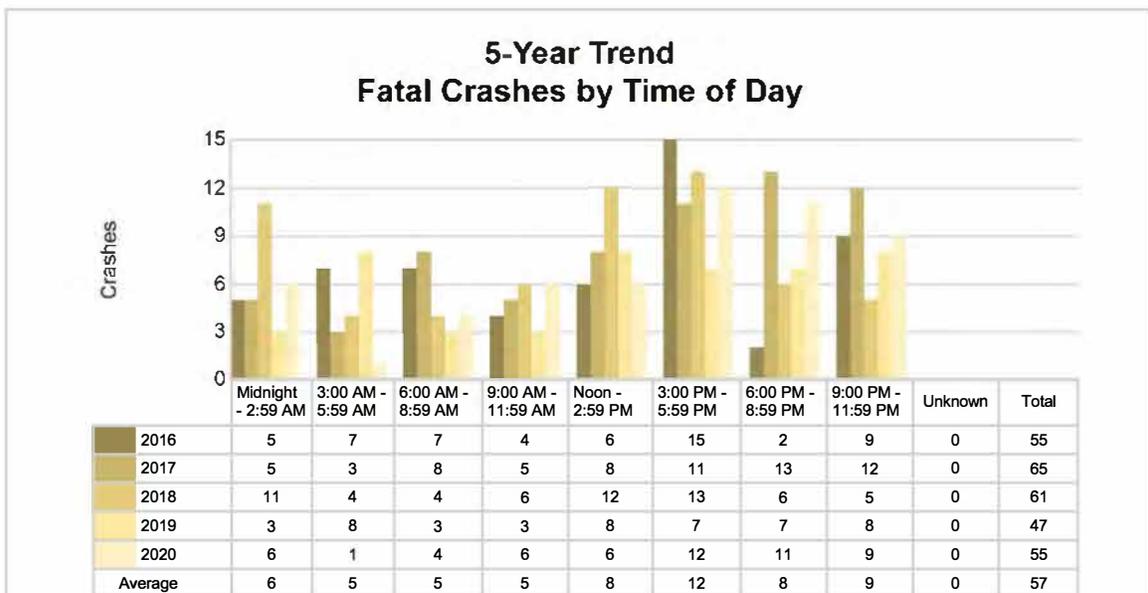
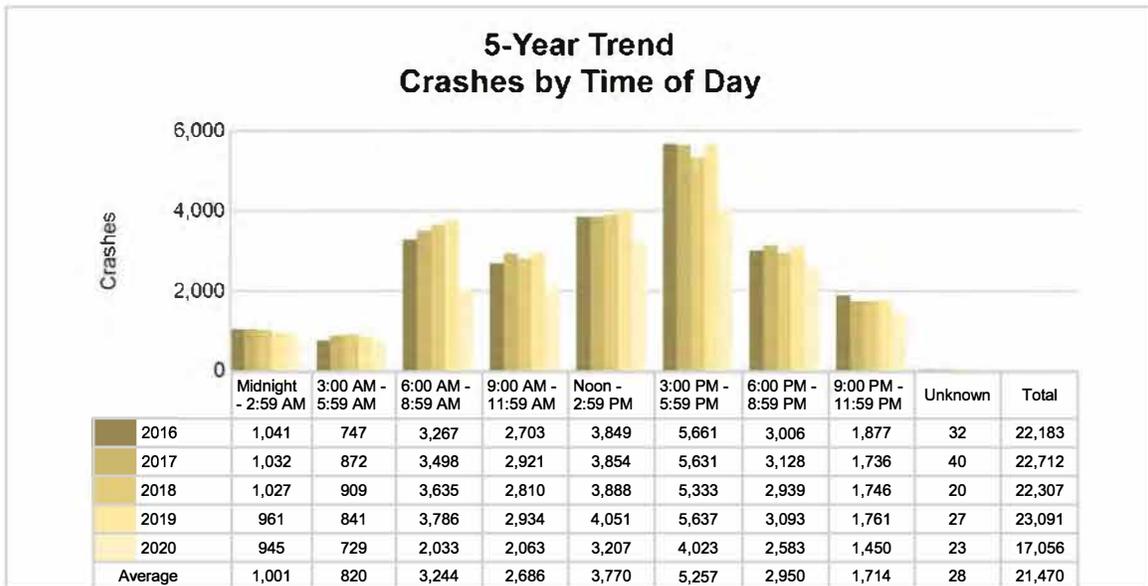


Kent County (continued)

5-Year Trend - Crashes by Time of Day

Time of Day	2016		2017		2018		2019		2020	
	Total Crashes	Fatal Crashes								
Midnight - 2:59 AM	1,041	5	1,032	5	1,027	11	961	3	945	6
3:00 AM - 5:59 AM	747	7	872	3	909	4	841	8	729	1
6:00 AM - 8:59 AM	3,267	7	3,498	8	3,635	4	3,786	3	2,033	4
9:00 AM - 11:59 AM	2,703	4	2,921	5	2,810	6	2,934	3	2,063	6
Noon - 2:59 PM	3,849	6	3,854	8	3,888	12	4,051	8	3,207	6
3:00 PM - 5:59 PM	5,661 †	15	5,631 †	11	5,333 †	13	5,637 †	7	4,023 †	12
6:00 PM - 8:59 PM	3,006	2	3,128	13	2,939	6	3,093	7	2,583	11
9:00 PM - 11:59 PM	1,877	9	1,736	12	1,746	5	1,761	8	1,450	9
Unknown	32	0	40	0	20	0	27	0	23	0
Total	22,183	55	22,712	65	22,307	61	23,091	47	17,056	55

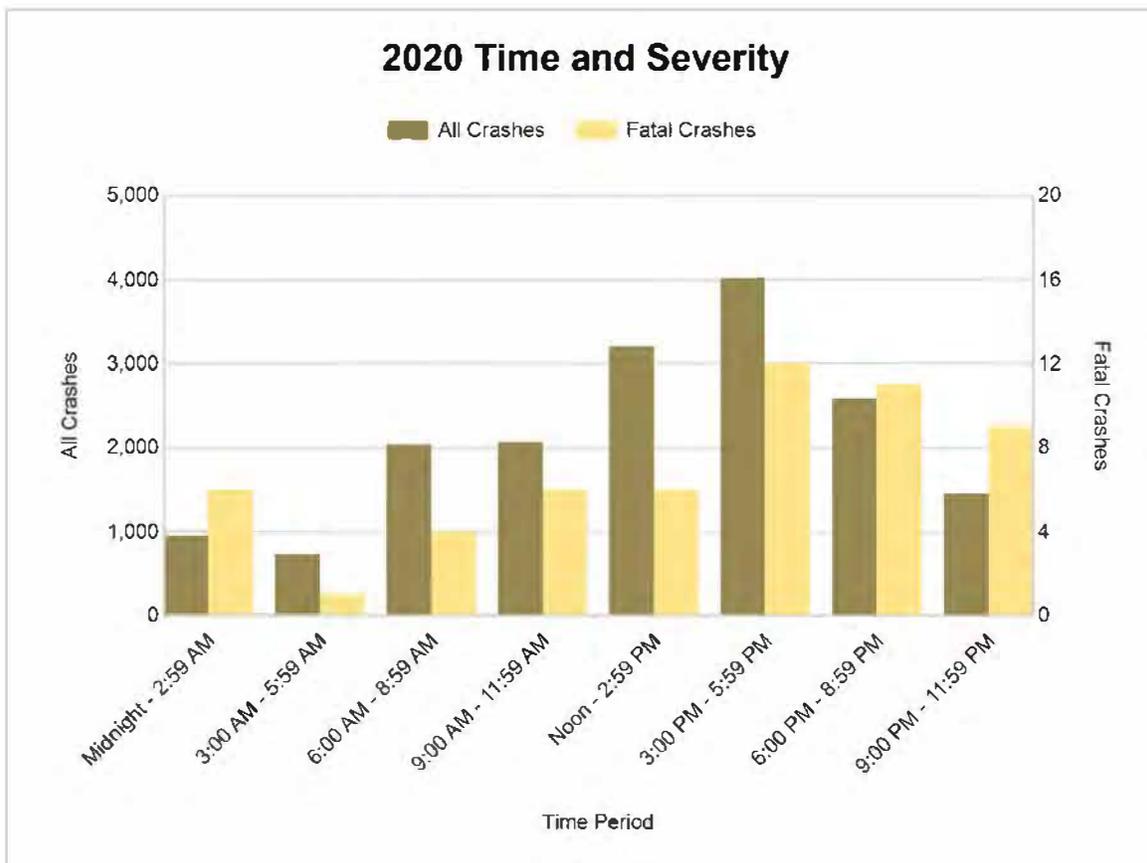
Note: † Indicates that the highest number of total crashes reported in the 5-year period occurred in the same time period



Kent County (continued)

2020 - Time and Severity

Time of Day	All Crashes		Fatal Crashes		Injury Crashes			PDO Crashes
	Number	% of Total	Number	% of Fatal	A	B	C	Number
Midnight - 2:59 AM	945	5.5	6	10.9	26	69	75	769
3:00 AM - 5:59 AM	729	4.3	1	1.8	20	29	70	609
6:00 AM - 8:59 AM	2,033	11.9	4	7.3	26	73	204	1,726
9:00 AM - 11:59 AM	2,063	12.1	6	10.9	27	86	247	1,697
Noon - 2:59 PM	3,207	18.8	6	10.9	63	150	426	2,562
3:00 PM - 5:59 PM	4,023	23.6	12	21.8	69	189	529	3,224
6:00 PM - 8:59 PM	2,583	15.1	11	20.0	55	153	308	2,056
9:00 PM - 11:59 PM	1,450	8.5	9	16.4	41	63	163	1,174
Unknown	23	0.1	0	0.0	0	0	1	22
Total	17,056	100.0	55	100.0	327	812	2,023	13,839

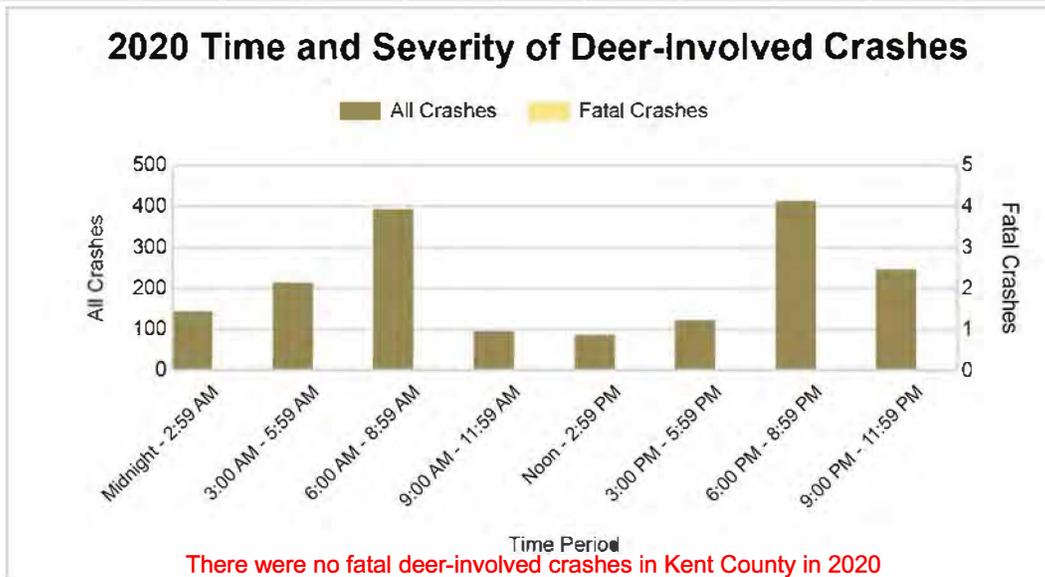
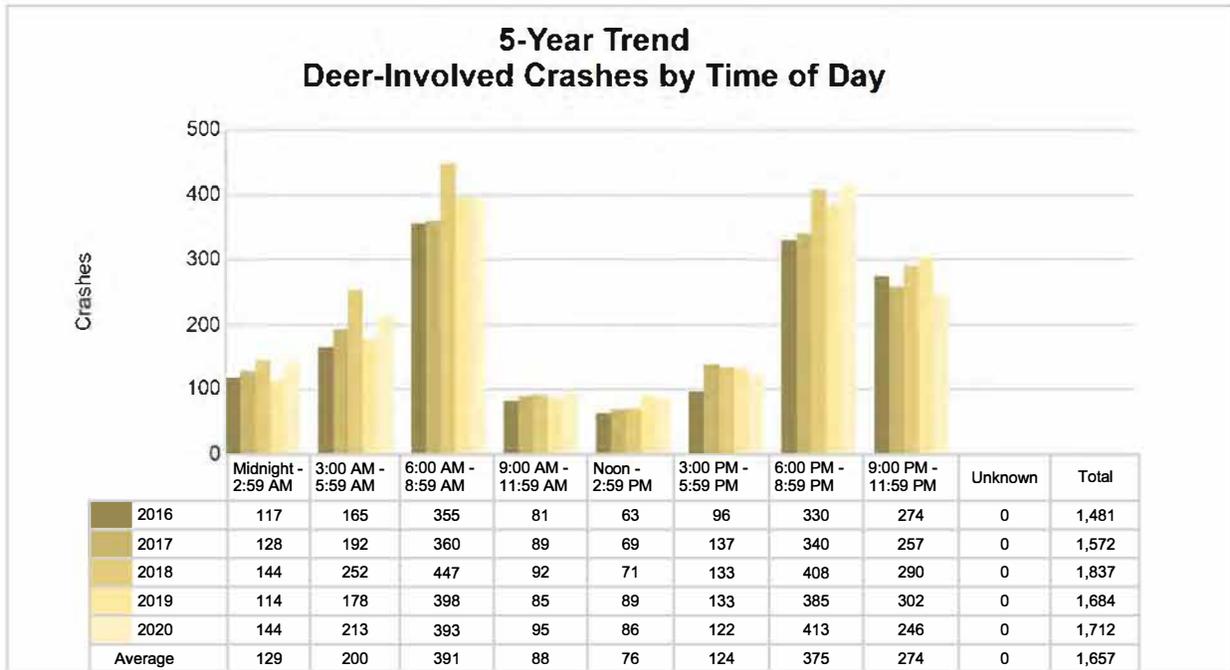


Kent County (continued)

5-Year Trend - Deer-Involved Crashes by Time of Day

Time of Day	2016		2017		2018		2019		2020	
	Total Crashes	Fatal Crashes								
Midnight - 2:59 AM	117	0	128	0	144	0	114	0	144	0
3:00 AM - 5:59 AM	165	0	192	0	252	0	178	0	213	0
6:00 AM - 8:59 AM	355	0	360	1	447	0	398	0	393	0
9:00 AM - 11:59 AM	81	0	89	0	92	0	85	0	95	0
Noon - 2:59 PM	63	0	69	0	71	0	89	0	86	0
3:00 PM - 5:59 PM	96	0	137	1	133	0	133	0	122	0
6:00 PM - 8:59 PM	330	0	340	0	408	0	385	0	413	0
9:00 PM - 11:59 PM	274	0	257	0	290	0	302	0	246	0
Unknown	0	0	0	0	0	0	0	0	0	0
Total	1,481	0	1,572	2	1,837	0	1,684	0	1,712	0

Note: † Indicates that the highest number of total crashes reported in the 5-year period occurred in the same time period



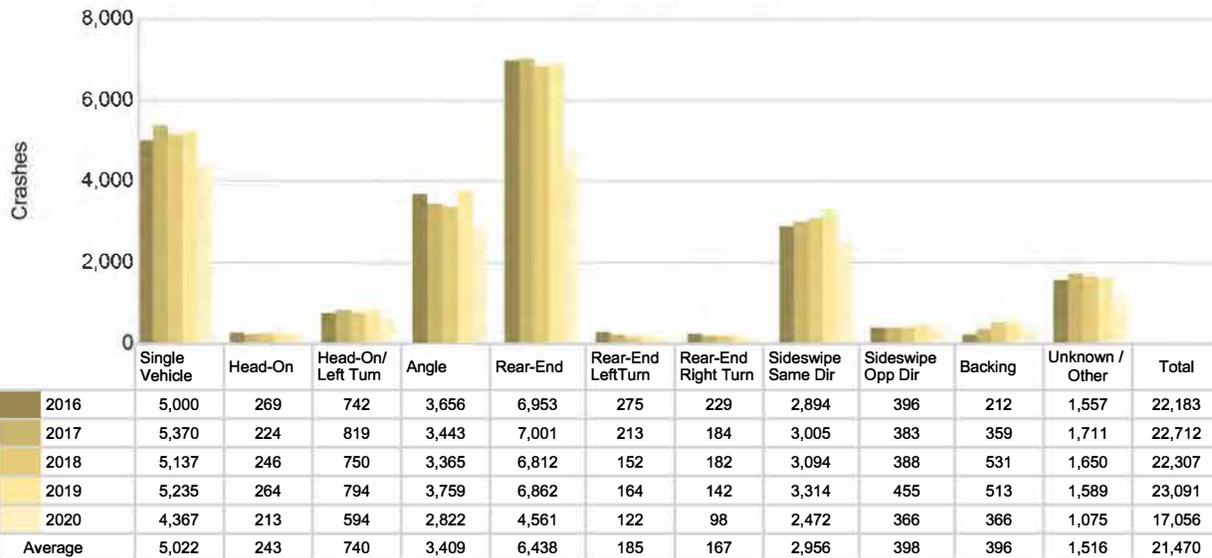
There were no fatal deer-involved crashes in Kent County in 2020

Kent County (continued)

5-Year Trend - Crashes by Crash Type

Crash Type	2016		2017		2018		2019		2020	
	Total Crashes	Fatal Crashes								
Single motor vehicle	5,000	21	5,370	27	5,137	25	5,235	21	4,367	21
Head-on	269	6	224	7	246	5	264	6	213	6
Head-on / left turn	742	6	819	3	750	3	794	4	594	4
Angle	3,656	17	3,443	13	3,365	17	3,759	9	2,822	17
Rear-end	6,953	2	7,001	8	6,812	7	6,862	4	4,561	3
Rear-end left turn	275	0	213	1	152	1	164	0	122	1
Rear-end right turn	229	0	184	0	182	0	142	0	98	0
Sideswipe same direction	2,894	0	3,005	3	3,094	1	3,314	0	2,472	1
Sideswipe opposite direction	396	1	383	0	388	0	455	1	366	0
Backing	212	0	359	0	531	0	513	0	366	0
Other / Unknown	1,557	2	1,711	3	1,650	2	1,589	2	1,075	2
Uncoded and Errors	0	0	0	0	0	0	0	0	0	0
Total	22,183	55	22,712	65	22,307	61	23,091	47	17,056	55

5-Year Trend
Crashes by Crash Type



Kent County (continued)

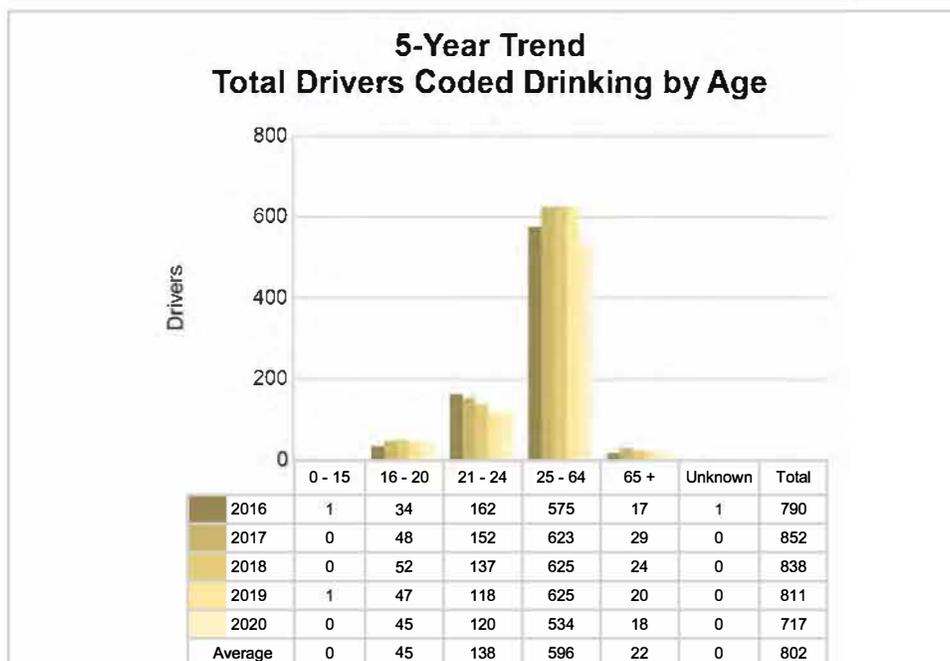
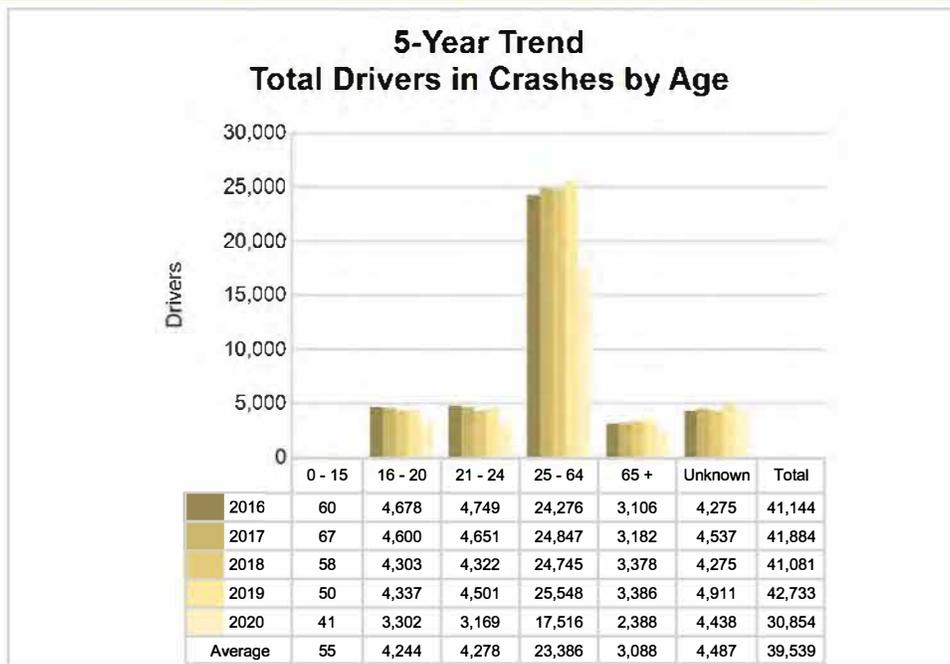
2020 - Reported Motor Vehicle Crashes by Municipality

Municipality	Crashes											Persons	
	Total	Fatal	Injury	Property Damage	Inter-state	US Route	State Route	Local Street	Alcohol-Involved	Drug-Involved	Deer-Involved	Fatalities	Injuries
Ada Twp.	238	1	40	197	0	0	78	160	9	4	85	1	49
Algoma Twp.	227	0	41	186	0	91	20	116	12	2	84	0	58
Alpine Twp.	297	4	61	232	0	0	172	125	18	4	52	4	84
Bowne Twp.	64	2	15	47	0	0	28	36	4	1	28	2	32
Byron Twp.	565	1	98	466	0	176	76	313	19	10	69	1	134
Caledonia	28	0	4	24	0	0	19	9	2	0	1	0	6
Caledonia Twp.	314	0	53	261	0	0	157	157	7	5	73	0	67
Cannon Twp.	168	0	27	141	0	0	66	102	3	4	64	0	42
Cascade Twp.	582	1	83	498	171	0	97	314	17	4	131	1	111
Casnovia	1	0	0	1	0	0	1	0	0	0	1	0	0
Cedar Springs	70	1	14	55	0	0	0	70	1	2	3	1	19
Courtland Twp.	166	1	30	135	0	0	57	109	3	2	61	1	35
East Grand Rapids	96	0	11	85	0	0	0	96	3	2	1	0	13
Gaines Twp.	453	3	94	356	0	0	70	383	19	5	67	3	127
Grand Rapids	6,602	14	1,192	5,396	701	774	916	4,211	348	88	100	14	1,498
Grand Rapids Twp.	401	1	68	332	100	0	163	138	12	5	63	1	92
Grandville	575	4	121	450	146	0	74	355	10	5	17	4	172
Grattan Twp.	87	1	16	70	0	0	41	46	4	2	43	1	25
Kent City	13	0	6	7	0	0	9	4	4	0	2	0	7
Kentwood	1,069	2	248	819	16	0	266	787	40	9	78	2	341
Lowell	64	0	8	56	0	0	32	32	3	1	6	0	11
Lowell Twp.	176	3	31	142	60	0	31	85	5	1	52	3	46
Nelson Twp.	111	0	17	94	0	35	0	76	3	0	50	0	23
Oakfield Twp.	106	1	14	91	0	0	46	60	9	1	36	1	24
Plainfield Twp.	711	1	106	604	0	141	109	461	19	11	128	1	126
Rockford	102	0	14	88	0	0	0	102	0	0	22	0	19
Sand Lake	9	0	1	8	0	0	0	9	2	0	1	0	1
Solon Twp.	174	1	26	147	0	46	44	84	10	3	59	1	45
Sparta	30	0	5	25	0	0	0	30	1	0	3	0	6
Sparta Twp.	178	2	43	133	0	0	55	123	13	1	61	2	65
Spencer Twp.	85	0	19	66	0	0	0	85	9	2	30	0	24
Tyrone Twp.	100	1	21	78	0	0	37	63	4	0	40	1	35
Vergennes Twp.	91	0	17	74	0	0	0	91	1	2	41	0	24
Walker	1,066	0	188	878	221	35	432	378	25	8	115	0	241
Wyoming	2,037	10	430	1,597	109	259	348	1,321	94	31	45	10	586
Unknown Community	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	17,056	55	3,162	13,839	1,524	1,557	3,444	10,531	733	215	1,712	55	4,188

Kent County (continued)

5-Year Trend - Drivers in Crashes Coded Drinking by Driver Age

Driver Age	2016		2017		2018		2019		2020	
	Total Drivers in Crashes	Total Drivers Coded Drinking	Total Drivers in Crashes	Total Drivers Coded Drinking	Total Drivers in Crashes	Total Drivers Coded Drinking	Total Drivers in Crashes	Total Drivers Coded Drinking	Total Drivers in Crashes	Total Drivers Coded Drinking
0 - 15	60	1	67	0	58	0	50	1	41	0
16 - 20	4,678	34	4,600	48	4,303	52	4,337	47	3,302	45
21 - 24	4,749	162	4,651	152	4,322	137	4,501	118	3,169	120
25 - 64	24,276	575	24,847	623	24,745	625	25,548	625	17,516	534
65 +	3,106	17	3,182	29	3,378	24	3,386	20	2,388	18
Unknown	4,275	1	4,537	0	4,275	0	4,911	0	4,438	0
Total	41,144	790	41,884	852	41,081	838	42,733	811	30,854	717



Kent County (continued)

2020 - Bodily Alcohol Concentration (BAC) Results Among All Vehicle Drivers in Alcohol-Involved Crashes by Age

Age Group	Drivers				BAC Result Range for Drivers Coded Drinking				
	Total Drivers in Alcohol-Involved Crashes	Total Drivers Tested in all Crashes	Total Drivers Coded Drinking, Tested	Total Drivers Coded Drinking	BAC = 0.00	BAC 0.01 g/dL to 0.07 g/dL	BAC 0.08 g/dL to 0.16 g/dL	BAC 0.17 g/dL and Above	BAC Not Reported
0 - 15	0	3	0	0	0	0	0	0	0
16 - 20	74	71	42	45	0	9	14	9	13
21 - 24	154	135	105	120	0	12	35	44	29
25 - 64	735	577	428	534	0	39	140	159	196
65 +	33	24	15	18	0	1	4	5	8
Unknown	183	0	0	0	0	0	0	0	0
Total	1,179	810	590	717	0	61	193	217	246

Notes: BAC measured in grams (g) per deciliter (dL).
 BAC may not be reported if drivers are not tested or if the results are not available immediately (as in the case of a blood test).
 A driver may be coded by the officer as drinking even though no test is administered.

Alcohol-Involved Crashes

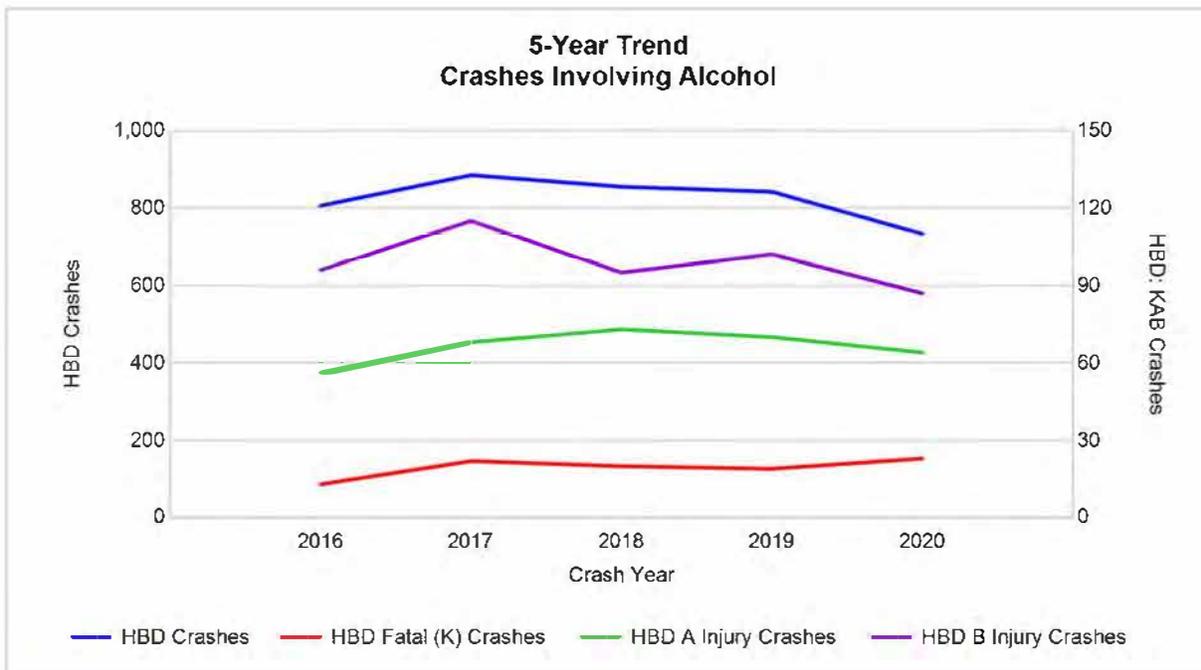
In 2020, there were 1,179 drivers in alcohol-involved crashes; 717 (60.8%) of those drivers were coded as had-been-drinking by the officer on the crash form.

- 410 (57.2%) of the 717 drivers had a blood alcohol concentration (BAC) of 0.08 g/dL (grams per deciliter) or greater, and 217 (52.9%) of the 410 drivers had a BAC at or above 0.17 g/dL.
- 590 (82.3%) of the 717 drivers were coded as had-been-drinking and were tested for alcohol consumption.

5-Year Trend - Crashes Involving Alcohol

Year	All Crashes	HBD Crashes	% HBD	Fatal Crashes	HBD Fatal Crashes	% HBD	A Injury Crashes	HBD A Injury Crashes	% HBD	B Injury Crashes	HBD B Injury Crashes	% HBD
2016	22,183	806	3.6	55	13	23.6	352	56	15.9	957	96	10.0
2017	22,712	885	3.9	65	22	33.8	371	68	18.3	964	115	11.9
2018	22,307	855	3.8	61	20	32.8	343	73	21.3	985	95	9.6
2019	23,091	842	3.6	47	19	40.4	353	70	19.8	877	102	11.6
2020	17,056	733	4.3	55	23	41.8	327	64	19.6	812	87	10.7

Note: * Indicates that the most recent year is the lowest number or percentage reported in the 5-year period in that column
 ** Indicates that the most recent year is the highest number or percentage reported in the 5-year period in that column



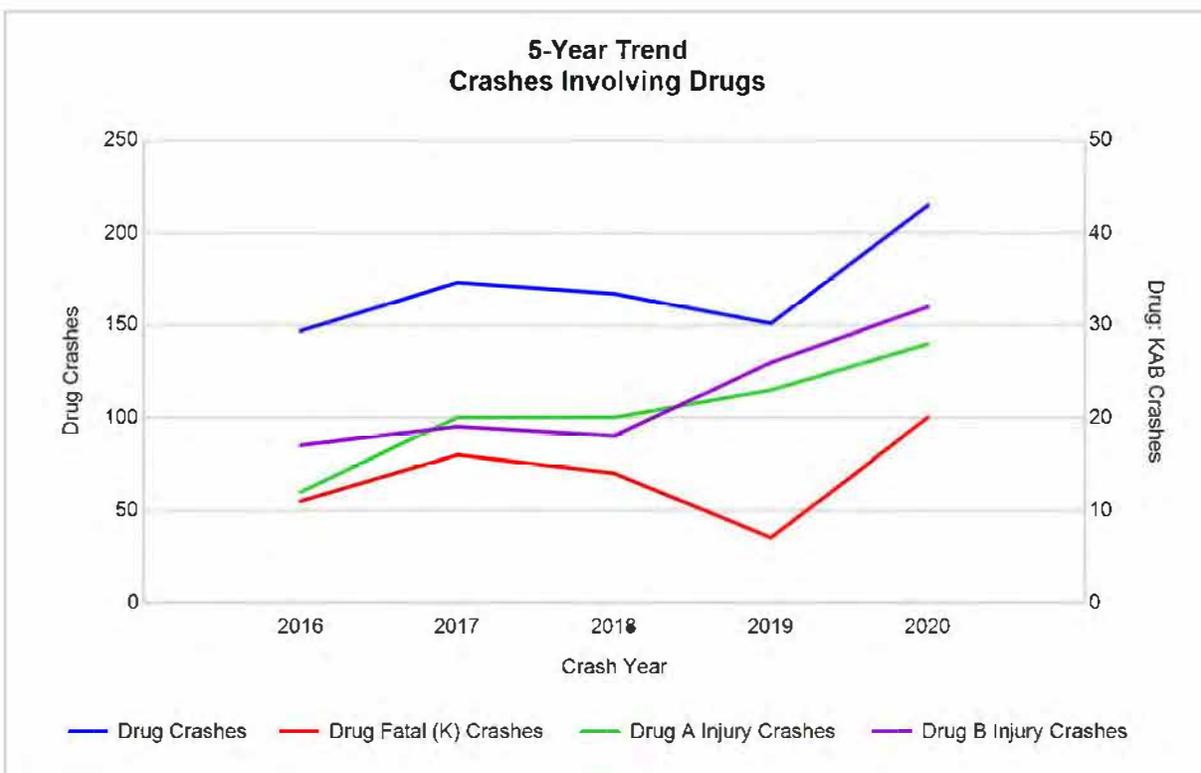
Note: Had-Been-Drinking (HBD)

Kent County (continued)

5-Year Trend - Crashes Involving Drugs

Year	All Crashes	Drug Crashes	% Drug	Fatal Crashes	Drug Fatal Crashes	% Drug	A Injury Crashes	Drug A Injury Crashes	% Drug	B Injury Crashes	Drug B Injury Crashes	% Drug
2016	22,183	147	0.7	55	11	20.0	352	12	3.4	957	17	1.8
2017	22,712	173	0.8	65	16	24.6	371	20	5.4	964	19	2.0
2018	22,307	167	0.7	61	14	23.0	343	20	5.8	985	18	1.8
2019	23,091	151	0.7	47	7	14.9	353	23	6.5	877	26	3.0
2020	17,056	215	1.3	55	20	36.4	327	28	8.6	812	32	3.9

Note: * Indicates that the most recent year is the lowest number or percentage reported in the 5-year period in that column
 ** Indicates that the most recent year is the highest number or percentage reported in the 5-year period in that column

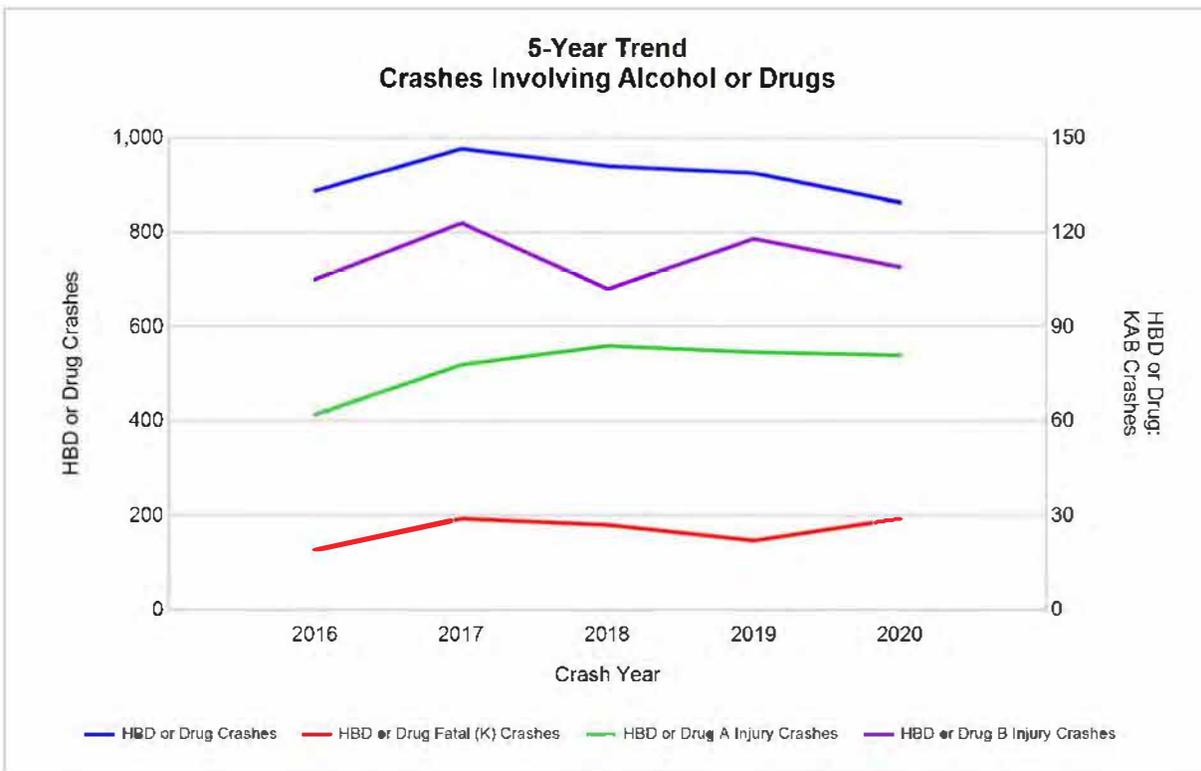


Kent County (continued)

5-Year Trend - Crashes Involving Alcohol or Drugs

Year	All Crashes	HBD or Drug Crashes	% HBD or Drug	Fatal Crashes	HBD or Drug Fatal Crashes	% HBD or Drug	A Injury Crashes	HBD or Drug A Injury Crashes	% HBD or Drug	B Injury Crashes	HBD or Drug B Injury Crashes	% HBD or Drug
2016	22,183	887	4.0	55	19	34.5	352	62	17.6	957	105	11.0
2017	22,712	977	4.3	65	29	44.6	371	78	21.0	964	123	12.8
2018	22,307	940	4.2	61	27	44.3	343	84	24.5	985	102	10.4
2019	23,091	925	4.0	47	22	46.8	353	82	23.2	877	118	13.5
2020	17,056	863	5.1	55	29	52.7	327	81	24.8	812	109	13.4

Note: * Indicates that the most recent year is the lowest number or percentage reported in the 5-year period in that column
 ** Indicates that the most recent year is the highest number or percentage reported in the 5-year period in that column



Note: Had-Been-Drinking (HBD)

Kent County (continued)

2020 - Restraints Worn Among Vehicle Drivers and Injured Passengers by Vehicle Type

Vehicle Type	Total Occupants			Fatalities			A - Suspected Serious			B - Suspected Minor			C - Possible Injury			No Injury		
	Total	Used Restraint	%	Total	Used Restraint	%	Total	Used Restraint	%	Total	Used Restraint	%	Total	Used Restraint	%	Total	Used Restraint	%
Passenger car, SUV, van	26,377	22,275	84.4	33	17	51.5	255	198	77.6	783	689	88.0	2,467	2,302	93.3	19,946	19,069	95.6
Motor home	39	31	79.5	0	0	0.0	1	1	100.0	0	0	0.0	1	1	100.0	31	29	93.5
Pickup truck	2,810	2,430	86.5	2	1	50.0	14	11	78.6	60	54	90.0	147	137	93.2	2,316	2,227	96.2
Small truck under 10,000 lbs. GVWR	101	73	72.3	0	0	0.0	1	0	0.0	1	1	100.0	5	5	100.0	71	67	94.4
Motorcycle	237	130	54.9	8	5	62.5	51	25	49.0	76	48	63.2	42	21	50.0	42	31	73.8
Moped / goped	41	12	29.3	0	0	0.0	13	4	30.8	15	5	33.3	8	1	12.5	4	2	50.0
Go-cart / golf cart	2	0	0.0	0	0	0.0	1	0	0.0	0	0	0.0	0	0	0.0	1	0	0.0
Snowmobile	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Off-Road Vehicle - ORV / All-Terrain Vehicle - ATV	8	2	25.0	0	0	0.0	1	0	0.0	1	0	0.0	1	1	100.0	5	1	20.0
Other	76	38	50.0	0	0	0.0	1	0	0.0	1	0	0.0	4	3	75.0	44	35	79.5
Truck/bus over 10,000 lbs.	845	794	94.0	0	0	0.0	2	2	100.0	5	4	80.0	28	25	89.3	788	763	96.8
Unknown	1,269	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Total	31,805	25,785	81.1	43	23	0.0	340	241	70.9	942	801	85.0	2,703	2,496	92.3	23,248	22,224	95.6

Note: Restraint Use includes shoulder belt only used, lap belt only used, both lap and shoulder belts used, child restraint used, restraint failure, and helmet worn.

2020 - Restraints Worn Among Vehicle Drivers and Injured Passengers by Age

Age Group	Total Occupants			Fatalities			A - Suspected Serious			B - Suspected Minor			C - Possible Injury			No Injury		
	Total	Used Restraint	%	Total	Used Restraint	%	Total	Used Restraint	%	Total	Used Restraint	%	Total	Used Restraint	%	Total	Used Restraint	%
0 - 15	278	229	82.4	0	0	0.0	10	5	50.0	67	55	82.1	165	145	87.9	35	24	68.6
16 - 20	3,468	3,268	94.2	6	1	16.7	44	31	70.5	143	130	90.9	334	298	89.2	2,934	2,808	95.7
21 - 24	3,260	3,020	92.6	6	4	66.7	37	24	64.9	113	89	78.8	276	252	91.3	2,810	2,651	94.3
25 - 64	17,890	16,869	94.3	26	14	53.8	218	151	69.3	525	441	84.0	1,658	1,539	92.8	15,399	14,724	95.6
65 +	2,471	2,398	97.0	5	4	80.0	31	30	96.8	94	86	91.5	270	262	97.0	2,065	2,016	97.6
Unknown	4,438	1	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	5	1	20.0
Total	31,805	25,785	81.1	43	23	0.0	340	241	70.9	942	801	85.0	2,703	2,496	92.3	23,248	22,224	95.6

Note: Restraint Use includes shoulder belt only used, lap belt only used, both lap and shoulder belts used, child restraint used, restraint failure, and helmet worn.

Kent County (continued)

5-Year Trend - Restraint Use Among Drivers

Restraint Use	2016			2017			2018			2019			2020		
	Drivers	Fatal Drivers	Injured Drivers												
No belts available	79	2	7	48	0	3	57	0	8	58	0	7	43	0	11
Shoulder belt only used	169	0	21	138	0	20	156	0	28	223	0	29	179	0	23
Lap belt only used	304	0	33	179	0	26	109	0	12	84	0	6	47	0	2
Both lap & shoulder belts used	34,537	20	3,666	34,983	23	3,494	34,694	23	3,567	35,603	13	3,389	24,613	16	2,611
No belts used	313	5	77	233	9	64	167	7	63	150	6	58	116	8	50
Child restraint used	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Child restraint not used, unavailable or improper use	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Restraint failure	37	0	7	24	0	6	27	0	2	12	0	1	6	0	2
Restraint use unknown	4,268	3	100	5,998	4	111	5,647	3	114	6,391	4	122	5,600	5	149
Helmet worn	153	2	126	168	9	116	128	7	99	138	3	88	138	5	100
Helmet not worn	94	5	69	72	2	55	80	2	64	61	6	46	98	2	83
Helmet use unknown	13	0	7	14	0	7	8	0	6	10	0	5	12	1	9
Uncoded & errors	1,175	0	1	27	0	0	8	0	0	3	0	0	2	0	0
Total	41,144	37	4,114	41,884	47	3,902	41,081	42	3,963	42,733	32	3,751	30,854	37	3,040

5-Year Trend - Restraint Use Among Drivers Coded Drinking

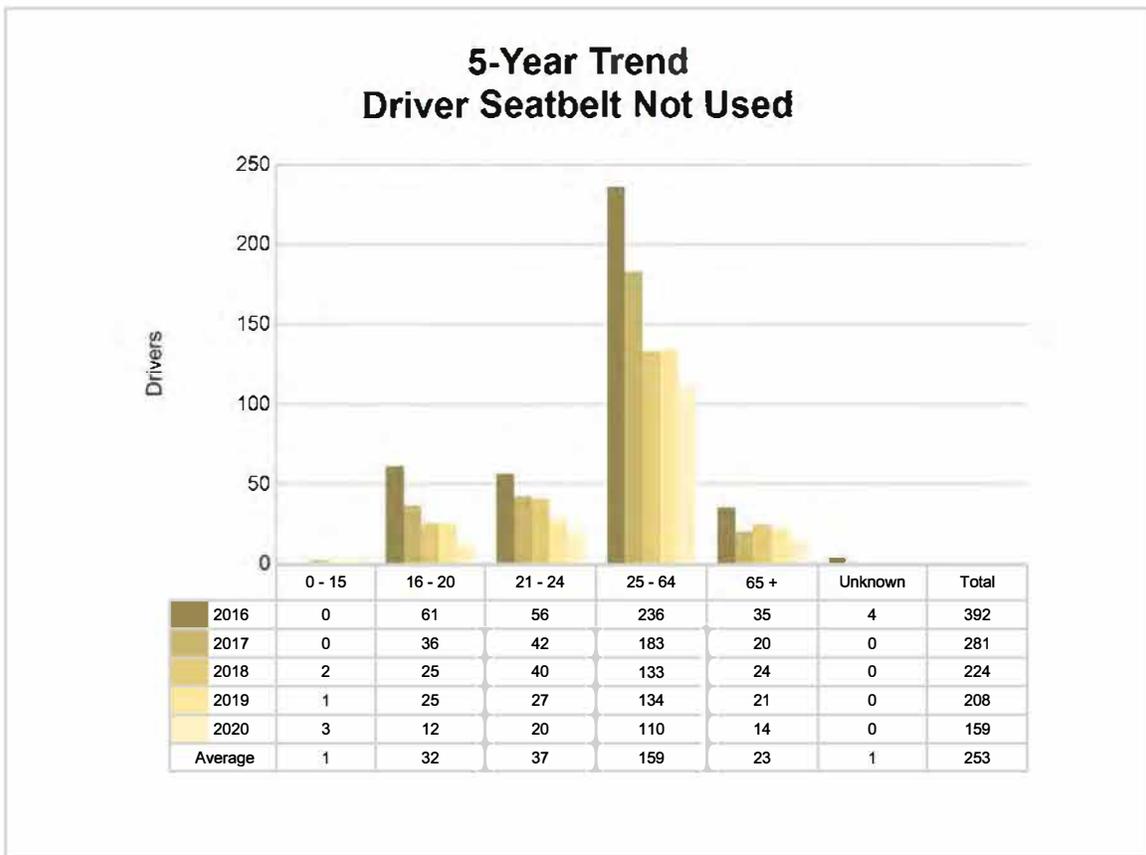
Restraint Use	2016			2017			2018			2019			2020		
	Drivers	Fatal Drivers	Injured Drivers												
No belts available	2	0	0	1	0	0	1	0	0	2	0	1	1	0	1
Shoulder belt only used	3	0	0	4	0	3	3	0	0	5	0	0	3	0	0
Lap belt only used	6	0	2	3	0	0	1	0	1	0	0	0	1	0	0
Both lap & shoulder belts used	560	1	131	616	3	151	584	7	140	562	2	128	492	5	126
No belts used	37	2	18	26	3	15	31	5	16	26	3	15	25	3	18
Child restraint used	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Child restraint not used, unavailable or improper use	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Restraint failure	4	0	2	1	0	0	2	0	0	0	0	0	0	0	0
Restraint use unknown	150	2	36	181	2	28	196	0	45	197	3	45	171	3	55
Helmet worn	10	0	9	9	1	7	8	1	4	3	1	2	5	0	3
Helmet not worn	18	3	14	10	0	9	12	1	11	14	2	12	19	1	14
Helmet use unknown	0	0	0	1	0	1	0	0	0	2	0	2	0	0	0
Uncoded & errors	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	790	8	212	852	9	214	838	14	217	811	11	205	717	12	217

Kent County (continued)

5-Year Trend - Seatbelt Not Used Among Drivers by Age

Age Group	2016			2017			2018			2019			2020		
	Drivers	Fatal Drivers	Injured Drivers												
0 - 15	0	0	0	0	0	0	2	0	0	1	0	0	3	0	0
16 - 20	61	2	10	36	2	12	25	0	14	25	0	5	12	1	6
21 - 24	56	1	9	42	2	8	40	2	13	27	1	11	20	1	8
25 - 64	236	2	54	183	5	40	133	4	41	134	3	41	110	5	45
65 +	35	2	11	20	0	7	24	1	3	21	2	8	14	1	2
Unknown	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	392	7	84	281	9	67	224	7	71	208	6	65	159	8	61

Note: Seatbelt Not Used includes no belts available or no belts used.

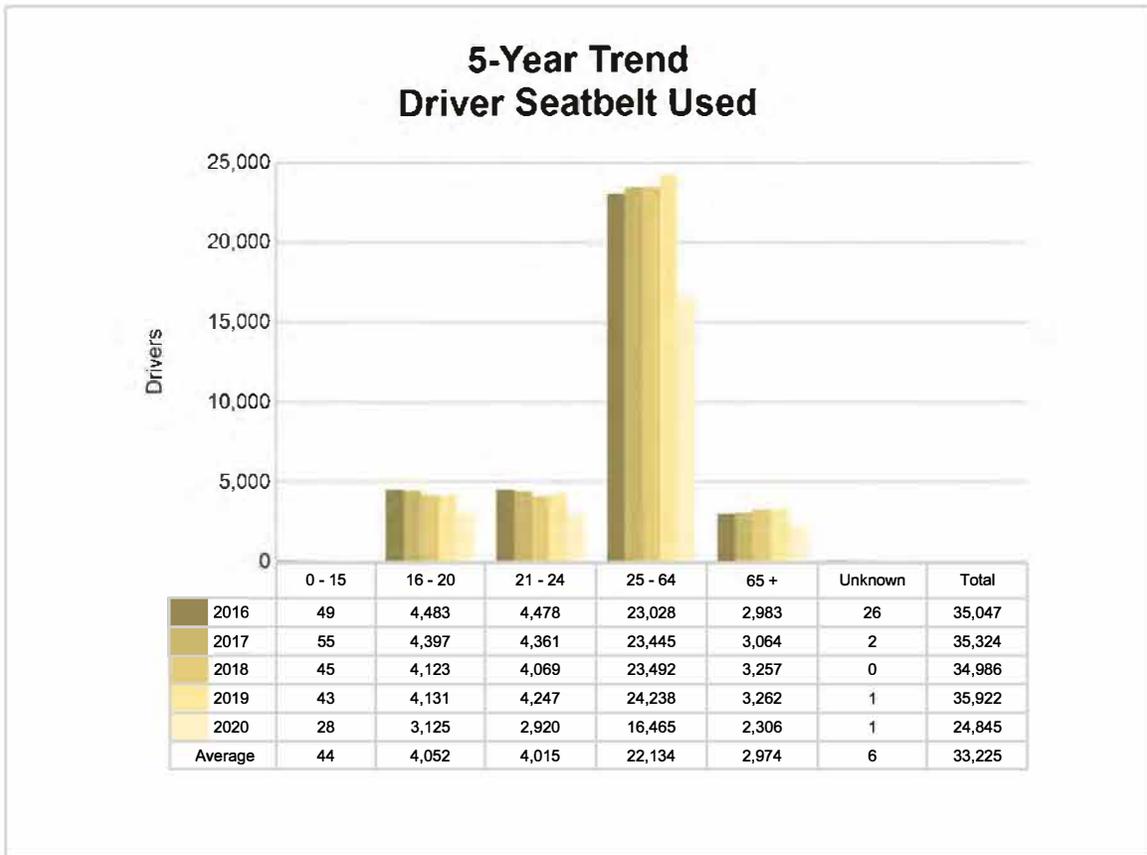


Kent County (continued)

5-Year Trend - Seatbelt Used Among Drivers by Age

Age Group	2016			2017			2018			2019			2020		
	Drivers	Fatal Drivers	Injured Drivers												
0 - 15	49	0	6	55	0	6	45	0	2	43	0	10	28	0	4
16 - 20	4,483	2	480	4,397	4	460	4,123	0	415	4,131	1	348	3,125	1	318
21 - 24	4,478	2	467	4,361	2	362	4,069	2	378	4,247	0	369	2,920	3	272
25 - 64	23,028	13	2,409	23,445	10	2,339	23,492	16	2,381	24,238	7	2,332	16,465	10	1,754
65 +	2,983	3	365	3,064	7	379	3,257	5	433	3,262	5	366	2,306	2	290
Unknown	26	0	0	2	0	0	0	0	0	1	0	0	1	0	0
Total	35,047	20	3,727	35,324	23	3,546	34,986	23	3,609	35,922	13	3,425	24,845	16	2,638

Note: Seatbelt Used includes shoulder belt only used, lap belt only used, both lap and shoulder belts used, and restraint failure.

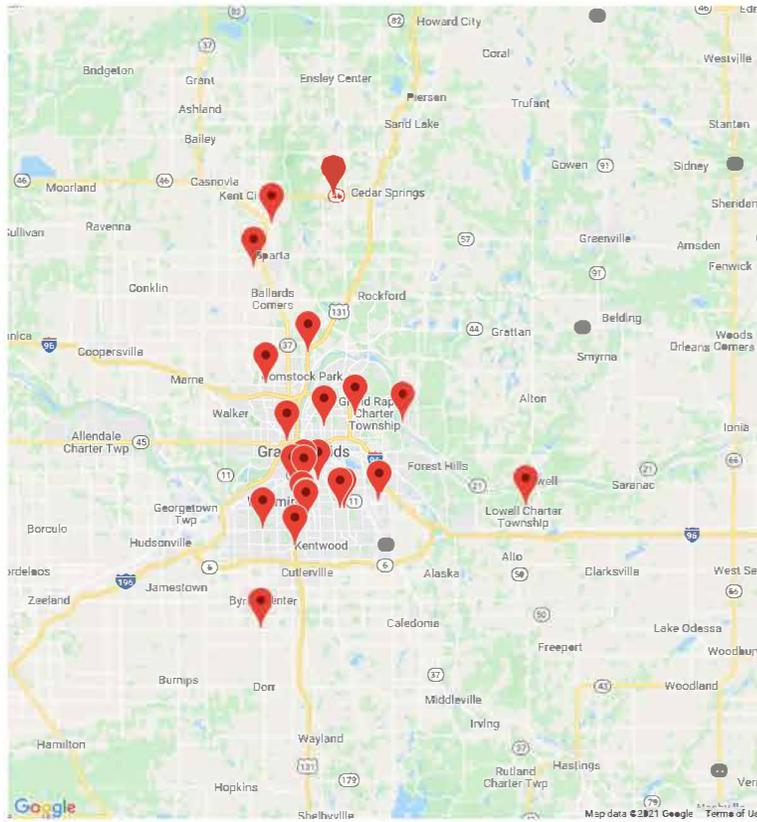


Kent County (continued)

5-Year Trend - Drivers in Crashes by Hazardous Action

Hazardous Action	2016		2017		2018		2019		2020	
	Total Drivers in Crashes	Drivers in Fatal Crashes	Total Drivers in Crashes	Drivers in Fatal Crashes	Total Drivers in Crashes	Drivers in Fatal Crashes	Total Drivers in Crashes	Drivers in Fatal Crashes	Total Drivers in Crashes	Drivers in Fatal Crashes
None	20,662	47	20,844	54	20,339	43	21,144	33	15,552	43
Speed too fast	2,195	10	2,343	9	2,242	11	2,682	11	1,384	5
Speed too slow	59	0	25	1	28	0	27	0	6	0
Failed to yield	3,814	10	3,800	5	3,832	9	4,165	11	2,904	7
Disregard traffic control	922	9	914	7	877	4	883	3	835	7
Drove wrong way	42	0	35	2	24	0	21	0	23	0
Drove left of center	161	1	155	5	143	2	178	5	158	3
Improper passing	228	1	247	1	214	0	225	0	178	1
Improper lane use	1,131	3	1,131	1	1,258	0	1,312	0	986	2
Improper turn	424	0	464	0	452	0	454	0	400	1
Improper/no signal	56	0	39	0	34	0	30	0	14	0
Improper backing	675	0	614	0	565	0	559	0	371	0
Unable to stop in assured clear distance	6,527	2	6,547	9	6,417	9	6,489	5	4,174	3
Other	1,499	5	1,557	2	1,359	4	1,383	2	943	3
Unknown	1,641	4	2,081	4	2,161	13	2,188	1	1,956	13
Reckless driving	214	4	186	6	177	4	175	1	217	4
Careless/negligent driving	891	0	900	2	956	3	815	4	753	6
Uncoded & errors	3	0	2	0	3	1	3	0	0	0
Total	41,144	96	41,884	108	41,081	103	42,733	76	30,854	98

Kent County (continued)



The picture above represents all 2020 alcohol-involved fatal crashes in Kent County.

In 2020, there were 733 alcohol-involved crashes in Kent County:

- 23 K - Fatal Crashes
- 64 A - Suspected Serious Injury Crashes
- 87 B - Suspected Minor Injury Crashes
- 133 C - Possible Injury Crashes
- 426 O - Property Damage Only/No Injury Crashes

July 2021



Michigan Traffic Crash Facts

Reporting Criteria

Please pay particular attention to the wording when interpreting the three levels of data gathered for this report.

Crash

The Crash Level analyzes data related to crash events and returns one result per crash.

Examples: Time, weather, and location.

Units

The Units Level analyzes the experience of the units in the crash and returns one result per vehicle, driver, pedestrian, bicyclist, or train.

Examples: Vehicle type, driver condition, and unit events.

People

The People Level analyzes the experience of the people involved in the crash and returns one result per occupant/person/party.

Examples: Age, injury severity, and seat belt or helmet use.

KABCO Injury Indicator:

K = Killed

A = Suspected Serious Injury

B = Suspected Minor Injury

C = Possible Injury

O = No Injury

Property Damage Only (PDO)



Ottawa County

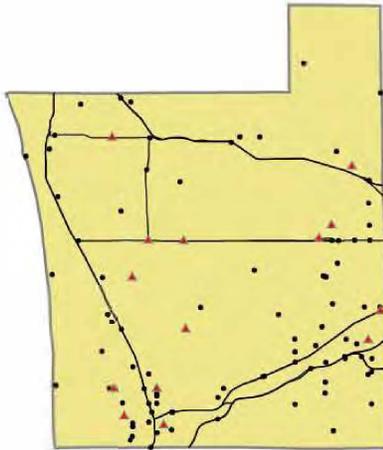
2020 Traffic Crash Data & 2016-2020 5-Year Trends



Sources:

The crashes in this report occurred on public roadways in Michigan and resulted in injuries, fatalities, or property damage (with \$1,000 as a reporting threshold). The information was gathered from Michigan Traffic Crash Report Forms (UD-10) submitted by local police departments, sheriff's offices, and the Michigan State Police. Other related information was obtained from the departments of Transportation, State, and Community Health.

Ottawa County



Crashes by most severe injury (mapped/actual)
 ▲ K - Fatal (14/14)
 ● A - Suspected Serious (89/89)

2020 - Crashes and Injuries by Month

Month	Crashes				Persons	
	Total	Fatal	Injury	Property Damage Only (PDO)	Fatalities	Injuries
January	626	2	84	540	3	109
February	630	0	92	538	0	121
March	341	0	57	284	0	72
April	220	0	34	186	0	48
May	404	3	77	324	3	109
June	565	3	126	436	3	190
July	508	1	102	405	1	143
August	533	2	119	412	2	163
September	624	1	95	528	1	131
October	769	1	137	631	1	191
November	642	0	80	562	0	99
December	577	1	93	483	1	127
Total	6,439	14	1,096	5,329	15	1,503

Ottawa County

In 2020:

There were 10,541 drivers involved in 6,439 motor vehicle crashes in Ottawa County. Of those crashes, 14 were classified as fatal, resulting in 15 fatalities. An additional 1,503 persons were injured.

Ottawa County experienced the highest number of motor vehicle crashes (769) in October, the highest number of fatal crashes (3) in May and June, and the highest number of persons killed (3) in January, May, and June.

Michigan driver statistics indicate 7.8 percent of licensed drivers in Ottawa County were age 16-20, and 15.4 percent of drivers in crashes were also in that age group.

2020 - Driver Statistics

Age Group	Ottawa County			Driver Rates	
	2019 Population*	Licensed Drivers	Drivers in Crashes	Per 10k Population	Per 10k Licensed
0 - 15	61,386	1,934	30	4.9	155.1
16 - 20	26,072	16,436	1,626	623.7	989.3
21 - 24	20,119	14,058	1,067	530.3	759.0
25 - 64	138,965	134,655	6,065	436.4	450.4
65 +	45,288	44,159	1,066	235.4	241.4
Unknown	0	0	687	--	--
Total	291,830	211,242	10,541	361.2	499.0

*2020 Population of Michigan Counties (by single-year of age) not yet available from U.S. Census Bureau

2020 - Vehicles in Crashes

Vehicle Type	Motor Vehicles		Fatal Crashes		Injury Crashes	PDO Crashes
	Number of Vehicles	% of Total	Number	% of Total	Number	Number
Passenger car, SUV, van	8,606	81.6	18	75.0	1,614	6,974
Motor home	9	0.1	0	0.0	4	5
Pickup truck	1,226	11.6	3	12.5	220	1,003
Small truck under 10,000 lbs. GVWR	24	0.2	0	0.0	6	18
Motorcycle	64	0.6	1	4.2	49	14
Moped / goped	18	0.2	0	0.0	15	3
Go-cart / golf cart	1	0.0	0	0.0	1	0
Snowmobile	0	0.0	0	0.0	0	0
Off-Road Vehicle - ORV / All-Terrain Vehicle - ATV	6	0.1	1	4.2	2	3
Other	28	0.3	0	0.0	4	24
Truck/bus over 10,000 lbs.	325	3.1	1	4.2	57	267
Unknown	234	2.2	0	0.0	17	217
Total	10,541	100.0	24	100.0	1,989	8,528

Ottawa County (continued)

5-Year Trend - Crashes by Month

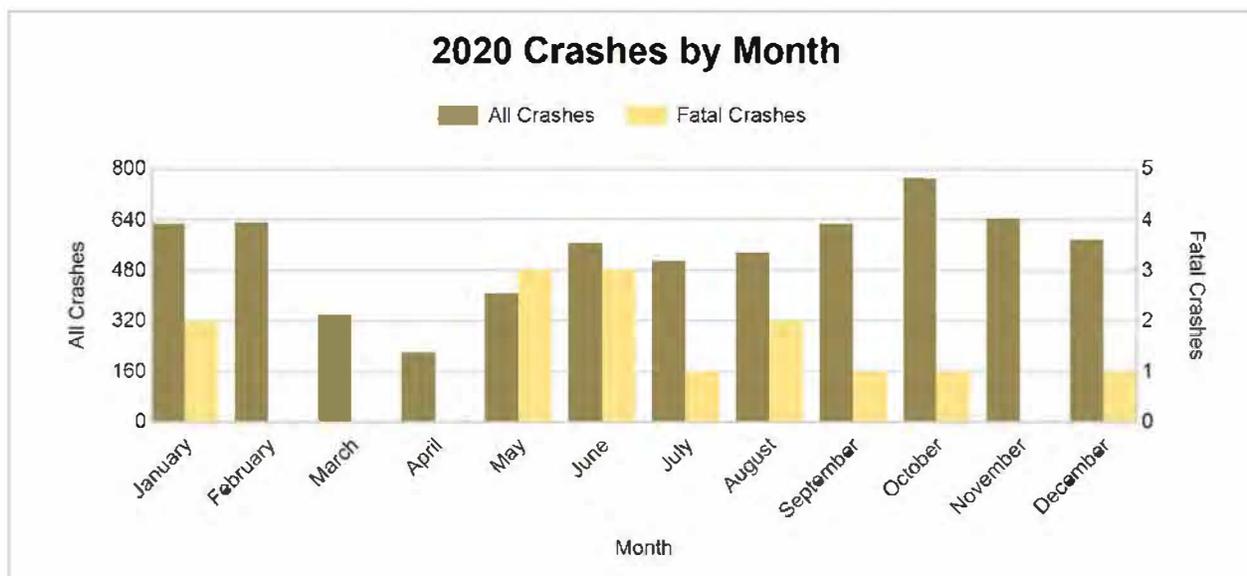
Month	2016		2017		2018		2019		2020	
	Total Crashes	Fatal Crashes								
January	788	3	825	2	698	2	946	0	626	2
February	662	2	470	0	717	1	718	2	630	0
March	597	0	596	0	535	1	555	0	341	0
April	550	2	517	1	612	2	579	0	220	0
May	661	2	639	1	600	2	678	1	404	3
June	706	5	676	2	612	0	669	4	565	3
July	621	1	585	2	559	2	631	3	508	1
August	671	2	568	1	668	5	645	1	533	2
September	596	4	567	3	652	5	569	3	624	1
October	723	1	789	1	815	2	919	2	769	1
November	770	2	741	2	881	0	903	1	642	0
December	1,083	0	1,079	2	622	1	746	3	577	1
Total	8,428	24	8,052	17	7,971	23	8,558	20	6,439	14

Note: † Indicates that the highest number of total crashes reported in the 5-year period occurred in the same month

5-Year Trend - Crashes by Day of Week

Day	2016		2017		2018		2019		2020	
	Total Crashes	Fatal Crashes								
Monday	1,247	2	1,232	2	1,199	3	1,275	1	942	2
Tuesday	1,325	5	1,184	2	1,208	2	1,483	0	927	0
Wednesday	1,298	3	1,207	3	1,319	5	1,391	3	983	2
Thursday	1,415	2	1,337	3	1,149	2	1,343	4	1,045	2
Friday	1,421	4	1,393	5	1,357	3	1,421	8	1,056	4
Saturday	997	4	993	1	1,027	3	917	3	832	2
Sunday	725	4	706	1	712	5	728	1	654	2
Total	8,428	24	8,052	17	7,971	23	8,558	20	6,439	14

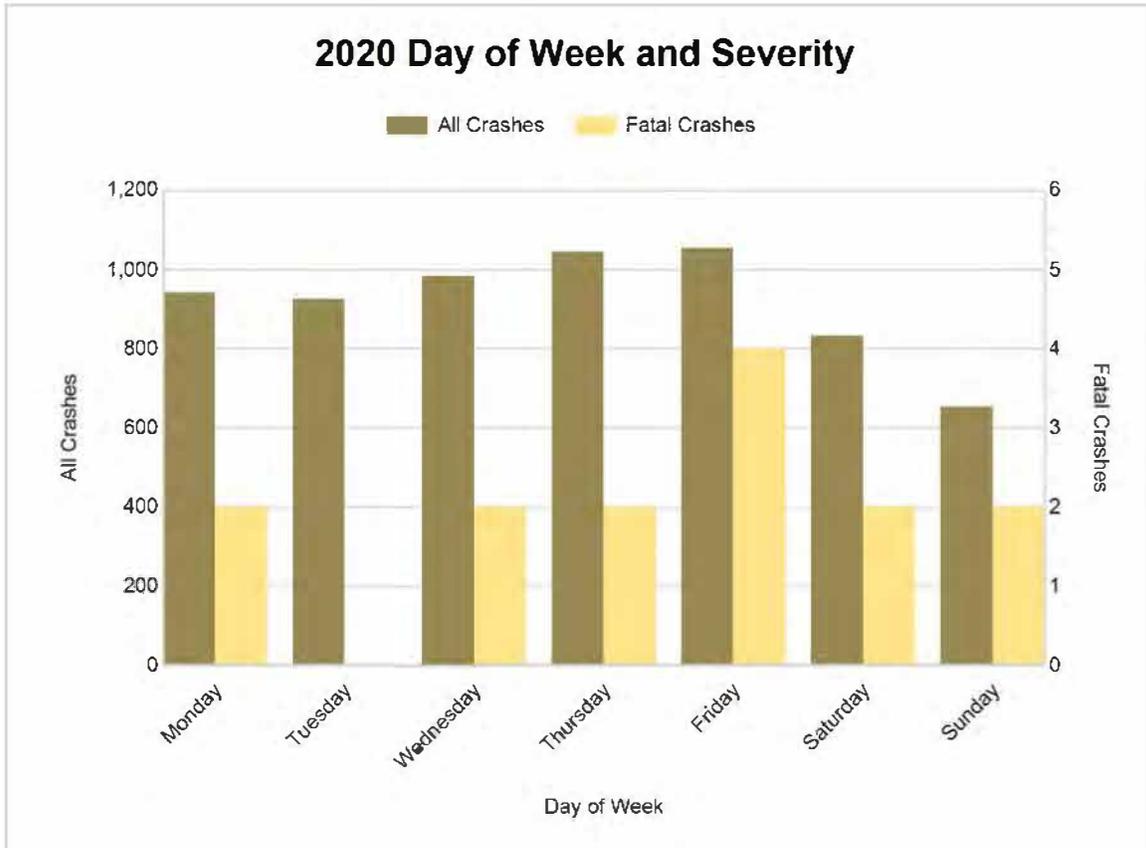
Note: † Indicates that the highest number of total crashes reported in the 5-year period occurred on the same day of the week



Ottawa County (continued)

2020 - Crashes by Day of Week

Day	All Crashes		Fatal Crashes		Injury Crashes			PDO Crashes
	Number	% of Total	Number	% of Fatal	A	B	C	Number
Monday	942	14.6	2	14.3	6	36	100	798
Tuesday	927	14.4	0	0.0	9	56	94	768
Wednesday	983	15.3	2	14.3	20	44	105	812
Thursday	1,045	16.2	2	14.3	18	54	110	861
Friday	1,056	16.4	4	28.6	14	50	110	878
Saturday	832	12.9	2	14.3	11	38	86	695
Sunday	654	10.2	2	14.3	11	51	73	517
Total	6,439	100.0	14	100.0	89	329	678	5,329



Ottawa County (continued)

5-Year Trend - Crashes by Weekday and Weekend

Portion of Week	2016		2017		2018		2019		2020	
	Total Crashes	Fatal Crashes								
Weekday	6,706	16	6,353	15	6,232	15	6,913	16	4,953	10
Weekend	1,722	8	1,699	2	1,739	8	1,645	4	1,486	4
Total	8,428	24	8,052	17	7,971	23	8,558	20	6,439	14

5-Year Crash Trends by Weekday (Monday - Friday) and Weekend (Saturday & Sunday)

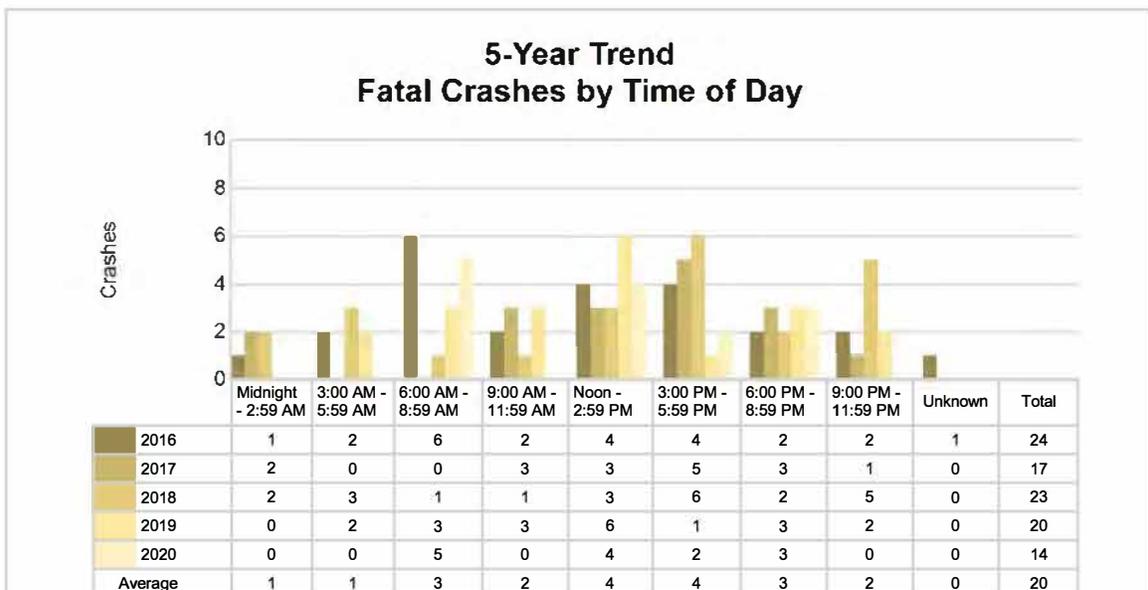
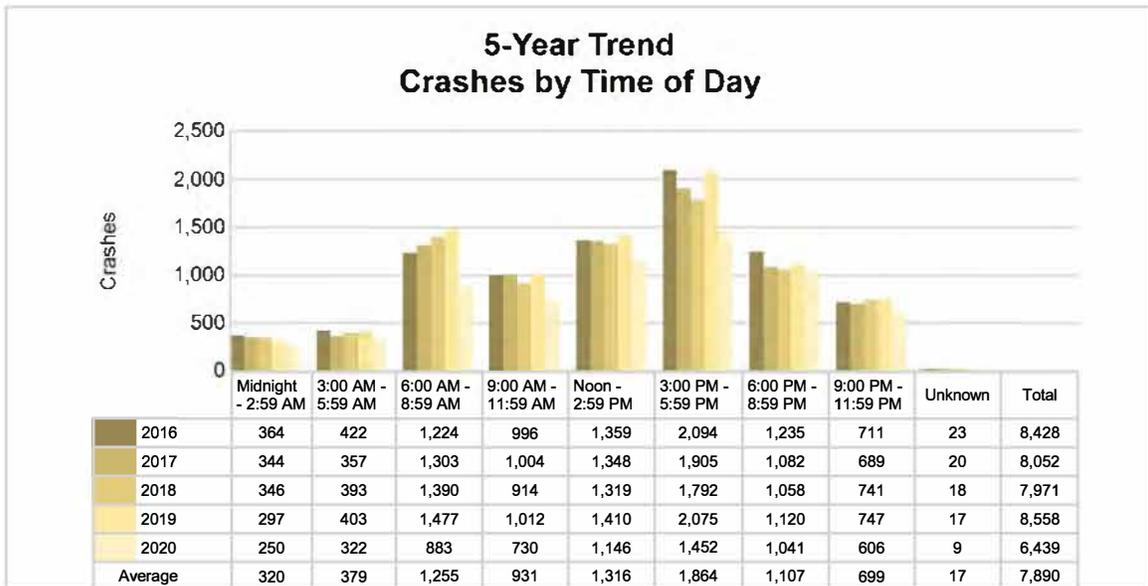


Ottawa County (continued)

5-Year Trend - Crashes by Time of Day

Time of Day	2016		2017		2018		2019		2020	
	Total Crashes	Fatal Crashes								
Midnight - 2:59 AM	364	1	344	2	346	2	297	0	250	0
3:00 AM - 5:59 AM	422	2	357	0	393	3	403	2	322	0
6:00 AM - 8:59 AM	1,224	6	1,303	0	1,390	1	1,477	3	883	5
9:00 AM - 11:59 AM	996	2	1,004	3	914	1	1,012	3	730	0
Noon - 2:59 PM	1,359	4	1,348	3	1,319	3	1,410	6	1,146	4
3:00 PM - 5:59 PM	2,094 †	4	1,905 †	5	1,792 †	6	2,075 †	1	1,452 †	2
6:00 PM - 8:59 PM	1,235	2	1,082	3	1,058	2	1,120	3	1,041	3
9:00 PM - 11:59 PM	711	2	689	1	741	5	747	2	606	0
Unknown	23	1	20	0	18	0	17	0	9	0
Total	8,428	24	8,052	17	7,971	23	8,558	20	6,439	14

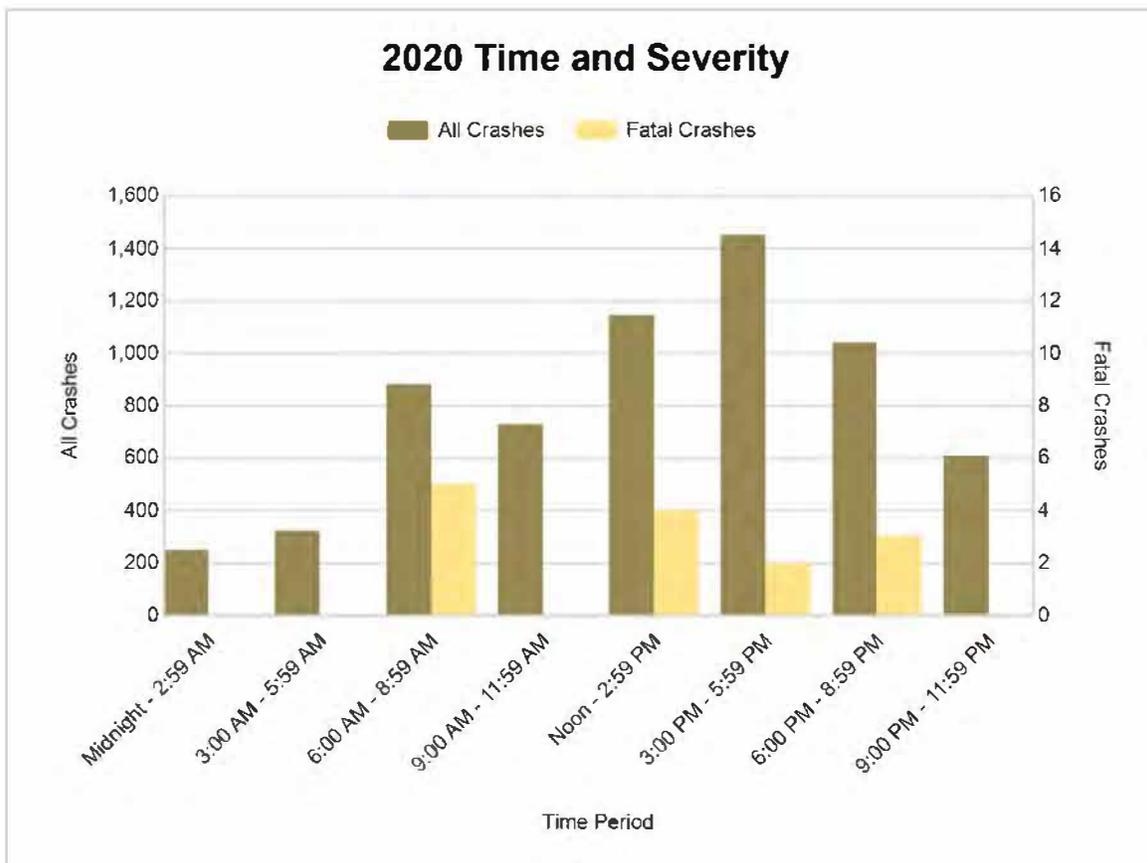
Note: † Indicates that the highest number of total crashes reported in the 5-year period occurred in the same time period



Ottawa County (continued)

2020 - Time and Severity

Time of Day	All Crashes		Fatal Crashes		Injury Crashes			PDO Crashes
	Number	% of Total	Number	% of Fatal	A	B	C	Number
Midnight - 2:59 AM	250	3.9	0	0.0	5	9	17	219
3:00 AM - 5:59 AM	322	5.0	0	0.0	2	13	25	282
6:00 AM - 8:59 AM	883	13.7	5	35.7	12	42	70	754
9:00 AM - 11:59 AM	730	11.3	0	0.0	4	36	88	602
Noon - 2:59 PM	1,146	17.8	4	28.6	21	69	139	913
3:00 PM - 5:59 PM	1,452	22.6	2	14.3	22	72	176	1,180
6:00 PM - 8:59 PM	1,041	16.2	3	21.4	15	63	110	850
9:00 PM - 11:59 PM	606	9.4	0	0.0	8	25	53	520
Unknown	9	0.1	0	0.0	0	0	0	9
Total	6,439	100.0	14	100.0	89	329	678	5,329

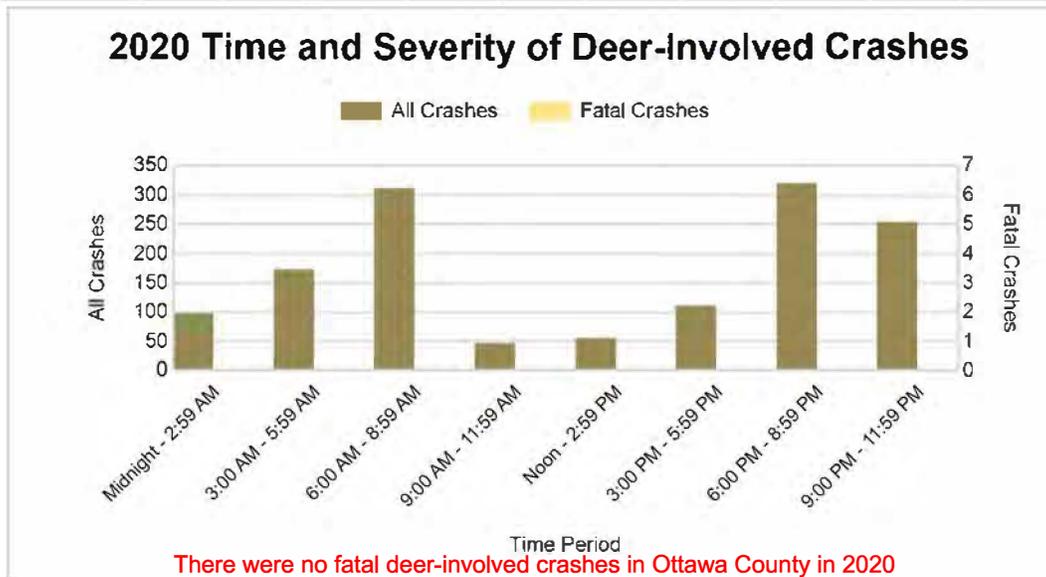
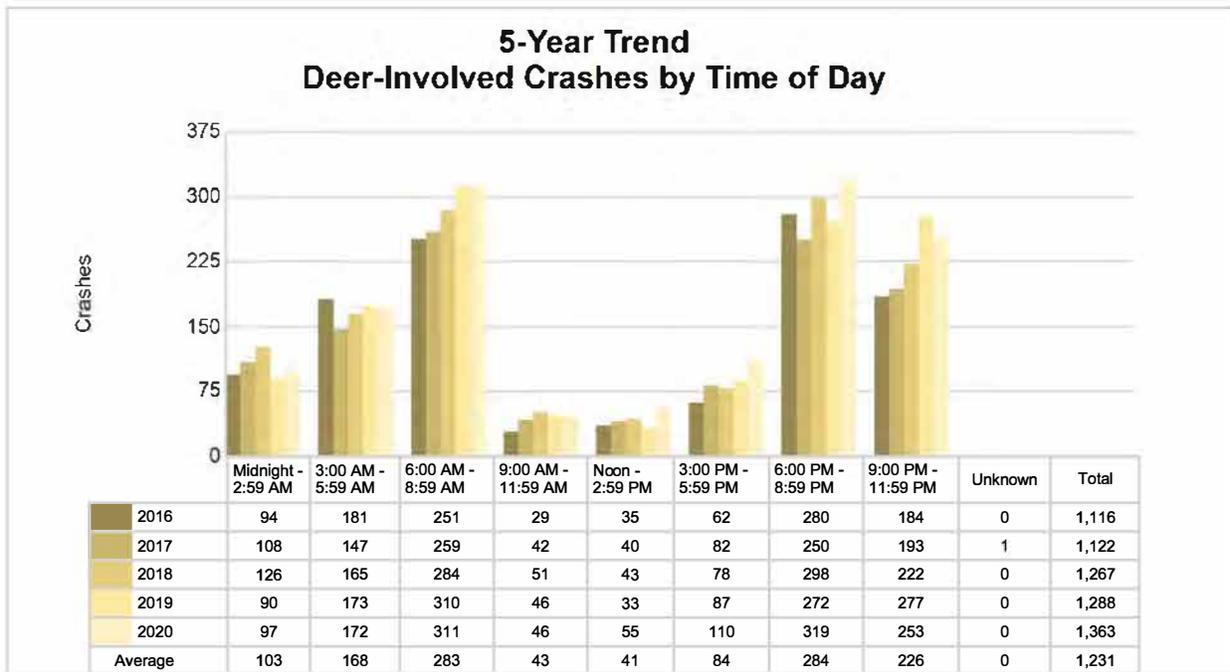


Ottawa County (continued)

5-Year Trend - Deer-Involved Crashes by Time of Day

Time of Day	2016		2017		2018		2019		2020	
	Total Crashes	Fatal Crashes								
Midnight - 2:59 AM	94	0	108	0	126	0	90	0	97	0
3:00 AM - 5:59 AM	181	0	147	0	165	0	173	0	172	0
6:00 AM - 8:59 AM	251	0	259	0	284	0	310	0	311	0
9:00 AM - 11:59 AM	29	0	42	0	51	0	46	0	46	0
Noon - 2:59 PM	35	0	40	0	43	0	33	0	55	0
3:00 PM - 5:59 PM	62	0	82	0	78	0	87	0	110	0
6:00 PM - 8:59 PM	280	0	250	0	298	0	272	0	319	0
9:00 PM - 11:59 PM	184	0	193	0	222	0	277	0	253	0
Unknown	0	0	1	0	0	0	0	0	0	0
Total	1,116	0	1,122	0	1,267	0	1,288	0	1,363	0

Note: † Indicates that the highest number of total crashes reported in the 5-year period occurred in the same time period



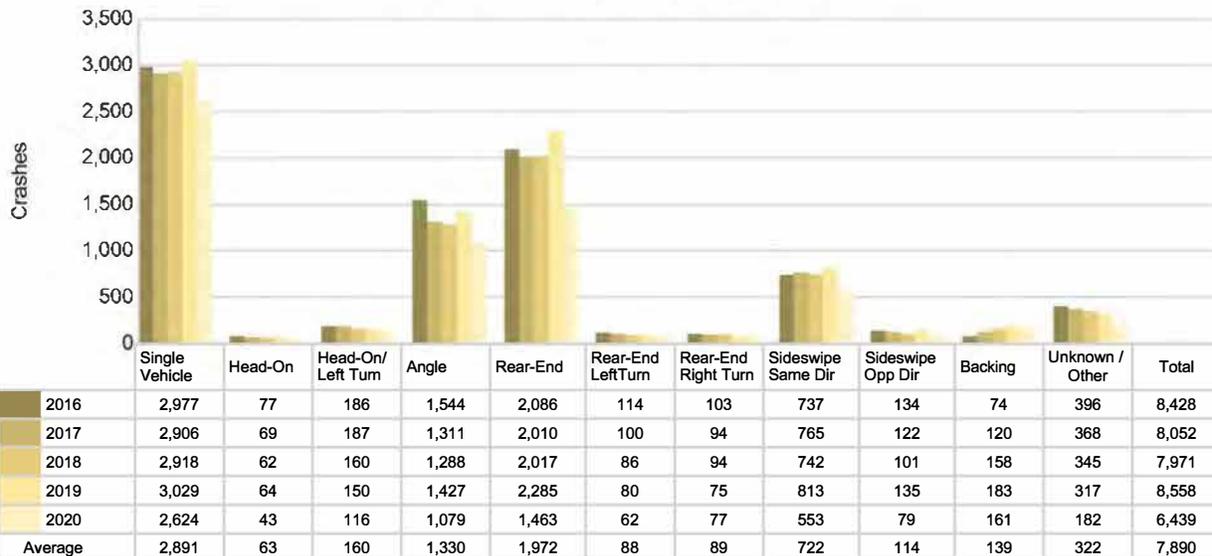
There were no fatal deer-involved crashes in Ottawa County in 2020

Ottawa County (continued)

5-Year Trend - Crashes by Crash Type

Crash Type	2016		2017		2018		2019		2020	
	Total Crashes	Fatal Crashes								
Single motor vehicle	2,977	10	2,906	5	2,918	10	3,029	6	2,624	6
Head-on	77	3	69	0	62	2	64	3	43	3
Head-on / left turn	186	3	187	1	160	1	150	1	116	1
Angle	1,544	5	1,311	9	1,288	6	1,427	7	1,079	4
Rear-end	2,086	2	2,010	0	2,017	2	2,285	2	1,463	0
Rear-end left turn	114	1	100	0	86	1	80	0	62	0
Rear-end right turn	103	0	94	0	94	0	75	0	77	0
Sideswipe same direction	737	0	765	1	742	0	813	0	553	0
Sideswipe opposite direction	134	0	122	0	101	0	135	1	79	0
Backing	74	0	120	0	158	0	183	0	161	0
Other / Unknown	396	0	368	1	345	1	317	0	182	0
Uncoded and Errors	0	0	0	0	0	0	0	0	0	0
Total	8,428	24	8,052	17	7,971	23	8,558	20	6,439	14

5-Year Trend Crashes by Crash Type



Ottawa County (continued)

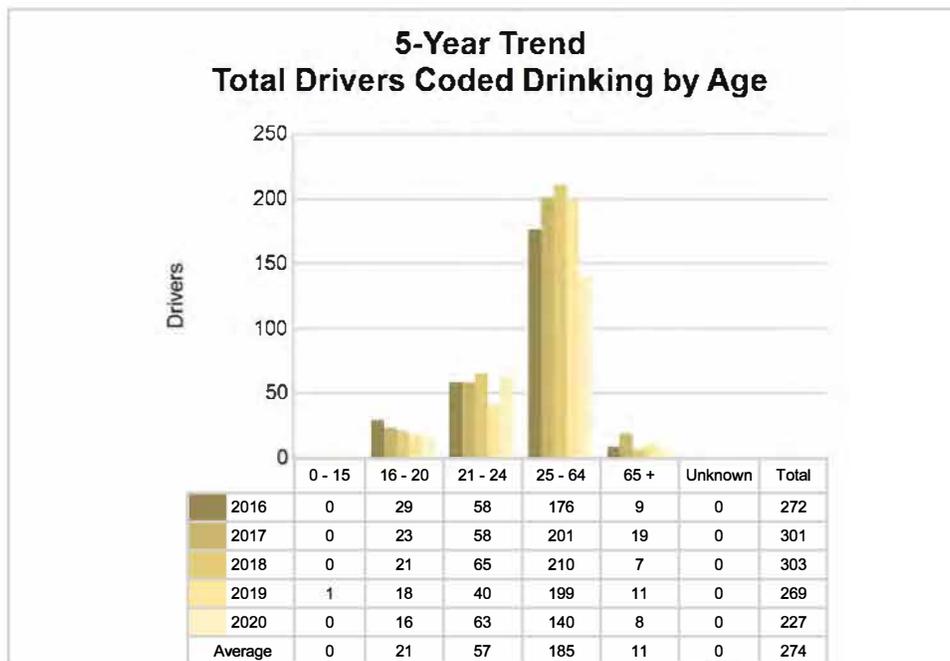
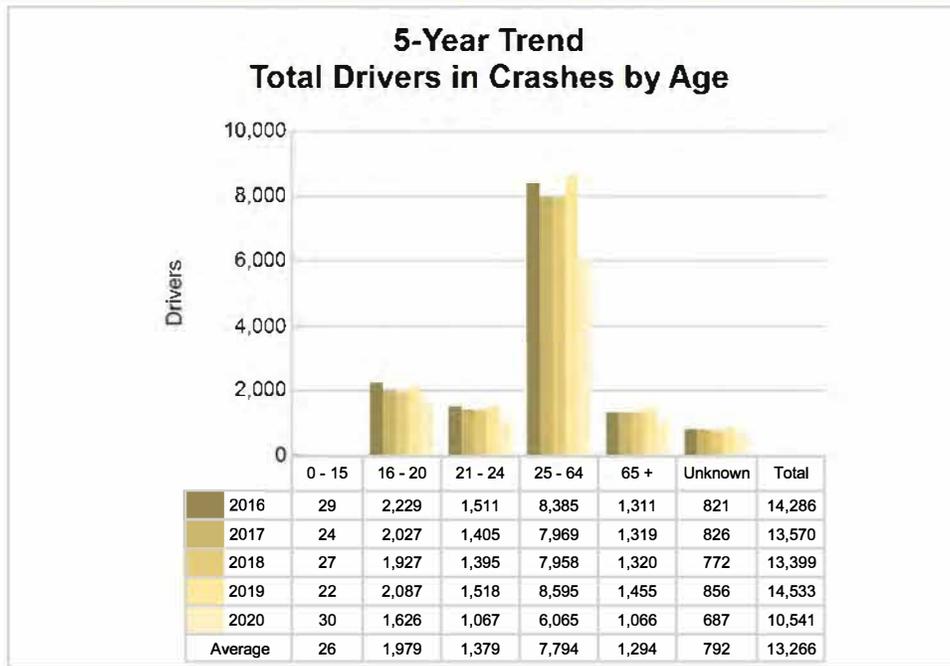
2020 - Reported Motor Vehicle Crashes by Municipality

Municipality	Crashes											Persons	
	Total	Fatal	Injury	Property Damage	Inter-state	US Route	State Route	Local Street	Alcohol-Involved	Drug-Involved	Deer-Involved	Fatalities	Injuries
Allendale Twp.	332	0	53	279	0	0	178	153	13	2	65	0	74
Blendon Twp.	154	0	18	136	0	0	0	154	6	0	85	0	25
Chester Twp.	49	0	9	40	0	0	0	49	1	1	29	0	14
Coopersville	88	0	11	77	2	0	0	86	3	1	21	0	13
Crockery Twp.	222	1	36	185	91	0	46	83	8	2	97	1	48
Ferrysburg	71	0	10	61	0	30	8	33	3	0	10	0	12
Georgetown Twp.	737	2	146	589	38	0	101	597	25	11	109	2	202
Grand Haven	396	0	43	353	0	216	0	179	5	3	12	0	49
Grand Haven Twp.	293	0	43	250	0	113	12	168	5	0	97	0	59
Holland	619	1	117	501	15	58	0	546	30	10	13	1	161
Holland Twp.	1,151	3	216	932	86	219	0	845	39	7	97	4	301
Hudsonville	133	0	12	121	21	0	34	78	3	1	9	0	16
Jamestown Twp.	200	0	45	155	17	0	35	148	6	2	55	0	63
Olive Twp.	224	2	42	180	0	47	0	176	5	1	83	2	56
Park Twp.	188	0	38	150	0	0	0	188	12	3	35	0	53
Polkton Twp.	176	0	20	156	73	0	0	103	9	1	91	0	26
Port Sheldon Twp.	113	0	21	92	0	21	0	92	4	3	36	0	28
Robinson Twp.	151	2	19	130	0	0	41	110	7	0	78	2	33
Spring Lake	48	0	9	39	0	0	35	12	3	0	2	0	11
Spring Lake Twp.	152	0	22	130	0	15	31	106	2	1	51	0	25
Tallmadge Twp.	259	2	43	214	9	0	124	125	15	7	113	2	55
Wright Twp.	194	1	44	149	89	0	3	102	13	3	81	1	62
Zeeland	127	0	23	104	18	0	0	109	4	4	6	0	31
Zeeland Twp.	362	0	56	306	111	0	104	146	8	4	88	0	86
Unknown Community	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	6,439	14	1,096	5,329	570	719	752	4,388	229	67	1,363	15	1,503

Ottawa County (continued)

5-Year Trend - Drivers in Crashes Coded Drinking by Driver Age

Driver Age	2016		2017		2018		2019		2020	
	Total Drivers in Crashes	Total Drivers Coded Drinking	Total Drivers in Crashes	Total Drivers Coded Drinking	Total Drivers in Crashes	Total Drivers Coded Drinking	Total Drivers in Crashes	Total Drivers Coded Drinking	Total Drivers in Crashes	Total Drivers Coded Drinking
0 - 15	29	0	24	0	27	0	22	1	30	0
16 - 20	2,229	29	2,027	23	1,927	21	2,087	18	1,626	16
21 - 24	1,511	58	1,405	58	1,395	65	1,518	40	1,067	63
25 - 64	8,385	176	7,969	201	7,958	210	8,595	199	6,065	140
65 +	1,311	9	1,319	19	1,320	7	1,455	11	1,066	8
Unknown	821	0	826	0	772	0	856	0	687	0
Total	14,286	272	13,570	301	13,399	303	14,533	269	10,541	227



Ottawa County (continued)

2020 - Bodily Alcohol Concentration (BAC) Results Among All Vehicle Drivers in Alcohol-Involved Crashes by Age

Age Group	Drivers				BAC Result Range for Drivers Coded Drinking				
	Total Drivers in Alcohol-Involved Crashes	Total Drivers Tested in all Crashes	Total Drivers Coded Drinking, Tested	Total Drivers Coded Drinking	BAC = 0.00	BAC 0.01 g/dL to 0.07 g/dL	BAC 0.08 g/dL to 0.16 g/dL	BAC 0.17 g/dL and Above	BAC Not Reported
0 - 15	1	0	0	0	0	0	0	0	0
16 - 20	32	31	15	16	0	3	6	2	5
21 - 24	73	58	52	63	0	7	15	11	30
25 - 64	191	160	118	140	0	13	23	46	58
65 +	12	12	5	8	0	1	1	1	5
Unknown	26	0	0	0	0	0	0	0	0
Total	335	261	190	227	0	24	45	60	98

Notes: BAC measured in grams (g) per deciliter (dL).
 BAC may not be reported if drivers are not tested or if the results are not available immediately (as in the case of a blood test).
 A driver may be coded by the officer as drinking even though no test is administered.

Alcohol-Involved Crashes

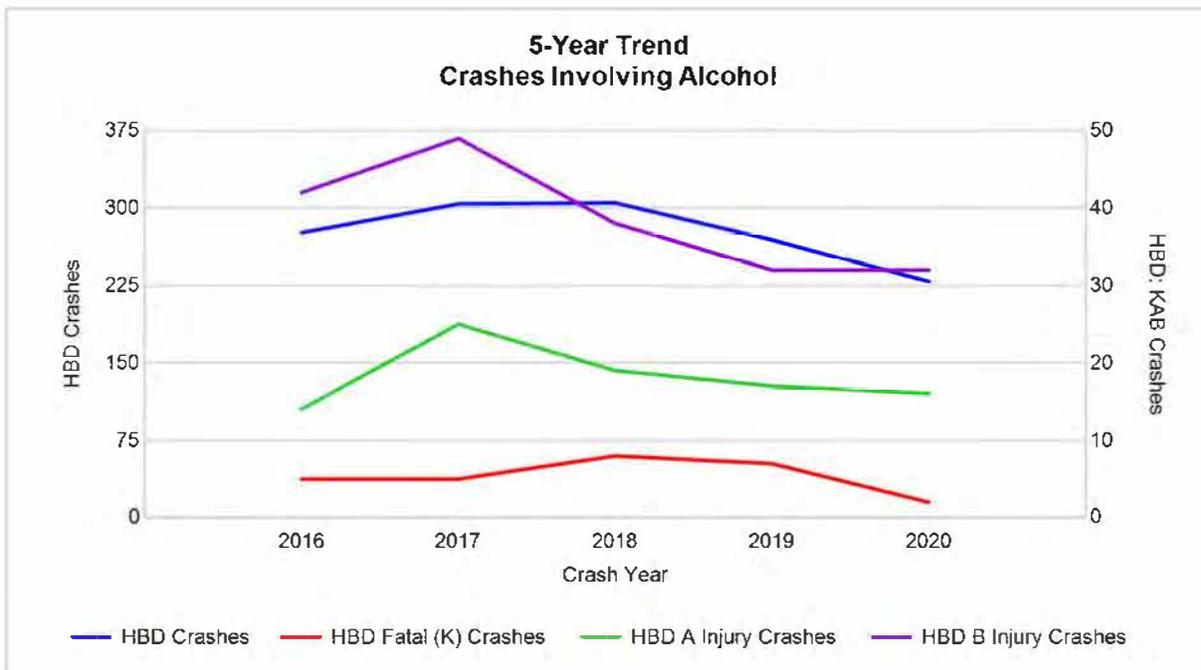
In 2020, there were 335 drivers in alcohol-involved crashes; 227 (67.8%) of those drivers were coded as had-been-drinking by the officer on the crash form.

- 105 (46.3%) of the 227 drivers had a blood alcohol concentration (BAC) of 0.08 g/dL (grams per deciliter) or greater, and 60 (57.1%) of the 105 drivers had a BAC at or above 0.17 g/dL.
- 190 (83.7%) of the 227 drivers were coded as had-been-drinking and were tested for alcohol consumption.

5-Year Trend - Crashes Involving Alcohol

Year	All Crashes	HBD Crashes	% HBD	Fatal Crashes	HBD Fatal Crashes	% HBD	A Injury Crashes	HBD A Injury Crashes	% HBD	B Injury Crashes	HBD B Injury Crashes	% HBD
2016	8,428	276	3.3	24	5	20.8	136	14	10.3	404	42	10.4
2017	8,052	304	3.8	17	5	29.4	135	25	18.5	382	49	12.8
2018	7,971	305	3.8	23	8	34.8	132	19	14.4	327	38	11.6
2019	8,558	269	3.1	20	7	35.0	123	17	13.8	357	32	9.0
2020	6,439	229	3.6	14	2	14.3	89	16	18.0	329	32	9.7

Note: * Indicates that the most recent year is the lowest number or percentage reported in the 5-year period in that column
 ** Indicates that the most recent year is the highest number or percentage reported in the 5-year period in that column



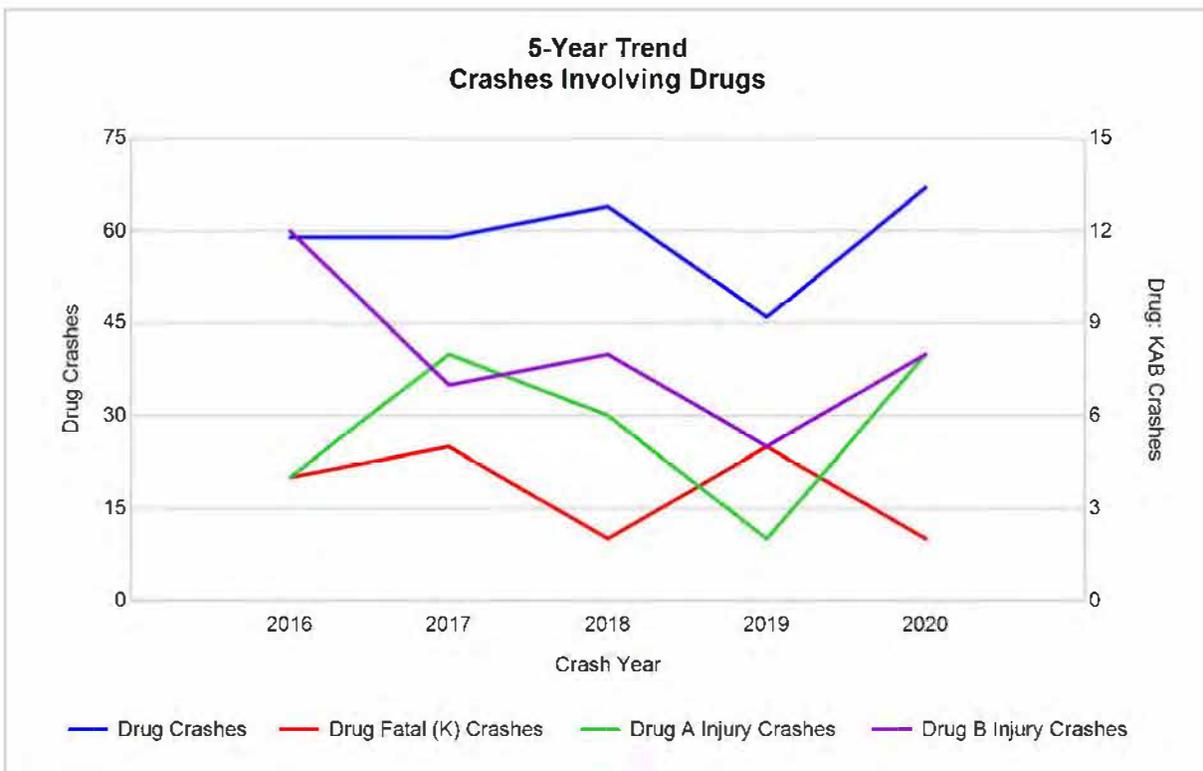
Note: Had-Been-Drinking (HBD)

Ottawa County (continued)

5-Year Trend - Crashes Involving Drugs

Year	All Crashes	Drug Crashes	% Drug	Fatal Crashes	Drug Fatal Crashes	% Drug	A Injury Crashes	Drug A Injury Crashes	% Drug	B Injury Crashes	Drug B Injury Crashes	% Drug
2016	8,428	59	0.7	24	4	16.7	136	4	2.9	404	12	3.0
2017	8,052	59	0.7	17	5	29.4	135	8	5.9	382	7	1.8
2018	7,971	64	0.8	23	2	8.7	132	6	4.5	327	8	2.4
2019	8,558	46	0.5	20	5	25.0	123	2	1.6	357	5	1.4
2020	6,439	67	1.0	14	2	14.3	89	8	9.0	329	8	2.4

Note: * Indicates that the most recent year is the lowest number or percentage reported in the 5-year period in that column
 ** Indicates that the most recent year is the highest number or percentage reported in the 5-year period in that column

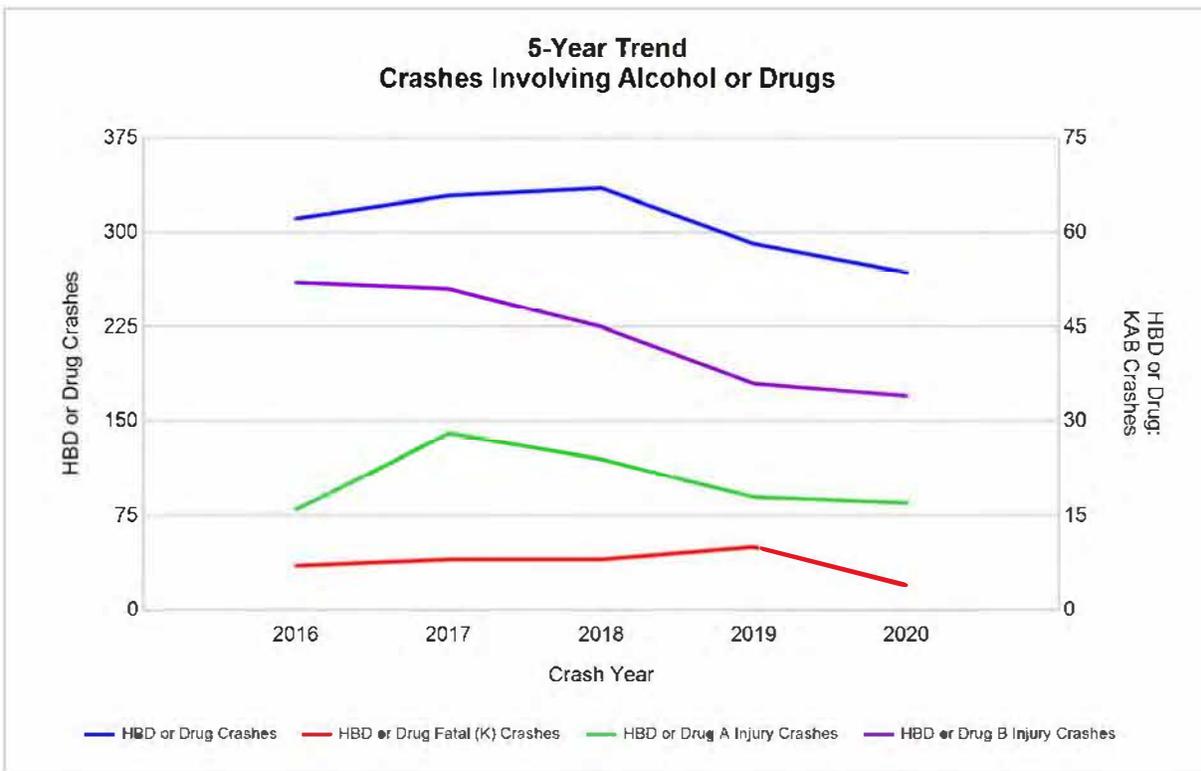


Ottawa County (continued)

5-Year Trend - Crashes Involving Alcohol or Drugs

Year	All Crashes	HBD or Drug Crashes	% HBD or Drug	Fatal Crashes	HBD or Drug Fatal Crashes	% HBD or Drug	A Injury Crashes	HBD or Drug A Injury Crashes	% HBD or Drug	B Injury Crashes	HBD or Drug B Injury Crashes	% HBD or Drug
2016	8,428	311	3.7	24	7	29.2	136	16	11.8	404	52	12.9
2017	8,052	329	4.1	17	8	47.1	135	28	20.7	382	51	13.4
2018	7,971	335	4.2	23	8	34.8	132	24	18.2	327	45	13.8
2019	8,558	291	3.4	20	10	50.0	123	18	14.6	357	36	10.1
2020	6,439	268	4.2	14	4	28.6	89	17	19.1	329	34	10.3

Note: * Indicates that the most recent year is the lowest number or percentage reported in the 5-year period in that column
 ** Indicates that the most recent year is the highest number or percentage reported in the 5-year period in that column



Note: Had-Been-Drinking (HBD)

Ottawa County (continued)

2020 - Restraints Worn Among Vehicle Drivers and Injured Passengers by Vehicle Type

Vehicle Type	Total Occupants			Fatalities			A - Suspected Serious			B - Suspected Minor			C - Possible Injury			No Injury		
	Total	Used Restraint	%	Total	Used Restraint	%	Total	Used Restraint	%	Total	Used Restraint	%	Total	Used Restraint	%	Total	Used Restraint	%
Passenger car, SUV, van	8,920	8,390	94.1	12	10	83.3	78	63	80.8	315	300	95.2	821	797	97.1	7,319	7,220	98.6
Motor home	9	7	77.8	0	0	0.0	0	0	0.0	1	1	100.0	2	2	100.0	4	4	100.0
Pickup truck	1,254	1,165	92.9	1	1	100.0	7	3	42.9	37	34	91.9	81	77	95.1	1,071	1,050	98.0
Small truck under 10,000 lbs. GVWR	24	22	91.7	0	0	0.0	0	0	0.0	2	2	100.0	0	0	0.0	20	20	100.0
Motorcycle	69	49	71.0	1	1	100.0	12	6	50.0	26	21	80.8	16	10	62.5	13	11	84.6
Moped / goped	18	8	44.4	0	0	0.0	2	1	50.0	9	3	33.3	4	2	50.0	2	2	100.0
Go-cart / golf cart	2	0	0.0	0	0	0.0	1	0	0.0	0	0	0.0	0	0	0.0	1	0	0.0
Snowmobile	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Off-Road Vehicle - ORV / All-Terrain Vehicle - ATV	7	0	0.0	1	0	0.0	2	0	0.0	0	0	0.0	1	0	0.0	1	0	0.0
Other	28	17	60.7	0	0	0.0	0	0	0.0	1	1	100.0	0	0	0.0	20	16	80.0
Truck/bus over 10,000 lbs.	326	308	94.5	0	0	0.0	0	0	0.0	4	4	100.0	10	10	100.0	296	294	99.3
Unknown	234	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Total	10,891	9,966	91.5	15	12	0.0	102	73	71.6	395	366	92.7	935	898	96.0	8,747	8,617	98.5

Note: Restraint Use includes shoulder belt only used, lap belt only used, both lap and shoulder belts used, child restraint used, restraint failure, and helmet worn.

2020 - Restraints Worn Among Vehicle Drivers and Injured Passengers by Age

Age Group	Total Occupants			Fatalities			A - Suspected Serious			B - Suspected Minor			C - Possible Injury			No Injury		
	Total	Used Restraint	%	Total	Used Restraint	%	Total	Used Restraint	%	Total	Used Restraint	%	Total	Used Restraint	%	Total	Used Restraint	%
0 - 15	101	91	90.1	0	0	0.0	5	2	40.0	12	11	91.7	59	54	91.5	25	24	96.0
16 - 20	1,696	1,674	98.7	1	1	100.0	16	13	81.3	74	72	97.3	155	150	96.8	1,448	1,438	99.3
21 - 24	1,092	1,048	96.0	0	0	0.0	12	7	58.3	39	34	87.2	102	91	89.2	938	916	97.7
25 - 64	6,203	6,056	97.6	9	8	88.9	51	35	68.6	218	197	90.4	502	487	97.0	5,416	5,329	98.4
65 +	1,112	1,097	98.7	5	3	60.0	18	16	88.9	52	52	100.0	117	116	99.1	920	910	98.9
Unknown	687	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Total	10,891	9,966	91.5	15	12	0.0	102	73	71.6	395	366	92.7	935	898	96.0	8,747	8,617	98.5

Note: Restraint Use includes shoulder belt only used, lap belt only used, both lap and shoulder belts used, child restraint used, restraint failure, and helmet worn.

Ottawa County (continued)

5-Year Trend - Restraint Use Among Drivers

Restraint Use	2016			2017			2018			2019			2020		
	Drivers	Fatal Drivers	Injured Drivers												
No belts available	19	0	2	25	0	4	31	0	3	22	1	2	19	0	0
Shoulder belt only used	42	0	3	43	0	6	34	0	3	39	0	5	36	0	5
Lap belt only used	23	0	6	23	0	3	25	0	4	34	0	2	34	0	4
Both lap & shoulder belts used	12,955	6	1,325	12,224	6	1,244	12,252	12	1,177	13,283	10	1,235	9,515	9	970
No belts used	56	3	23	45	3	19	48	3	16	56	2	19	30	1	14
Child restraint used	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Child restraint not used, unavailable or improper use	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Restraint failure	10	0	0	10	0	1	4	0	0	7	0	0	8	0	1
Restraint use unknown	864	4	33	1,108	2	26	932	2	27	1,012	1	20	815	0	25
Helmet worn	79	2	56	54	1	38	59	2	39	55	0	41	54	1	40
Helmet not worn	33	1	26	36	2	32	14	0	9	23	1	19	27	1	25
Helmet use unknown	2	0	1	2	0	0	0	0	0	2	0	1	3	0	1
Uncoded & errors	203	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Total	14,286	16	1,476	13,570	14	1,373	13,399	19	1,278	14,533	15	1,344	10,541	12	1,085

5-Year Trend - Restraint Use Among Drivers Coded Drinking

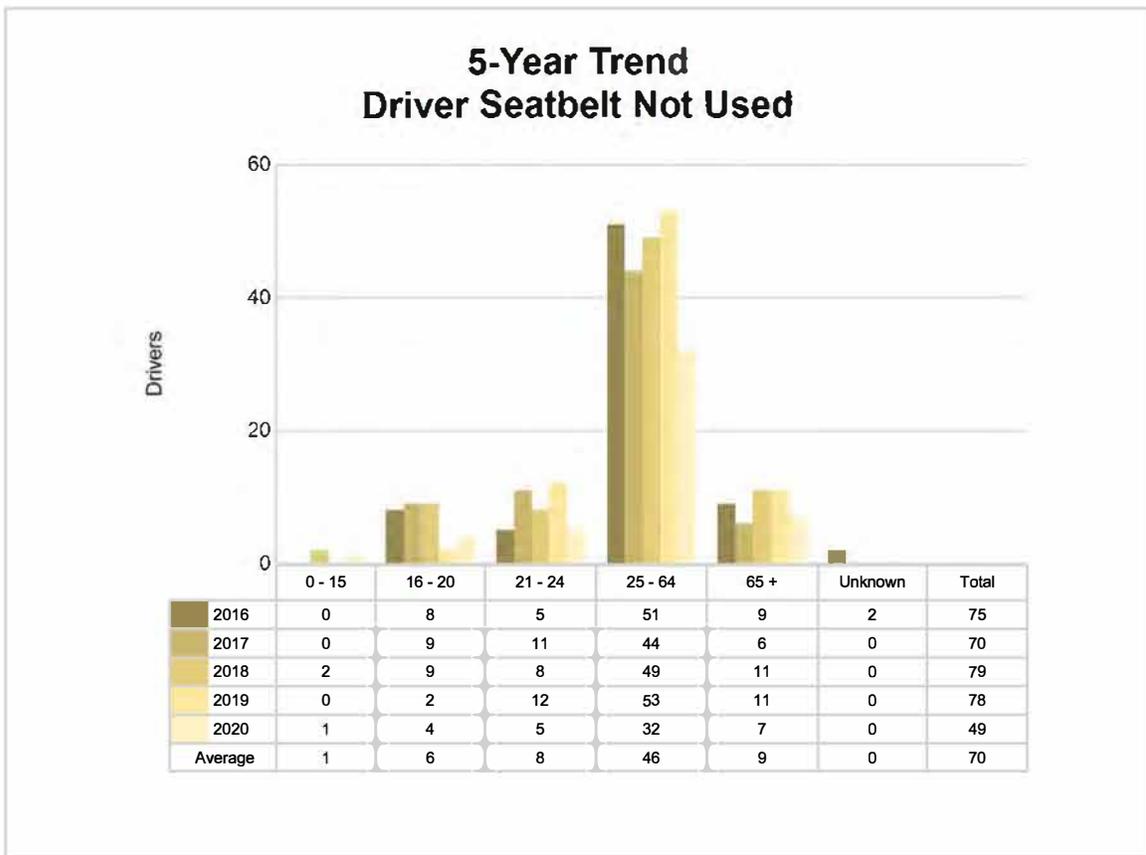
Restraint Use	2016			2017			2018			2019			2020		
	Drivers	Fatal Drivers	Injured Drivers												
No belts available	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
Shoulder belt only used	1	0	0	0	0	0	2	0	1	0	0	0	0	0	0
Lap belt only used	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Both lap & shoulder belts used	205	0	44	230	1	60	243	2	51	216	2	49	167	0	43
No belts used	11	2	6	8	2	4	6	1	5	5	2	3	8	0	6
Child restraint used	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Child restraint not used, unavailable or improper use	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Restraint failure	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Restraint use unknown	48	1	13	50	0	10	46	2	12	39	1	6	43	0	11
Helmet worn	1	0	1	2	0	2	4	0	3	3	0	3	5	1	4
Helmet not worn	5	0	5	10	1	8	2	0	2	5	0	5	3	0	3
Helmet use unknown	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
Uncoded & errors	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	272	3	69	301	4	85	303	5	74	269	5	66	227	1	67

Ottawa County (continued)

5-Year Trend - Seatbelt Not Used Among Drivers by Age

Age Group	2016			2017			2018			2019			2020		
	Drivers	Fatal Drivers	Injured Drivers												
0 - 15	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0
16 - 20	8	0	3	9	0	5	9	0	1	2	0	0	4	0	2
21 - 24	5	0	1	11	1	4	8	0	3	12	0	3	5	0	3
25 - 64	51	2	17	44	2	14	49	3	11	53	2	14	32	0	8
65 +	9	1	4	6	0	0	11	0	4	11	1	4	7	1	1
Unknown	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	75	3	25	70	3	23	79	3	19	78	3	21	49	1	14

Note: Seatbelt Not Used includes no belts available or no belts used.

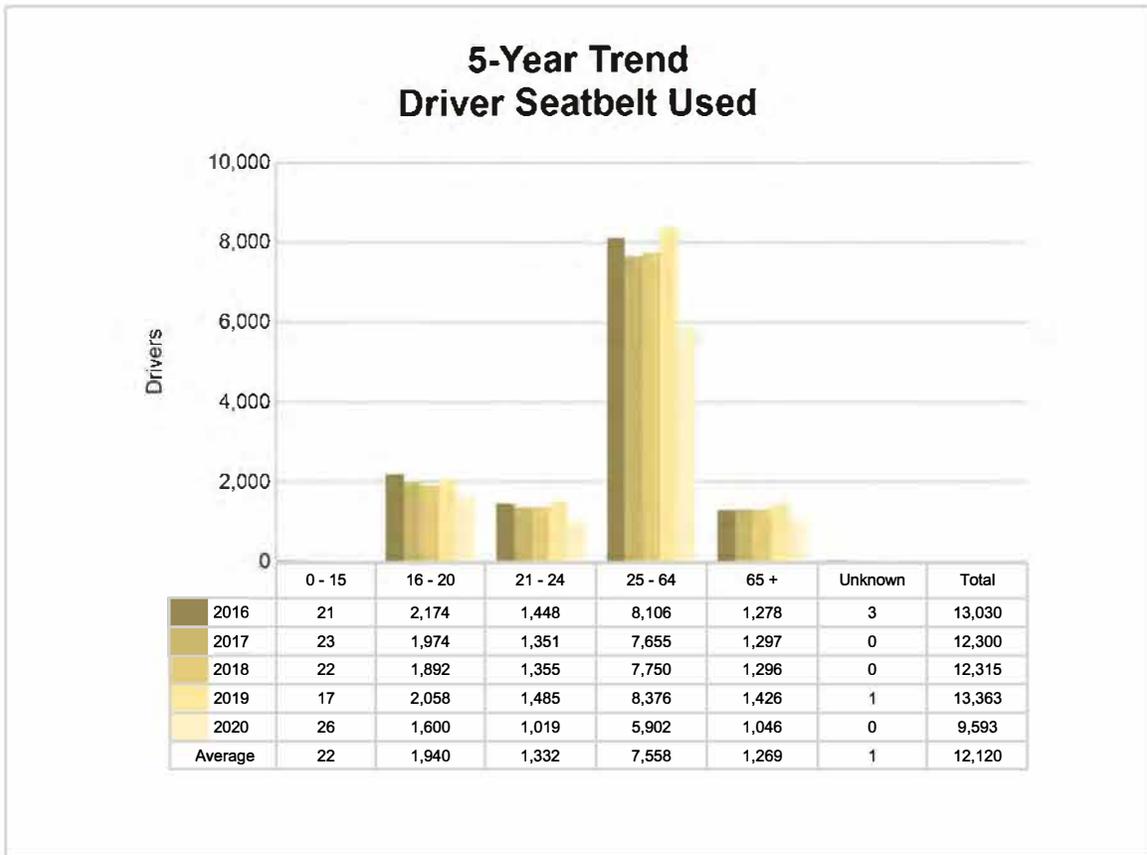


Ottawa County (continued)

5-Year Trend - Seatbelt Used Among Drivers by Age

Age Group	2016			2017			2018			2019			2020		
	Drivers	Fatal Drivers	Injured Drivers	Drivers	Fatal Drivers	Injured Drivers									
0 - 15	21	0	2	23	0	0	22	0	1	17	0	0	26	0	2
16 - 20	2,174	1	213	1,974	0	180	1,892	0	143	2,058	2	164	1,600	0	163
21 - 24	1,448	2	149	1,351	1	143	1,355	0	126	1,485	2	138	1,019	0	104
25 - 64	8,106	2	825	7,655	2	774	7,750	9	756	8,376	5	784	5,902	7	574
65 +	1,278	1	145	1,297	3	157	1,296	3	158	1,426	1	156	1,046	2	137
Unknown	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Total	13,030	6	1,334	12,300	6	1,254	12,315	12	1,184	13,363	10	1,242	9,593	9	980

Note: Seatbelt Used includes shoulder belt only used, lap belt only used, both lap and shoulder belts used, and restraint failure.

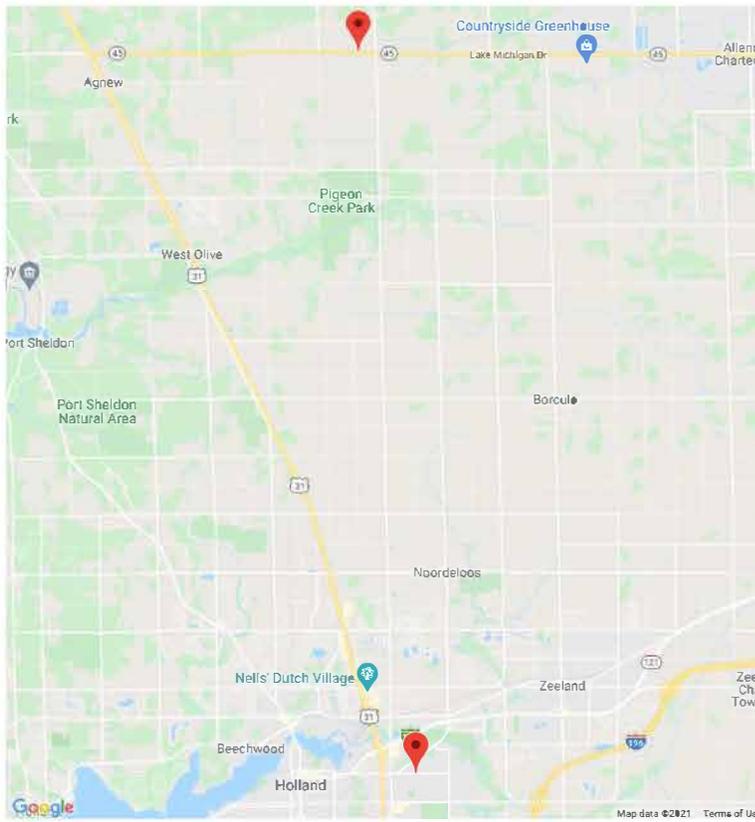


Ottawa County (continued)

5-Year Trend - Drivers in Crashes by Hazardous Action

Hazardous Action	2016		2017		2018		2019		2020	
	Total Drivers in Crashes	Drivers in Fatal Crashes	Total Drivers in Crashes	Drivers in Fatal Crashes	Total Drivers in Crashes	Drivers in Fatal Crashes	Total Drivers in Crashes	Drivers in Fatal Crashes	Total Drivers in Crashes	Drivers in Fatal Crashes
None	7,348	18	6,995	14	6,945	20	7,452	19	5,620	10
Speed too fast	1,044	4	935	2	773	5	978	4	495	1
Speed too slow	19	0	13	0	9	0	3	0	1	0
Failed to yield	1,416	3	1,312	5	1,260	3	1,290	5	953	4
Disregard traffic control	410	5	336	5	320	2	329	2	267	1
Drove wrong way	11	0	6	0	3	0	4	0	4	1
Drove left of center	63	2	44	0	41	1	54	2	38	0
Improper passing	61	0	74	0	61	0	58	0	42	0
Improper lane use	254	0	265	0	304	1	304	0	220	0
Improper turn	124	0	122	0	107	0	131	0	114	0
Improper/no signal	18	0	6	0	9	0	15	0	9	0
Improper backing	243	0	218	0	189	0	204	0	172	0
Unable to stop in assured clear distance	2,026	2	1,980	0	1,997	3	2,241	0	1,475	0
Other	413	1	412	1	448	0	494	1	381	1
Unknown	474	3	561	2	597	6	614	1	495	4
Reckless driving	44	1	38	0	34	0	52	0	45	1
Careless/negligent driving	318	1	253	1	302	0	310	4	210	1
Uncoded & errors	0	0	0	0	0	0	0	0	0	0
Total	14,286	40	13,570	30	13,399	41	14,533	38	10,541	24

Ottawa County (continued)



The picture above represents all 2020 alcohol-involved fatal crashes in Ottawa County.

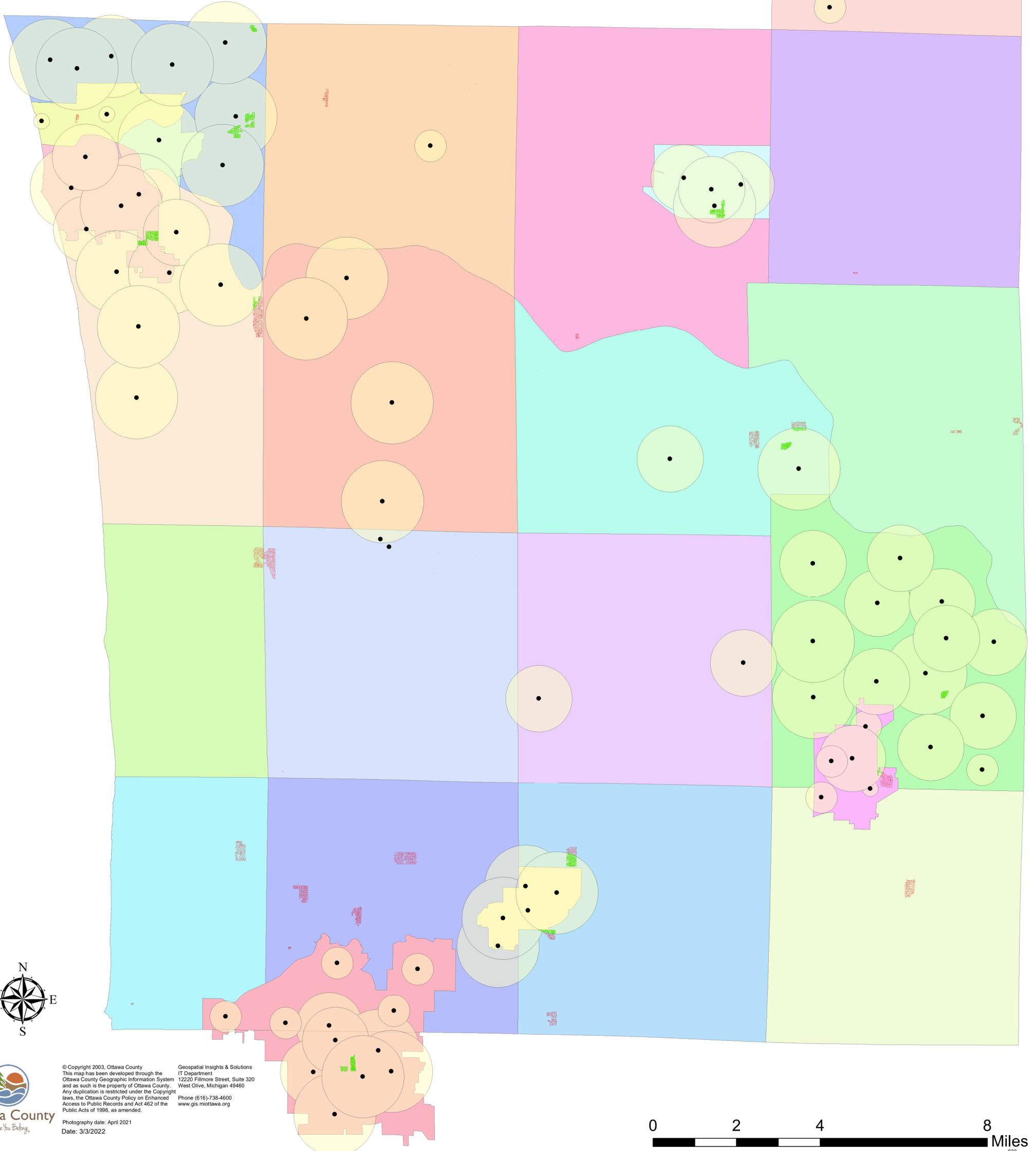
In 2020, there were 229 alcohol-involved crashes in Ottawa County:

- 2 K - Fatal Crashes
- 16 A - Suspected Serious Injury Crashes
- 32 B - Suspected Minor Injury Crashes
- 38 C - Possible Injury Crashes
- 141 O - Property Damage Only/No Injury Crashes

Ottawa County Weather Emergency Sirens Effectiveness Range

Legend

- Emergency Sirens
- ManufacturedHomes In Range (2418)
- Manufactured Homes out of Range (5686)
- Emergency Sirens Effectiveness Range



© Copyright 2003, Ottawa County
This map has been developed through the
Ottawa County Geographic Information System
and as such is the property of Ottawa County.
Any duplication is restricted under the Copyright
laws, the Ottawa County Policy on Enhanced
Access to Public Records and Act 462 of the
Public Acts of 1996, as amended.
Photography date: April 2021
Date: 3/3/2022

Geospatial Insights & Solutions
IT Department!
12220 Fillmore Street, Suite 320
West Olive, Michigan 49460
Phone (616)-738-4600
www.gis.miottawa.org

APPENDIX E

Existing Polices and Authorities

KENT COUNTY AUTHORITIES AND RESOURCES

<http://www.accesskent.com/>

Kent County Sheriff Dept.

<https://www.accesskent.com/Sheriff/LEPC/>

- GET READY! Kent County Program
<https://www.accesskent.com/Sheriff/getready/>
- Kent County Radio Amateur Civil Emergency Service
<http://www.kcraces.net/> <http://www.weather.gov/>
- Unused Medication Drop-Off
https://www.accesskent.com/Sheriff/meds_drop-off.htm

Kent County Road Commission

<http://www.kentcountyroads.net/>

Kent County Department of Public Works

<https://www.accesskent.com/Departments/DPW/>

- Solid Waste Management
https://www.google.com/url?client=internal-element-cse&cx=002464469049091051884:lys7yhzv5-c&q=https://accesskent.com/Departments/DPW/pdfs/Solid_Waste_Management.pdf&sa=U&ved=2ahUKEwith9fe0tL1AhWtjokEHSruA0oQFnoECAgQAQ&usg=AOvVaw2jFYXfAJIoKfh9U8_ik69D
- Waste to Energy Facility
https://www.google.com/url?client=internal-element-cse&cx=002464469049091051884:lys7yhzv5-c&q=https://www.accesskent.com/News/2017/10132017_1.pdf&sa=U&ved=2ahUKEwiWj8ei09L1AhUgj4kEHcSmDEIQFnoECACQAg&usg=AOvVaw20_P357fx2rHbluSyr--Zs
- Recycling and Education
<http://www.reimagnetrash.org/>
- Hazardous Waste Program
<http://www.reimagnetrash.org/safehomes/safechem/>

Kent County Bureau of Equalization

<http://www.accesskent.com/YourGovernment/Departments/BureauofEqualization/BureauofEqualization.htm>

Kent County Drain Commission

<https://www.accesskent.com/Departments/DrainCommissioner/>

- Storm Water
<https://www.accesskent.com/Departments/DrainCommissioner/stormwater.htm>
- Drain Maps
<https://www.accesskent.com/Departments/DrainCommissioner/maps.htm>
- Drain Maintenance
<https://www.accesskent.com/Departments/DrainCommissioner/maintenance.htm>

- Drain Development
<https://www.accesskent.com/Departments/DrainCommissioner/rules.htm>
- Stormwater Ordinances
https://www.accesskent.com/Departments/DrainCommissioner/stormwater_ordinance.htm
- Permits
<https://www.accesskent.com/Departments/DrainCommissioner/permits.htm>
- Related Resources
<https://www.accesskent.com/Departments/DrainCommissioner/links.htm>
- Problem Reporting Overview
<https://apps.accesskent.com/maintenance-request-drain-commissioner/>
- Development Drainage Rules and Fees:
<https://www.accesskent.com/Departments/DrainCommissioner/rules.htm>

The County Drain Commissioner is elected to a four-year term to perform a number of duties assigned by State law. The office of the Drain Commissioner is responsible for the administration of the State Drain Code as it applies to the receipt of petitions for the establishment, improvement, or maintenance of over 533 miles of County Drain and 356 storm water detention ponds in Kent County. Under the Subdivision Control Act, this office reviews storm water plans for all plats developed within the County and maintains records on over 1,800 developments. Other duties include the administration of 19 court established lake levels under the Lake Level Act, participation in the NPDES Phase II program, participation on lake improvement boards, maintenance of the GIS system as it pertains to County Drains and the resolution of citizen complaints and storm water concerns.

Currently, this office is actively developing a project and meeting with local government engineers to solve flooding of homes in the Shawmut Hills area of Grand Rapids, undertaking projects to address obstructions to the flow in the Troy with Mosher & Farnham Drain, the erosion of the stream bed and banks of the Black Creek Inter-County Drain which is causing sedimentation of Lincoln Lake, and is constructing a project on the Warner Drain to solve flooding problems experienced by homes at the upper end of the drainage district.

Goals of the Drain Commission:

- Administer the Drain Code (Act 40, PA of 1956) as it pertains to the establishment and maintenance of drains in Kent County
- Administer the Subdivision Control Act (Act 288, PA of 1967) as it applies to stormwater management
- Administer Inland Lake Levels under Part 307 of the Natural Resources and Environmental Protection Act (Part 307, Act 451, PA of 1994) as it pertains to the establishment and maintenance of lake levels in Kent County

BLACK CREEK INTERCOUNTY DRAIN:

- Petition received on 08-15-06
- Drainage Board met for the Determination of Practicability on 10-19-06 and petition was found practicable
- Engineer was selected on 12-07-06
- Hearing of Necessity took place on 12-15-08 and project was found to be necessary
- An appeal against the Determination of Necessity was filed by Spencer and Nelson Townships on 12-23-08

KENOWA DRAIN:

- Petition being circulated
- Drain Office meeting with the City of Walker on 03-12-09 to discuss possible solutions
- Scheduling Drain Board Meeting to Determine Necessity

SHAWMUT HILLS DRAIN

- Petition received 08-26-08
- Board of Determination met on 06-02-09 and found project to be necessary

TROY WITH MOSHER AND FARNHAM DRAIN

- Petition received on 05-20-09
- Scheduling Board of Determination

WATERS DRAIN

- Petition received on 05-07-07
- Board of Determination met on 01-17-08 and found project to be necessary
- Engineer was selected on 03-10-08
- DEQ Permit Application submitted on 01-30-09
- Bids received 06-01-09
- Day of Apportionment scheduled for 06-29-09
- Under Construction

WARNER DRAIN

- Petition received on 07-02-08
- Board of Determination met on 01-15-09 and found project to be necessary
- Request for Proposals from Engineers was sent out on 01-23-09
- Proposals due from Engineers on 03-06-09
- Stream survey complete
- Engineer Designing Drain Improvements

Model Storm Water Ordinance

The Drain Commissioner and many other individuals have worked on a Task Force to draft a model storm water ordinance since late 1999. This Task Force was started in anticipation of the Nation Pollution Discharge Elimination System Phase II (NPDES). NPDES Phase II are regulations created by the Environmental Protection Agency to address storm water discharges into the nation's lakes, rivers, streams, and the oceans.

Phase I of the regulations addressed the point discharges such as wastewater treatment plants and industrial discharges. Phase II of NPDES addresses non-point source pollution such as fertilizers, soil erosion, etc... that is carried into our inland lakes and streams by runoff.

The model ordinance that resulted from this collaborative effort is the result of many committee and subcommittee meetings. Input from Engineers, Legal Representatives, Biologists, Hydrologists, Developers and Local Officials was sought and incorporated into the document. The document can be obtained in pdf format from the link below or a copy can be picked up from the Drain Commissioner's Office.

- 2020 Model Stormwater Ordinance Document
https://www.accesskent.com/Departments/DrainCommissioner/pdfs/Model_Stormwater_Ordinance.pdf
- Kent County Storm Water
https://www.google.com/url?client=internal-element-cse&cx=002464469049091051884:lys7yhzv5-c&q=https://www.accesskent.com/Departments/DrainCommissioner/stormwater.htm&sa=U&ved=2ahUKewiS_t323NL1AhV4kIkEHXoUBC4QFnoECAkQAQ&usg=AOvVaw2OSzV0iVi7sztrjf3IL_lk

Kent County Health Department

<https://www.accesskent.com/Health/>

- Communicable diseases
https://www.accesskent.com/Health/HealthPromo/communicable_disease.htm
- Illness Prevention/Immunizations
<https://www.accesskent.com/Health/Immunizations/default.htm>
- Health Education
<https://www.accesskent.com/Health/HealthPromo/default.htm>
- Resources for Health Care Providers
<https://www.accesskent.com/Health/Immunizations/resources.htm>
- Resources for Schools/Daycare providers
https://www.accesskent.com/Health/CommDisease/school_daycare.htm
- Data and Reports
<https://www.accesskent.com/Health/covid-19-data.htm>
- Animal Control
https://www.accesskent.com/Health/AnimalControl/animal_control.htm
- Educational Services
<https://www.accesskent.com/Health/AnimalControl/education.htm>

Kent County Information Technology Department

<https://www.accesskent.com/Departments/IT/>

Kent County Department of Aeronautics

<https://www.google.com/url?client=internal-element-cse&cx=002464469049091051884:lys7yhzv5-c&q=https://www.accesskent.com/Departments/BOC/pdfs/Reports/AeronauticsGovernanceReport.pdf&sa=U&ved=2ahUKEwj1g6rW4NL1AhVjkkEHYUxC8oQFnoECAMQAQ&usg=AOvVaw2yqWc5Rbdd-43ZxqZIyX81>

Kent County Housing Choice

<https://www.accesskent.com/Departments/CommunityAction/vouchers.htm>

Kent County/MSU Cooperative Extension

<https://www.accesskent.com/Community/KentMSU/>

Kent County Community Action

<https://www.accesskent.com/Departments/CommunityAction/>

- Community Action Plan
<https://www.accesskent.com/Departments/CommunityAction/documents.htm>

- Housing Rehabilitation Program
https://www.google.com/url?client=internal-element-cse&cx=002464469049091051884:lys7yhzv5-c&q=https://www.accesskent.com/Departments/CommunityAction/pdf/HRP/Program-Flyer.pdf&sa=U&ved=2ahUKEwjn5o6I49L1AhVHk4kEHd0pB6sQFnoECAUQAAQ&usg=AOvVaw1TKY2zS43OoG1y2f_I_CmB
- Neighborhood Stabilization Program
https://www.google.com/url?client=internal-element-cse&cx=002464469049091051884:lys7yhzv5-c&q=https://www.accesskent.com/Departments/CountyAdministrator/Performance/Community_Housing_Development.pdf&sa=U&ved=2ahUKEwis1YG649L1AhWbkYkEHbtrBQ8QFnoECAUQAAQ&usg=AOvVaw1CZHiW1LpJENX16agspQV

Kent County Parks Department

<https://www.accesskent.com/Departments/parks.htm>

- County Parks
<https://www.kentcountyparks.org/>
- Campgrounds
<https://www.kentcountyparks.org/wabasislakecampground/index.php>
- Community Trails
<https://www.kentcountyparks.org/trails/index.php>
- Millennium Park
<https://www.kentcountyparks.org/millennium/index.php>
- Kent County Parks Master Plan
<https://www.kentcountyparks.org/millennium/index.php>

Kent County Purchasing Department

<https://www.accesskent.com/Departments/Purchasing/>

Kent County Facilities Management

<http://www.accesskent.com/YourGovernment/Departments/FacilitiesManagement/FacilitiesManagement.htm>

JURISDICTIONS IN KENT COUNTY

Ada Township

<http://ada.mi.us/>

- Master Plan
<http://adamichigan.org/township/departments/planning-zoning/master-plan>

Algoma Township

<http://www.algotatwp.org/>

- Master Plan
http://www.algotatwp.org/documents/master_plan.php

Alpine Township

<http://www.alpinetwp.org/>

- Master Plan
<http://www.alpinetwp.org/Planning%20Zoning/2015%20Master%20Plan%20Update.pdf>

Bowne Township

<http://bownetwp.org/index.html>

- Master Plan
<http://www.bownetwp.org/adobe/Master%20Plan%20Maps.pdf>

Byron Township

<http://www.byrontownship.org/index.php>

- Master Plan
<https://byrontwpmi.documents-on-demand.com/?l=fb59f3d3243aeb11a31e000c29a59557&d=6e23c750553aeb11a31e000c29a59557>

Caledonia Township

<http://www.caledoniatownship.org/>

- Master Plan
<https://www.caledoniatownship.org/222/Master-Plan>

Village of Caledonia

<https://www.villageofcaledonia.org/>

- Master Plan
<https://www.villageofcaledonia.org/document/2014-general-development-plan/>

Cannon Township

<https://www.cannontwp.org/>

- Master Plan
<https://cannontwp.civicweb.net/filepro/documents/4738>

Cascade Township

<http://www.cascadetwp.com/>

- Master Plan
<http://cascadetwpvision.com/our-vision/>

Village of Casnovia

<https://www.casnoviavillage.com/>

- Ordinances
<https://www.casnoviavillage.com/ordinances-foia>

City of Cedar Springs

<http://cityofcedarsprings.org/>

- Master Plan
<http://cityofcedarsprings.org/2016/12/08/2016-draft-master-plan-for-city-of-cedar-springs/>

Courtland Township

<http://www.courtlandtpw.org/>

- Master Plan
<https://www.courtlandtpw.org/ordinances-maps/pages/master-plan>

Gaines Township

<http://gainestownship.net/>

- Master Plan
http://www.gainestownship.org/departments/docs/Adopted_Plan_12_8_08.pdf

City of East Grand Rapids

<http://www.eastgr.org/>

City of Grand Rapids Authorities and Resources

<https://www.grandrapidsmi.gov/Government/Departments>

- Police Department
<https://www.grandrapidsmi.gov/Government/Departments/Police-Department>
- Community Development
<https://www.grandrapidsmi.gov/Government/Departments/Community-Development>
- Neighborhood Enterprise Zones
<https://www.grandrapidsmi.gov/Government/Policies-and-Orders/City-Commission-Policies/Neighborhood-Enterprise-Zones-NEZ-900-45?BestBetMatch=neighborhood%20enterprise%20zones|d13b95b2-5146-4b00-9e3e-a80c73739a64|4f05f368-ecaa-4a93-b749-7ad6c4867c1f|en-US>
- Neighborhood Associations
http://www.cridata.org/Neighb_GR.aspx
- Code Compliance Division
<http://grcity.us/community-development/Code-Compliance-Division/Pages/default.aspx>

- Community Development
<https://www.grandrapidsmi.gov/Government/Departments/Community-Development?BestBetMatch=design%20and%20development%20services|d13b95b2-5146-4b00-9e3e-a80c73739a64|4f05f368-ecaa-4a93-b749-7ad6c4867c1f|en-US>
- Development Center
<https://www.grandrapidsmi.gov/Government/Departments/Development-Center>
- Economic Development
<http://grcity.us/design-and-development-services/Economic-Development/Pages/default.aspx>
- Planning Department
<https://www.grandrapidsmi.gov/Government/Departments/Planning>
- Master Plan
<https://www.grandrapidsmi.gov/Government/Programs-and-Initiatives/Community-Master-Plan>
- Downtown Development Authority
<https://www.grandrapidsmi.gov/Government/Departments/Downtown-Grand-Rapids-Inc.-DGRI>
- Sustainability
<https://www.grandrapidsmi.gov/Government/Departments/Sustainability>
- Energy, Lighting, and Communications
<https://www.grandrapidsmi.gov/Government/Departments/Energy-Lighting-and-Communications>
- Housing Commission
<https://www.grandrapidsmi.gov/Government/Departments/Housing-Commission>
- Economic Development
<https://growgr.grandrapidsmi.gov/Home>
- Environmental Services
<https://www.grandrapidsmi.gov/Government/Departments/Environmental-Services>
- Public Works
<https://www.grandrapidsmi.gov/Government/Departments/Public-Works-Department>
- Engineering Department
<https://www.grandrapidsmi.gov/Government/Departments/Engineering-Department>
- Facilities Management
<https://www.grandrapidsmi.gov/Government/Departments/Facilities-and-Fleet-Management>
- Parks and Recreation
<https://www.grandrapidsmi.gov/Government/Departments/Parks-and-Recreation>
- Water System
<https://www.grandrapidsmi.gov/Government/Departments/Water-System>
- Technology and Change Management
<https://www.grandrapidsmi.gov/Government/Departments/Technology-and-Change-Management>

- Fire Department
<https://www.grandrapidsmi.gov/Government/Departments/Fire-Department>

Grand Rapids Township

<http://www.grandrapidstwp.org/>

- Master Plan
https://www.grandrapidstwp.org/services/planning_and_zoning/index.php

City of Grandville

<http://cityofgrandville.com/>

- Master Plan
<https://www.cityofgrandville.com/Documents%20Center/Departments/Community%20development/Master%20Plan%20FINAL%201-28-2008.pdf>

Grattan Township

<http://www.grattantownship.org/>

- Master Plan
https://www.google.com/url?client=internal-element-cse&cx=partner-pub-0841112309333758:6241144813&q=https://www.grattantownship.org/Document_center/How%2520do%2520i/DRAFT%2520Revised%2520Master%2520Plan%25202018_.pdf&sa=U&ved=2ahUKEwi3kqrcutT1AhWrlIkEHX2VBWcQFnoEAcQAQ&usg=AOvVaw0dGaJHauhvdbN9CriLDzTV

Village of Kent City

<http://www.kentcitymi.org/>

- Master Plan
https://www.kentcitymi.org/Document_Center/Government/Village%20Boards/Planning%20Commission/MasterLandUsePlan2015.pdf

Cit of Kentwood

<http://www.ci.kentwood.mi.us/>

- Master Plan
https://www.kentwood.us/city_services/city_departments/planning/master_plan1.php

City of Lowell

<http://ci.lowell.mi.us/>

- Master Plan
[https://www.google.com/url?client=internal-element-cse&cx=partner-pub-0841112309333758:8333218883&q=http://www.lowellmi.gov/document_center/departments/Lowell%2520Master%2520Plan%2520\(with%2520maps\).pdf&sa=U&ved=2ahUKEwiThIH9vNT1AhUwIYkEHQkeBxEQFnoEACA MQAQ&usg=AOvVaw0-TXDnczWtU_Iiv62bna5d](https://www.google.com/url?client=internal-element-cse&cx=partner-pub-0841112309333758:8333218883&q=http://www.lowellmi.gov/document_center/departments/Lowell%2520Master%2520Plan%2520(with%2520maps).pdf&sa=U&ved=2ahUKEwiThIH9vNT1AhUwIYkEHQkeBxEQFnoEACA MQAQ&usg=AOvVaw0-TXDnczWtU_Iiv62bna5d)

Lowell Township

<http://www.twp.lowell.mi.us/>

- Master Plan
[http://www.lowellmi.gov/document_center/departments/Lowell%20Master%20Plan%20\(with%20maps\).pdf](http://www.lowellmi.gov/document_center/departments/Lowell%20Master%20Plan%20(with%20maps).pdf)

Nelson township

<http://www.nelsontownship.org/>

- Master Plan
<http://www.nelsontownship.org/adobe/Master%20Plan%204.13.07.pdf>

Oakfield Township

<https://www.oakfieldtp.org/>

Plainfield Township

<http://www.plainfieldmi.org/>

- Master Plan
https://www.plainfieldmi.org/services/planning_and_zoning_services/master_plan/master_plan.php

City of Rockford

<http://rockford.mi.us/>

- Master Plan
https://www.rockford.mi.us/city_hall/government/master_plan.php

Village of Sand Lake

<http://villageofsandlake.org/>

- Master Plan
<http://www.villageofsandlake.org/Government/Commissions>

Solon Township

<http://www.solontwp.org/>

- Master Plan
<http://solontwp.org/departments/solon-township-planning-commission/solon-township-master-plan/>

Sparta Township

<https://spartatownship.org/>

Village of Sparta

<http://spartami.org/>

- Master Plan
http://spartami.org/documents/2015_Master_Plan_Document_Final2_9d3Js.pdf

Spencer Township

<http://www.spencertwp.org/>

- Future Land Use Plan
<http://www.spencertwp.org/adobe/Future%20Use.pdf>

Tyrone Township

<http://www.tyronetownship.us/>

- Master Plan
<https://tyronetownship.us/LinkClick.aspx?fileticket=muq5tzmuoWA%3d&tabid=135&portalid=2&mid=553>

Vergennes Township

<http://www.vergennestwp.org/>

- Master Plan
<https://vergennestwp.org/wp-content/uploads/2019/09/Final-Adopted-Master-Plan-2012-07-09.pdf>

City of Walker

<https://www.walker.mi.gov/>

- Master Plan
<https://www.walker.mi.gov/191/Master-Plan-Information>

City of Wyoming

<https://www.wyomingmi.gov/>

- Master Plan
<https://www.wyomingmi.gov/Portals/0/Documents/Departments/Planning%20Community%20Development/Wyoming%20%5Bre%5DImagined/Wyoming%20%5Bre%5DImagined%20Master%20Plan%202021-03-02%20HQ.pdf>

OTTAWA COUNTY AUTHORITIES AND RESOURCES

<https://www.miottawa.org/>

Board of Commissioners

<https://www.miottawa.org/Departments/BOC/>

County Administrator

<https://www.miottawa.org/departments/admin/>

Equalization / Property Description & Mapping

<https://www.miottawa.org/Departments/Equalization/>

Insurance & Risk Management

<https://www.miottawa.org/Departments/FiscalServices/insurance.htm>

Planning and Performance Improvement/Strategic Impact

<https://www.miottawa.org/Departments/Planning/>

Sheriff's Office

<https://www.miottawa.org/Sheriff/>

Water Resources Commissioner

<https://www.miottawa.org/Departments/Drain/>

The Water Resources Commissioner and his staff are responsible for construction, operation and maintenance of over 800 storm water management systems, "County Drains" in Ottawa County. These systems are designed to provide storm water management, drainage, flood prevention and stream protection for urban and agricultural lands. A County Drain may be an open ditch, stream, or underground pipe, retention pond or swale that conveys storm water.

Routine maintenance of county drains is necessary from time to time to ensure their proper function. The Water Resources Commissioner may in any one year, expend up to \$5,000.00 per mile, per drain for maintenance and repair. Major projects are initiated through a petition process. Either property owners or a local municipality can petition the Water Resources Commissioner. To recover costs expended for a project, Special Assessments are levied against private properties, local municipalities, the County and the County Road Commission, railroads and state highways benefited by the construction and/or maintenance.

- The Ottawa Drain Commission works through consultants and contractors.
- Drains are the responsibility of either the 1) local jurisdiction, 2) the drain commission, or 3) the road commission.
- An open drainage ditch is designed to convey a 25 year, or 4% chance storm.
- An enclosed culvert system is designed to convey a 10 year, or 10% chance storm.

Equalization

<https://www.miottawa.org/Departments/Equalization/>

Ottawa County Road Commission

<https://www.ottawacorc.com/>

City, Township & Village Directory

<https://www.miottawa.org/ctvdirectory.htm>

Parks and Recreation

<https://www.miottawa.org/Parks/>

MSU Extension

<https://www.miottawa.org/Community/MSUE/>

Environmental Health

<https://www.miottawa.org/health/ochd/enviro.htm>

GIS

<https://www.miottawa.org/departments/gis/>

The Ottawa County GIS Department manages the County's Geographic Information System (GIS). A GIS is a computer-based mapping system which relates various types of data and information with real- world locations.

The GIS Department has established collaborative data partnerships with 17 of the County's 24 local units as well as the Ottawa County Road Commission. Under the partnership agreements, the GIS Department provides each partner with automated data updates, access to the GIS data library, access to exclusive Web mapping applications, and technical support. In addition, the GIS Department will also create customized data layers by request to meet the needs of its partners.

Ottawa Conservation Resources

<https://www.miottawa.org/GroundWater/resources.htm>

Soil Erosion:

<https://www.miottawa.org/Departments/Drain/soilerosion.htm>

The Ottawa County Water Resource Commissioner's office is responsible for enforcement of the Soil Erosion and Sedimentation Control Act, Part 91 of P.A. 451, 1994 as amended. The office is also responsible for an Ordinance to establish rules and regulations to control soil erosion and sedimentation, to establish a system of permits for the regulation of earth changes, to establish the Ottawa County Drain Commissioner as the Officer responsible for implementation and enforcement, and to establish a system of fees, penalties, and civil infraction penalties for the violation of the Ordinance, all as authorized by the Part 91 Soil Erosion and Sedimentation Control of the Natural Resources and Environmental Protection Act, Act 451 of the Public Acts of 1994 as amended.

WATERSHED ORGANIZATIONS IN OTTAWA COUNTY

Lower Grand Watershed

https://www.miottawa.org/departments/boc/waterquality/pdf/2010/LGROW_Mgmt_Plan.pdf

The [Lower Grand River Watershed Project](#) resulted in a nonpoint source watershed management plan for the approximately 3,020 square miles of the Lower Grand River Watershed (LGRW). This was made possible as a result of a 319 Nonpoint Source Watershed Planning Grant. A nonpoint source plan can improve water quality, and the quality of life in human communities. The draft version of the 2010 [LGRW Management Plan](#) is now available for review.

The LGRW has many small rivers and streams that have been studied, and some already have their own nonpoint source plans. The idea behind creating a plan for the large basin of the LGRW was to focus human, financial, and technical resources across political boundaries and sub-watershed boundaries. The project included numerous communities, agencies, and institutions. The LGRW boundary falls over ten counties and over 120 sub-watersheds. Many communities gave either time or financial support to this project.

Ottawa County participants included:

Ottawa County Water Resources Commissioner
Ottawa County Road Commission
Ottawa County
Ottawa County

Jurisdiction participants included:

City of Coopersville	Spring Lake Twp.
City of Ferrysburg	Tallmadge Twp.
City of Grand Haven	Wright Twp.
City of Hudsonville	Allendale Charter Twp.
Chester Twp.	Georgetown Charter Twp.
Crockery Twp.	Robinson Twp.

A portion of the project dealt with two pilot project areas in the LGRW. The LGRW is very large and to gain an understanding of what is happening in the watershed, two smaller sub-watersheds were studied. The LGRW was divided into two major land uses, rural and urban. It was decided by project members that one pilot project would be focused on rural watershed issues, Sand Creek Watershed, and that the other would be focused on urban watershed issues, Buck Creek Watershed.

As a result of these pilot projects, two nonpoint source management plans were developed and can now be used as examples for other sub-watersheds in the LGRW to make management plans:

- Sand Creek Watershed
- Buck Creek Watershed

Sand Creek Watershed

<http://www.miottawa.org/departments/drain/pdf/Sand-Creek-Brochure.pdf>

Sand Creek Watershed is part of the Grand River Watershed. It is covered by parts of Tallmadge, Wright, Chester Townships in Ottawa County.

Sand Creek is:

- 22 miles in length
- 55 square miles in area
- A tributary to the Grand River
- A designated cold water stream

Based on the 2003 Sand Creek Watershed Plan, there were 8 known pollutants identified as impacting the Sand Creek Watershed. They were sediment, nutrients, temperature, changes in flow, bacteria, oil/grease, invasive/exotic plant species, and trash. The greatest potential threat to the water quality of Sand Creek comes from storm water runoff.



Macatawa Watershed

https://www.miottawa.org/Departments/BOC/WaterQuality/pdf/2013/3_Williams.pdf

The Macatawa Watershed covers approximately 175 square miles of land and consists of all the land that drains to Lake Macatawa, including all or part of Fillmore, Overisel, Holland, Park, Zeeland, Port Sheldon, Olive and Blendon Townships and the cities of Holland and Zeeland.

The Macatawa Watershed Project was created in 1999 with a goal to reduce the amount of phosphorus that enters Lake Macatawa by rain runoff by approximately 70% through public awareness, education, and Best Management Practices.

The Watershed Project works with local units of government, farmers, homeowners, developers, educators, and other members of the community to increase awareness of how we impact the watershed, and what we can do to help reduce phosphorus. This information is detailed in the Macatawa Watershed Phosphorus Reduction Implementation Plan.

Pigeon Creek Watershed

https://www.miottawa.org/departments/boc/waterquality/pdf/2009/Ottawa_County's_Pigeon_River-A_Qualified_Success_Story.pdf

The Pigeon River Watershed is located in west-central Ottawa County, covering 41,395 acres or roughly 65 square miles. The main branch of the Pigeon River, which is 11.8 miles from 104th Ave. to the mouth, flows through the center of Port Sheldon and Olive Townships. Most of the tributaries are county drains, road ditches, or private ditches. The head waters are contained in Blendon Township, with reaches of the watershed touching Grand Haven, Robinson, Park and Zeeland Townships.

The Pigeon River Watershed consists of all the land area and water bodies that drain into the Pigeon River, flowing into Pigeon Lake and then into Lake Michigan.

The focus of the Pigeon River Watershed Project is to improve water quality and enhance the designated uses listed below by educating and informing the community and installing conservation practices and landowners in improving the quality of "their" watershed.

Agriculture

Habitat and Indigenous Aquatic Life and Wildlife Industrial Water Supply

Partial or Total Body Contact Recreation Public Water Supply at the Point of Intake Warm Water Fishery

Cold Water Fisher

LAW ENFORCEMENT AND FIRE IN OTTAWA COUNTY

Fire Departments:

Allendale Twp.	Grand Haven City	Olive Twp.	Robinson Twp.
Blendon Twp.	Grand Haven Twp.	Chester Twp.	Port Sheldon Twp.
Coopersville City	Holland City	Spring Lake Twp.	Park Twp.
Crockery Twp.	Holland Twp.	Polkton Twp.	Wright/Tallmadge
Georgetown Twp.	Hudsonville City	Jamestown Twp.	Zeeland City
Ferrysburg			Zeeland Twp.

Law Enforcement Agencies:

Ottawa County Sheriff

Grand Haven Dept. of Public Safety

Holland Department of Public Safety

Hope College Campus Safety

Grand Valley Police Department

Zeeland Police

JURISDICTIONS IN OTTAWA COUNTY

Allendale Charter Township

<http://www.allendale-twp.org/>

- Master Plan
<https://www.freshcoastplanning.com/allendalemp>

Allendale/GVSU

<https://www.gvsu.edu/>

- GVSU Stormwater Initiative
<http://www.gvsu.edu/stormwater/>
- GVSU Robert B. Annis Water Resources Institute (AWRI) - Information Services Center
<http://www.gvsu.edu/wri/isc/index.cfm?id=5D222890-DC3E-FE05-6449A01A6C69980D>
- GVSU Office of Sustainability Practices
<http://www.gvsu.edu/sustainability/water-271.htm>

Blendon Township

<http://www.blendontownship-mi.gov/>

- Master Plan
http://www.blendontownship-mi.gov/go.php?id=672&table=page_uploads
- Roads and Drains
<https://www.blendontownship-mi.gov/roads--drains>

Road Department

Under the supervision of the Engineering Director, the Roads and Bridges Department is responsible for the preparation of plans and specifications, construction engineering and coordinating construction activities with other departments and agencies. These activities pertain to road resurfacing, road reconstruction, bridge replacement, bridge rehabilitation, and culvert replacement.

Chester Township

<http://www.chester-twp.org/>

- Master Plan
<https://www.chester-twp.org/master-plan-and-maps/>

City of Coopersville

<http://cityofcoopersville.com/>

Coopersville functions under a Council/Manager government. With this system, the City Council acts as the legislative and policy-making voice of the city. It is an elected body, with the Mayor and Council Members chosen by the voters. The City Council appoints a City Manager, who serves as the city's chief administrator.

- Master Plan
<https://www.cityofcoopersville.com/masterplan.html>

Crockery Township

<http://www.crockery-township.org/>

- Comprehensive Plan
<https://www.crockery-township.org/assets/New%20Master%20Plan122713.pdf>

City of Ferrysburg

<http://www.ferrysburg.org/>

- Master Plan
<http://www.ferrysburg.org/?ddownload=3854>

Georgetown Charter Township

<http://www.gtwp.com/>

- Master Plan
<https://www.gtwp.com/documentcenter/view/82>

City of Grand Haven

<http://www.grandhaven.org/>

- Master Plan
<https://grandhaven.org/residents/grand-haven-master-plan/>

Grand Haven Charter Township

<http://www.ght.org/>

- Master Plan
<https://www.google.com/url?client=internal-element-cse&cx=016678717368864972484:k2kt0vwsm7c&q=http://www.ght.org/wp-content/uploads/master-plan/ExecutiveSummary.pdf&sa=U&ved=2ahUKEwjpwOKb39T1AhV6lYkeHTU5DW4QFnoECAMQAQ&usg=AOvVaw2BmZP30fF3azWhY6TKOFVy>

City of Holland

<http://www.cityofholland.com/>

- Master Plan
<https://www.cityofholland.com/251/Adopted-Master-Plan>
- Parks and Recreation Master Plan
<https://www.cityofholland.com/483/Parks-Recreation-Master-Plan>
- Holland Public Works
<https://hollandbpw.com/en/>

Water Distribution in Holland, MI

The Holland Board of Public Works' water distribution system contains 230 miles of water main. It is located mostly within the City of Holland, with some sections of Park, Laketown, and Holland Charter Townships included. Most of the water mains are 6, 8, or 12 inch diameter, but some are as large as 36 inch diameter. There are approximately 13,000 service connections and over 2,300 fire hydrants. There are four water storage tanks, and five pump stations pumping to five pressure zones within the system.

The Water Filtration Plant, located on Lake Michigan, began operating in 1955. It filters 38.5 million gallons per day (MGD).

Wastewater

The Holland Board of Public Works maintains all of the sanitary sewer collection system south of Lake Macatawa and the Macatawa River. This system contains nearly 190 miles of sanitary sewer pipe and 34 sewage lift stations. It is located mostly within the City of Holland, but also includes portions of Park, Laketown, Fillmore and Holland Charter Township. The majority of the system is 8-inch pipe with some pipes as large as 36-inches. The system is a separated system meaning that surface drainage is collected into a system known as the storm sewers and drains and the sewage from homes and businesses go into a separate system known as the sanitary sewer system.

Industrial Pretreatment Program: Protecting the health and safety of the public and the environment

The Pollution Control Department is a division of the Holland Area Wastewater Treatment Plant. The purpose of the program is to regulate the disposal of industrial wastewater into the sanitary wastewater collection system and to protect physical structures and the safety of operation and maintenance personnel of the wastewater system (collection and treatment). The program ensures compliance with pretreatment regulations as required under the Federal General Pretreatment Regulations and Categorical Standards and local source control ordinances.

Electric

The Holland Board of Public Works owns three electric generation facilities: the James De Young Power Plant; 48th Street Generation Station; and 6th Street Generation Station.

In addition, the Holland Board of Public Works owns shares in the J.H. Campbell Complex and the Belle River Plant, both are coal fired electrical generating plants. The plants are operated by Consumers Energy and Detroit Edison, respectively.

Gas Pipeline

The Holland Board of Public Works does not provide natural gas service to customers. However the Holland Board of Public Works owns and operates a natural gas pipeline that traverses a portion of Allegan County. This pipeline is a transmission line only, supplying natural gas to our three electric generating turbines at our 48th Street Generation Station.

Holland Charter Township

<http://www.hct.holland.mi.us/>

- Master Plan
<https://www.hct.holland.mi.us/departments/community-development/comprehensive-land-use-master-plan?highlight=WyJtYXN0ZXIiLCJwbGFuIiwicGxhbidzIiwibWFzdGVyIHBsYW4iXQ==>

Roads (administered by Ottawa County Road Commission)

Storm drainage system (administered by Ottawa County Water Resources Commission)

Street lighting (lighting services provided by Consumers Energy, Holland Board of Public Works, and Zeeland Board of Public Works)

City of Hudsonville

<http://www.hudsonville.org/>

- Master Plan
<https://www.hudsonville.org/media/Plans%20&%20Maps/2030%20master%20plan.pdf>

Jamestown Township

<http://www.twp.jamestown.mi.us/>

- Master Plan
<http://twp.jamestown.mi.us/wp-content/uploads/2021/03/Master-Plan-2019.pdf>
- Master Plan Map
<http://twp.jamestown.mi.us/wp-content/uploads/2021/03/Master-Plan-Map.pdf>

Olive Township

<http://www.olivetownship.com/>

- Master Plan
https://www.olivetownship.com/wp-content/uploads/2016/12/OliveTownship_Master_Plan.pdf

Park Township

<http://www.parktownship.org/>

- Master Plan
<https://parktownship.org/departments/building-zoning/master-plan/>

Polkton Township

<http://www.polktontownship.com/>

- Master Plan
<https://www.polktontownship.com/?download=406>
- Recreation Plan
<https://www.polktontownship.com/?download=318>

Port Sheldon Township

<http://www.portsheldontwp.org/>

- Master Plan
<https://www.portsheldontwp.org/forms-documents/>

Robinson Township

<http://www.robinson-twp.org/>

- Master Plan
<https://www.freshcoastplanning.com/planrobinson>

Village of Spring Lake

<http://springlakevillage.org/>

- Master Plan
<http://www.springlakevillage.org/?ddownload=3288>

Spring Lake Township

<https://www.springlaketwp.org/>

- Master Plan
<https://www.springlaketwp.org/ordinances/master-plan/>

Tallmadge & Wright Townships

<http://www.tallmadge.com/>

- Master Plan
<http://tallmadge.com/wp-content/uploads/2020/02/2020TTMPAdopted.pdf>

<http://wrighttownship.com/>

Both have floodplain ordinances and both belong to the Sand Creek Watershed Council. They share a fire department with two stations.

City of Zeeland

<http://ci.zeeland.mi.us/>

- Master Plan
<https://www.cityofzeeland.com/documentcenter/view/771>

Zeeland Charter Township

<http://www.zeelandtp.org/>

- Master Plan
<https://www.zeelandtp.org/Master-Plan>

APPENDIX F

Utility Provider Documents
DTE Summary
Consumers Safety Documents

April 30, 2020

Risks posing the greatest threat to DTE's electrical system are storm-related downed wires and outages, and substation-related forced outages. DTE continuously evaluates its system and has developed programs to mitigate said risks. The following helps to highlight some of those programs in place today.

Storm-Related Downed Wires and Customer Outages

When widespread storm-related downed wires and customer outages occur, DTE follows a disciplined restoration plan:

1. DTE prepares ahead of the incoming weather. This includes engaging and readying resources to support their storm assignments.
2. For everyone's safety, DTE prioritizes potentially hazardous situations first (e.g. downed power lines).
3. DTE also prioritizes the repair of power lines and equipment serving critical health and safety facilities like hospitals, police stations and pumping stations.
4. As part of our storm restoration process, our goal is to get the most customers restored as quickly as possible. We begin by repairing substation equipment, which delivers power to entire communities.
5. We then move on to distribution lines that serve large subdivisions and businesses.
6. Finally, we repair DTE equipment that powers individual homes.

DTE's goal is to reduce wire down response times. To that end, we've implemented certain actions to help improve our wire down response time which include, but are not limited to, the following:

- Increased number of employees and contractors to respond to downed wires
- Leveraged technology to proactively stage and deploy resources
- Developed wire down audit process to maximize field workmanship
- Tracking causes and locations of wire downs to help guide the preventive maintenance program

Customer outage response has also improved over time:

- Accelerated tree trimming program to improve system integrity and reliability
- Leveraged technology to better identify potential fault locations
- Developed an Incident Command System (ICS) organizational structure to optimize strategies and communications

Additionally, DTE has greatly increased communications with local Firefighters and county level Emergency Managers. Monthly collaborative sessions with leaders of local fire departments help drive process improvements. The State Fire Marshal participates in these monthly sessions. One key example of continuous improvement is the development of an emergency process allowing fire departments to escalate immediate concerns directly to DTE Electric dispatch. This improvement provides transparency and clarity during emergency conditions.

Substation-Related Outages

A Substation Event Operation Plan (EOP) was developed to provide a consistent framework for responding to a large substation event requiring the response of DTE personnel.

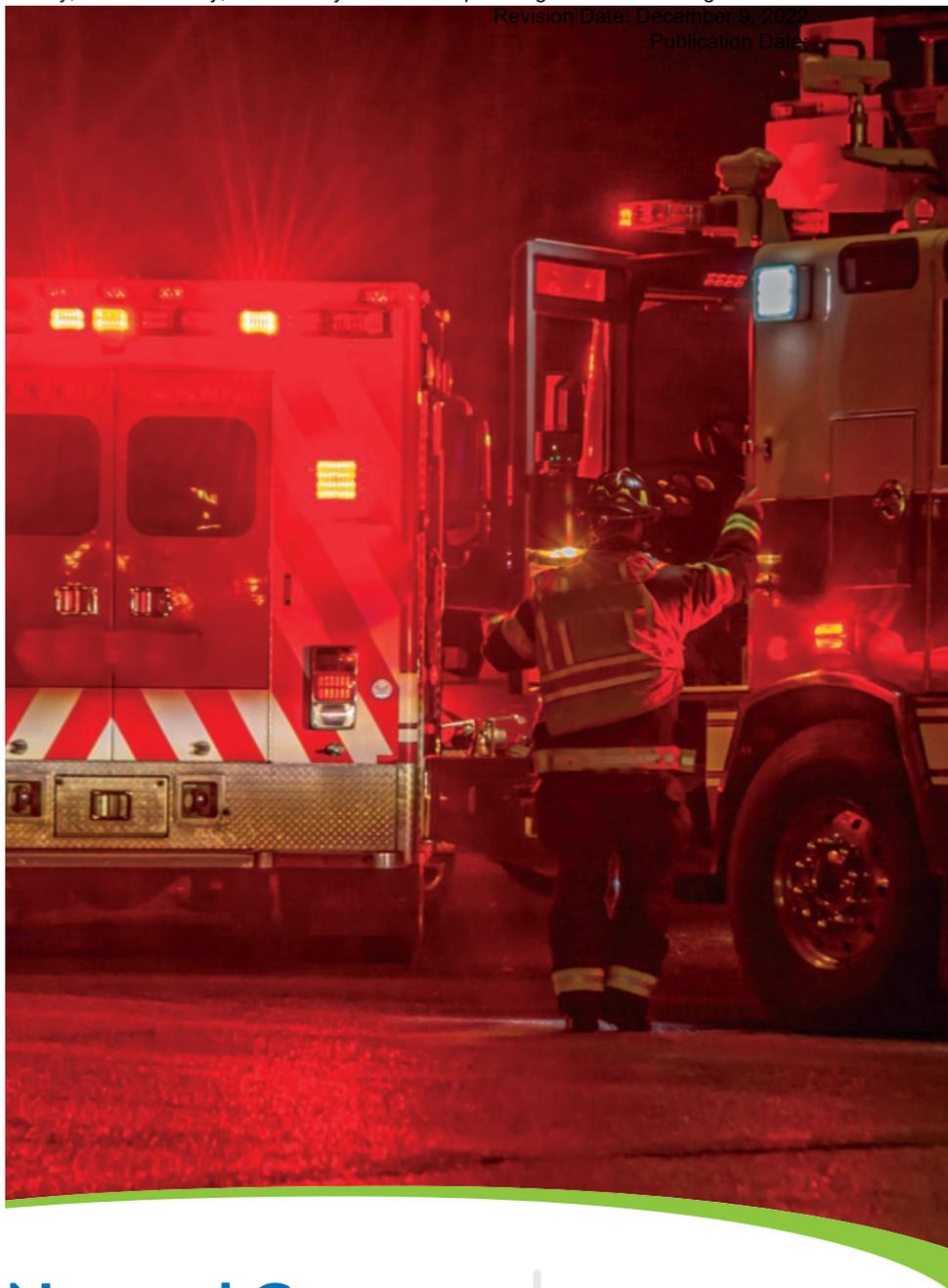
The purpose of the Significant Event Operation Plan is to ensure public safety, minimize impact, and ensure timely resolution and recovery from a large substation event.

The Substation EOP is used to respond to extended customer outages. The EOP is applicable to DTE personnel, departments, and facilities that have a response role during a substation event or play a support role during such a response. The objective for each significant event is to remedy any potential defects while minimizing customer interruptions.

Rotational teams have been developed to respond to these events. Furthermore, a Mobile Command Center was purchased in order to help facilitate strategic decision making and tactical planning at the point of activity.

Path Forward / Recommendations

It is DTE's recommendation to continue to work collaboratively with the County Emergency Managers (EMs). DTE will seek feedback from the EMs around how communications can be improved. DTE is also looking to establish a regular cadence of meetings with the EMs across the DTE Service Area to further their relationships with DTE's Regional Relations team.



Natural Gas Pipeline Safety

Information for
Emergency Officials

Consumers Energy

Count on Us[®]



Pipeline Safety in Your Community

We want to make you aware of our continuing efforts to keep your community safe and how you can play a role.

Knowing the signs of a natural gas leak, practicing safe digging and being aware of proper land use near pipelines all go a long way to keeping you and your community safe.

Consumers Energy provides natural gas service to more than 1.8 million Michigan customers. To help keep gas flowing to homes and businesses, we operate and maintain multiple natural gas storage fields along with compressor stations to pressurize the gas so it moves quickly through more than 28,000 miles of pipelines. Then, we reduce the pressure in regulating facilities so the gas can be efficiently used for cooking, heating and other purposes.

According to the U.S. Department of Transportation, pipelines are the safest, most reliable and cost effective means of transporting energy products, such as natural gas, over long distances. As one of the state's largest natural gas companies, we take our job of ensuring pipeline safety very seriously.

Knowing the signs of a natural gas leak, practicing safe digging and being aware of proper land use near pipelines all go a long way to keeping you and your community safe.

Responding to Natural Gas Leaks

Knowing how to recognize, react and report natural gas emergencies can help keep you and your community safe.

1. Recognize

- “Rotten egg” smell
- Blowing or hissing sound
- Dead or discolored vegetation in an otherwise green area
- Dirt or dust blowing from a hole in the ground
- Bubbling in wet or flooded areas
- Flames, if a leak has ignited

NOTE: Consumers Energy also may operate high-pressure transmission pipelines in your area. Signs of a transmission pipeline leak could include any of the above, except the “rotten egg” odor.

2. React

- Leave the area immediately, without using anything that could ignite the natural gas
- Do not use any electrical device, such as light switches, telephones, cell phones, garage door openers
- Do not use an open flame, matches or lighters
- Do not try to locate the source of the gas leak
- Do not try to shut off any natural gas valves or gas appliances
- Do not start vehicles
- Do not re-enter the building or return to the area until our employee says it's safe to do so

3. Report

Go to a safe location

- Then call 9-1-1 and call Consumers Energy toll-free at 800-477-5050, 24 hours a day, seven days a week.
- If you see unusual activity near a natural gas pipeline or facility call us at 800-760-3295. We will respond to both events at no charge.



Natural Gas Emergency Response Facts

Safety of public and emergency officials is our first priority when responding to a gas emergency.

Below are some tips for responding to gas emergencies. For more information or training, contact our Public Safety Outreach Team at PublicSafety@cmsenergy.com.

Emergency Response Precautions

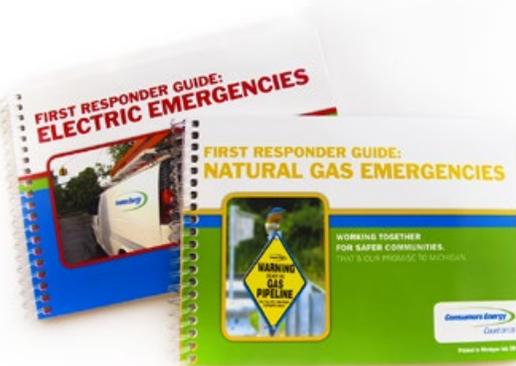
- Park upwind and avoid parking over manholes and vaults.
- Establish traffic control as needed and approach cautiously.
- Remember: natural gas can migrate beyond the immediate area.
- Gas will follow the path of least resistance, including traveling underground and into sewers or basements.
- Do not attempt to stop a gas leak.
- Evacuate the area and control ignition sources.
- Do not attempt to plug or squeeze a natural gas pipe. Pinching off a pipe can cause a spark from static electric charge.
- Gas can displace oxygen and cause asphyxiation, even outdoors.
- Allow gas to dissipate into the atmosphere. Do not bury a damaged pipe.
- If gas has ignited, do not attempt to put out the fire.
- Burning natural gas will not explode.

Resources for Emergency Officials

First Responder Training

We provide in-person safety education sessions for emergency officials on natural gas or electric hazards and responding to utility-related emergencies.

After the session, we can provide you with a quick reference guide to put in your emergency response vehicles.



Safe Digging

A major cause of leaks is damage from someone accidentally striking an underground pipeline. This is a serious safety threat and can lead to personal harm, physical damages and financial loss.

You can stay safe when digging by always contacting MISS DIG 811 by calling 8-1-1 or going online at missdig811.org at least three days before digging to have underground facilities marked.

MISS DIG 811 is a free service that will contact utility companies to have underground lines marked with stakes, flags or paint. Contact 8-1-1 even for routine jobs such as planting shrubs or trees, replacing a mailbox post or installing a fence or deck.

Consumers Energy uses yellow stakes, flags or paint to identify the location of natural gas pipelines before the start of a digging project.

Agricultural and farm workers also should be aware of nearby pipelines and contact 8-1-1 before performing deep plowing, trenching, leveling and other excavation work.

Public Act 174 of 2013 requires municipalities operating underground utilities (water, sewer, electric, etc.) in public right of way to be members of MISS DIG so they can protect their underground facilities.

Underground facilities belonging to the property owner such as electric lines to yard lights, invisible dog fences, sprinkler systems, and gas lines to barbecue grills are considered private utilities and will not be staked by utilities responding to a MISS DIG 811 request. Residents are responsible for marking these lines. Contractors are available who can provide this staking service for a fee.

Once underground facilities are marked:

- Avoid digging within four feet of marks.
- Use hand tools to expose buried utility lines before using power equipment within four feet of marks.
- Call Consumers Energy immediately at 800-477-5050 if you believe you may have hit or nicked a natural gas line.



Pipeline Corridors

Consumers Energy pipeline corridors are located on both company-owned land and rights of way (easements) obtained from other landowners.

Pipeline corridors must be kept free of trees, buildings or other structures to help ensure we deliver safe, reliable energy to Michigan homes and businesses. For public safety, the following guidelines must be observed on all pipeline corridors:

- Structures, such as buildings, sheds and swimming pools are NOT allowed in the corridor.
- Underground facilities, such as drain tiles, culverts, electric cables, septic systems, water wells, etc. must NOT be constructed in the corridor.
- No soil is to be added or removed over the pipeline.
- No roads shall be constructed over or across pipelines without first consulting with the pipeline owner.
- No trees or shrubs shall be planted in the corridor.
- No blasting must be conducted in the corridor.



Natural Gas Pipeline Markers

Since high-pressure pipelines are buried and out of sight, we've posted important warning signs above ground.

The route of an underground pipeline is identified with above-ground pipeline markers; however markers do not indicate the pipeline's exact location, its depth or the direction it follows.

Pipeline markers are located at road, railroad and waterway crossings and at regular intervals across agricultural areas. They are yellow signs that identify the company, type of pipeline and provide an emergency phone number.

Aerial pipeline markers approximately every four miles enable our pipeline aerial patrols to follow the route and detect soil erosion, heavy equipment working or digging in the area, or other situations requiring immediate action.

If you see a damaged sign, please call us.



Pipeline Safety Programs

We have many programs in place to maintain the safety of our natural gas system, especially in densely populated areas or places where people congregate such as schools, parks and campgrounds. The federal government sets specific standards for the development of integrity management programs near these High Consequence Areas. Some of our many safety efforts include:

- All pipe is factory tested to ensure it meets our safety standards.
- Our cathodic protection program uses a low-voltage electric current to help reduce or eliminate corrosion.
- We use high-tech devices called "smart pigs" to locate any breaks in the pipe's protective wrap, dents or small internal weaknesses.
- We conduct ground and aerial surveys to check our 2,550 miles of transmission pipelines at least twice a year.
- We respond to more than 300,000 MISS DIG 811 requests each year to mark pipeline locations so excavators can dig safely.
- To allow us to respond quickly to any emergency, our employees continuously monitor a computer system that alerts us to any abnormal pressures or flows in the gas system.
- Field employees receive extensive training to maintain pipelines and respond to any possible problem.
- We respond promptly to all gas emergency calls to make the situation safe as soon as possible and to mitigate the impact of an incident involving natural gas.
- We also count on the awareness of those living and working near pipelines to inform us of unusual activities and have an extensive pipeline public awareness program.



Pipelines in Your Area

The National Pipeline Mapping System (NPMS) provides maps of interstate and intrastate transmission pipelines for natural gas, oil and other products, along with contact information of the pipeline operator.

Consumers Energy provides data to NPMS for the natural gas pipelines we own and operate.

Public officials may register on NPMS to access information beyond what is available to the general public to aid in community planning activities.

To find out who operates any transmission pipelines in your area, including Consumers Energy, visit www.npms.phmsa.dot.gov.

Additionally, Consumers Energy maintains an Emergency Officials' online web portal that provides resources including Consumers Energy system maps, public safety bulletins and online hazard awareness videos for first responders. To request access to this portal, send an email to PublicSafety@cmsenergy.com.



Natural Gas Safety Facts

Detecting natural gas leaks

- Natural gas is naturally colorless, tasteless and odorless.
- Natural gas in most large, cross country transmission pipelines is odorless.
- A “rotten egg” odor is added before the gas enters the local distribution system for delivery to local homes and businesses so gas leaks can be detected quickly, without special equipment.

Gas flammability

- To burn, natural gas must be mixed with air and have access to an ignition source.
- Ignition sources can be anything with an open flame like pilot lights, matches, stoves or ovens. Ignition sources also include most things with an on/off switch such as indoor lights, cell phones, car motors, garage door openers, etc.
- If natural gas does ignite, do not attempt to put out the flame. Burning natural gas will not explode.

Natural gas is not LPG

- Liquefied petroleum gases (LPG), such as propane, are different than natural gas. They are heavier than air and collect in low places. Natural gas is almost 40 percent lighter than air and will rise; eventually the gas will dissipate if outside or in open, ventilated spaces.

Natural Gas Hazards

We work hard to maintain a safe gas system. However, if not timely addressed, natural gas leaks could cause fire and/or explosions. Asphyxiation could also result because natural gas can displace oxygen in confined spaces.

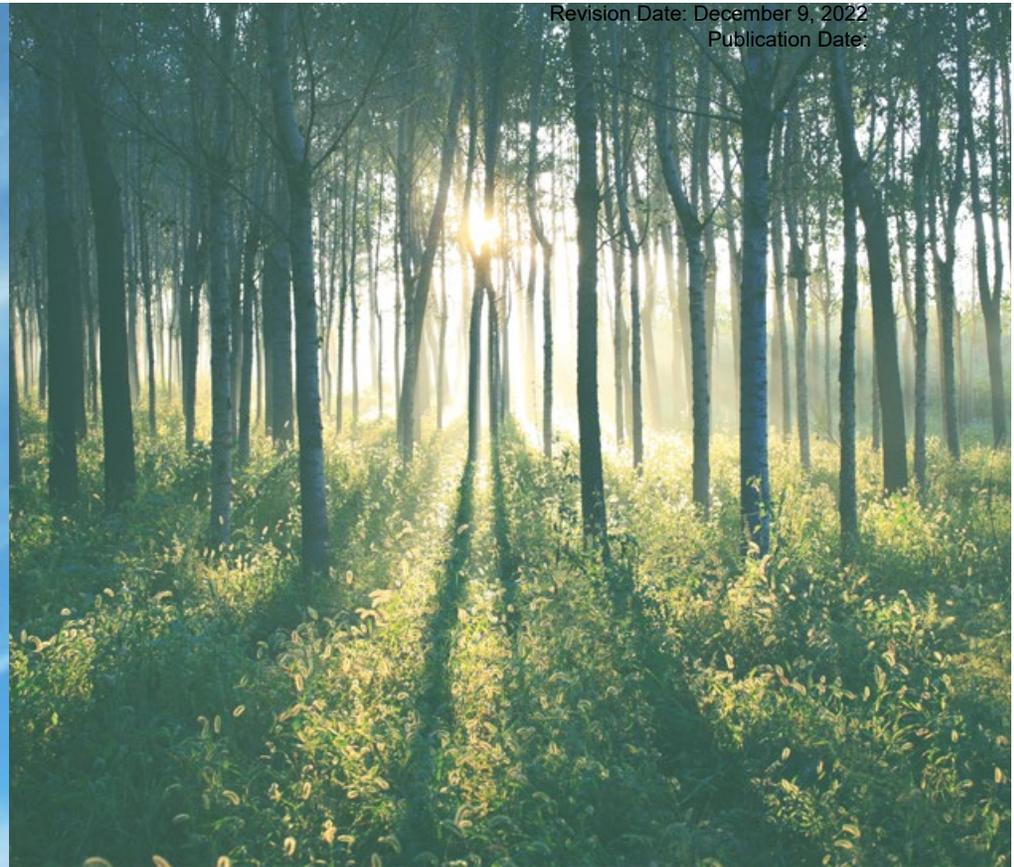
Gas leaks can be caused by

- Excavating accidents that result in the rupture, nicking or puncturing of a pipeline.
- Placing extremely heavy materials or equipment over buried pipelines, such as soil piles, heavy equipment, outriggers, etc.
- Water main breaks that weaken roadways and pavement can result in damaged pipelines.
- Excess accumulation of snow and ice on meters, gas pipes and gas appliance exhaust and combustion air vents. Exercise care when removing snow and ice.
- Collapsed buildings that break or damage gas pipelines.
- Fire or explosion near a pipeline.
- Too much, or not enough pressure, in the gas system.
- Equipment failure or corrosion.
- Natural disasters such as floods, tornadoes or earthquakes.



Did You Know?

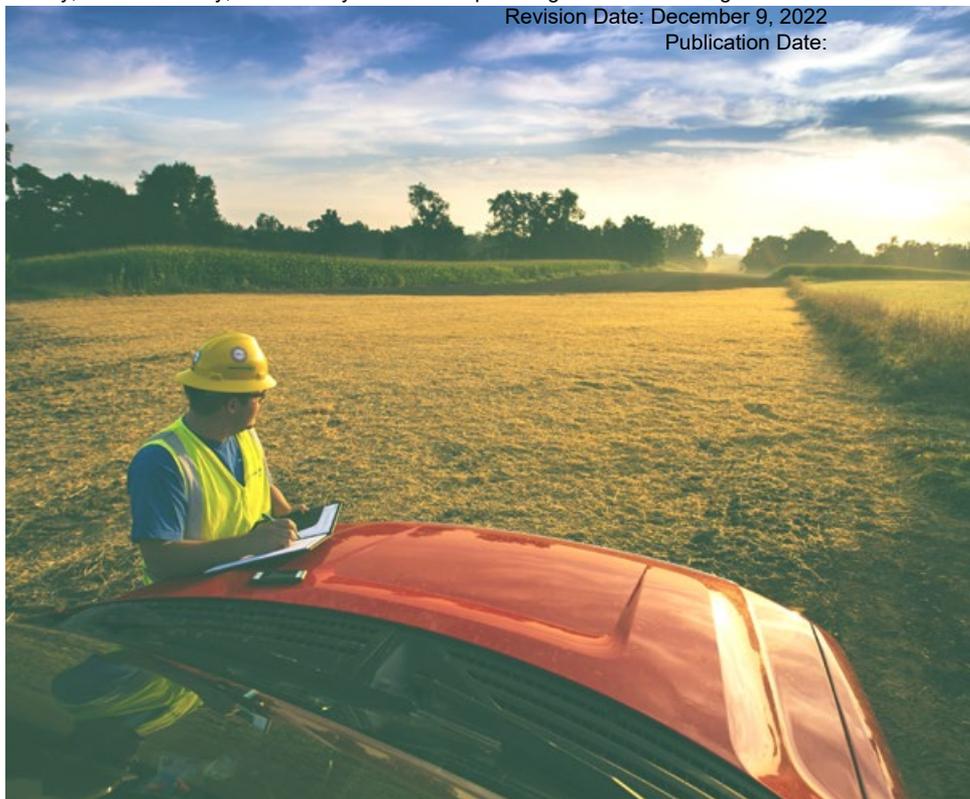
If you see an excavation site or someone digging with no utility markings and believe utility lines exist in the area, call MISS DIG at 8-1-1 to place a No Marks Ticket.



Using Consumers Energy Land

Obstruction-free corridors help us to safely deliver natural gas to our customers. Land owned by Consumers Energy is private property and not open for public use without permission. Sometimes the company may give specific permission to adjoining landowners and others to use its

property through a lease, license, permit or easement. For information on obtaining a lease, license, permit or easement, call the Consumers Energy operations planning center at 866-679-4054 or email LandContracts@cmsenergy.com.



If you notice any suspicious activity near a pipeline or gas facility, call 9-1-1 and our security command center: 800-760-3295

For more information

- Consumers Energy 800-477-5050
- [ConsumersEnergy.com/safety](https://www.consumersenergy.com/safety)
- [missdig811.org](https://www.missdig811.org)

Consumers Energy

Count on Us®

656

SAFETY BULLETIN

COORDINATION DURING STORM RESPONSE AND THE EMERGENCY OFFICIALS PORTAL



August 2018

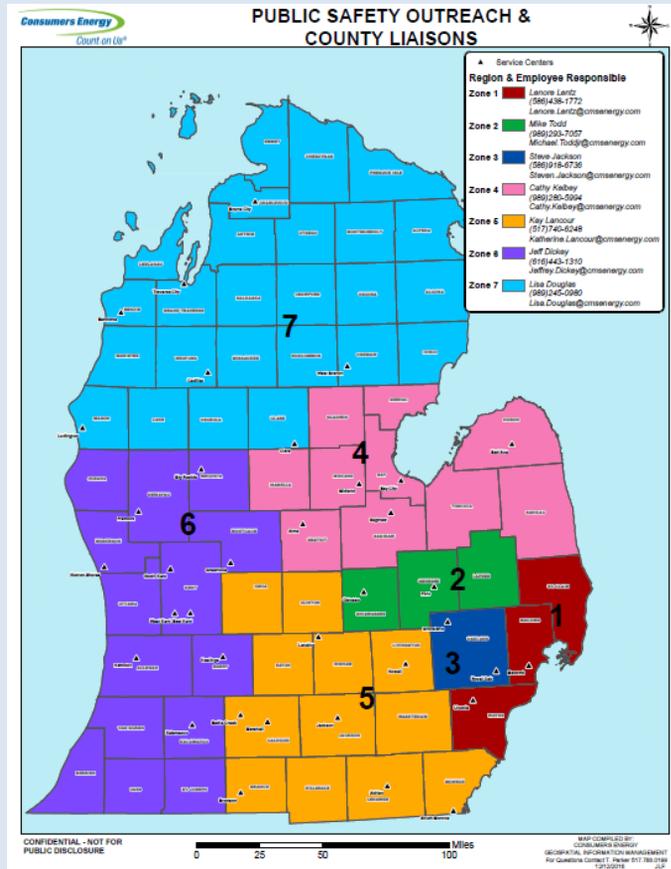
COORDINATING WITH THE PUBLIC SAFETY OUTREACH TEAM DURING STORMS

The Public Safety Outreach team provides support during utility-related emergencies, acting as the liaison between the public sector Incident Commander and Consumers Energy’s on-scene commander.

During large storms, the Public Safety Outreach team provides the following resources and assistance to public sector emergency officials:

- 24/7 on-call list on the [Emergency Officials Portal](#)
- Update county emergency managers of current status, estimated restoration times and total number of outages in the area
- Escalate and ensure priority of downed wires
- Assist with relieving police/fire from downed wire scenes
 - **If in need of assistance after business hours, please access our [24/7 On-Call list](#) and contact the Public Safety Outreach team member on-call.**
- Receive and escalate critical infrastructure concerns

The team also provides free, in-person education sessions on how to safely respond to natural gas and electric emergencies. If you’d like to request a free training, please contact Lisa Douglas at 989-245-0980 or email PublicSafety@cmsenergy.com.



Public Safety Outreach Team Members & Coverage Areas

- ZONE 1 – Lenore Lentz 586-438-1772**
- ZONE 2 – Mike Todd 989-293-7057**
- ZONE 3 – Steve Jackson 586-918-6736**
- ZONE 4 – Cathy Kelbey 989-280-5994**
- ZONE 5 – Kay Lancour 517-740-6248**
- ZONE 6 – Jeff Dickey 616-443-1310**
- ZONE 7 – Lisa Douglas 989-245-0980**

EMERGENCY OFFICIALS PORTAL

A Dedicated Website for First Responders!

The [Emergency Officials Portal](#) is a password protected portal that provides access to the following resources.

24/7 Public Safety Outreach On-Call List

ON-CALL Public Safety Outreach Team Member(s)

Name	Phone
Lisa Douglas	989-245-0980 or 989-948-4277

Gas & Electric Hazard Awareness Trainings

REQUEST FOR TRAINING

Upcoming Past

Hartland Deerfield Fire Authority FD: Gas Hazard Awareness Training
 Tue, 23 Jan 2018 18:30 EST—Tue, 23 Jan 2018 19:30 EST

Rockford FD: Electric Hazard Awareness Training
 Wed, 24 Jan 2018 13:00 EST—Wed, 24 Jan 2018 14:00 EST

Midland FD: Gas and Electric Hazard Awareness Training
 Thu, 25 Jan 2018 09:00 EST—Thu, 25 Jan 2018 11:00 EST

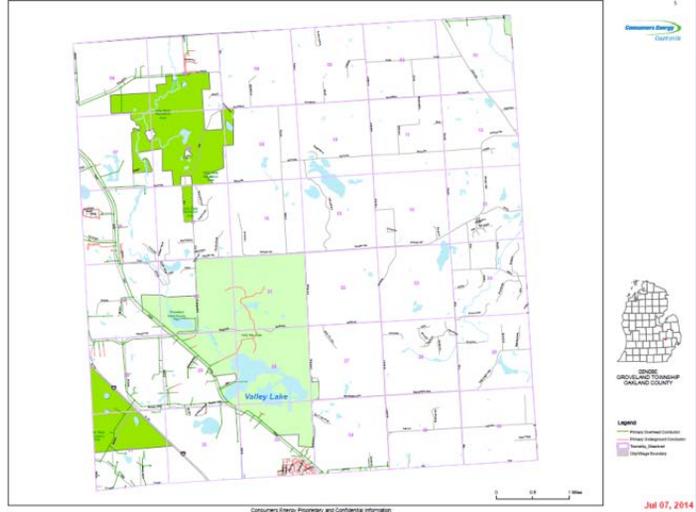
Free Safety Training Videos



Chapter 6: Energized Vehicle Rescue

Gas and Electric System Maps

GROVELAND
 Township Electric Distribution Map



Safety Brochures & Bulletins



NATURAL GAS PIPELINE SAFETY
 INFORMATION FOR EMERGENCY OFFICIALS



SAFETY BULLETIN Responding to an Emergency at a SOLAR GARDEN

CONSUMERS ENERGY is committed to working with you to respond to an emergency at a solar garden. This bulletin provides information on how to respond to an emergency at a solar garden. It covers topics such as: identifying solar gardens, responding to an emergency at a solar garden, and safety considerations for responders.

HOW TO RESPOND TO A STRUCTURE FIRE AT A SOLAR GARDEN

- FIRE DEPARTMENT EMERGENCY OPERATIONS**
- The potential for injury or illness from electrical fires is high. Use caution when working with electrical equipment.
 - Consider all PV equipment and wires to be energized and do not touch or attempt to remove, repair or disconnect.
 - Do not enter unsecured areas. Stay outside the high voltage area unless you are trained and equipped to do so. Do not touch any high voltage wires. Standing this far is dangerous. Areas are marked hazardous.
 - Protective coverings in these Solar Gardens do not have a ground for the purpose of dissipating the dangerous amount of energy stored within them. Reaction is safe, distance away and call Consumers Energy to de-energize.
- SAFETY HAZARDS**
- Electrical shock and flame - Solar panels being energized have the potential for a shock. Contact will result in a severe injury or death. There is a high voltage potential because of hazardous track location in some areas, and some areas have hot spots near to



DO NOT pull the electric meter to shut off power to a building.

How Helpful was this Safety Bulletin? We would love to hear from you!

Please let us know if this bulletin was helpful by emailing us at PublicSafety@cmsenergy.com.

Sincerely,

Lisa Douglas

Director of Emergency Management & Public Safety
 989-245-0980

Lisa.Douglas@cmsenergy.com

Follow Us on Social Media



APPENDIX G

Public Comment and Input

REDACTED FOR PUBLIC VIEW

Name: Pam Potter

Email: [REDACTED]

Message

Maybe missed this but did not see any reference to aquifer contamination including salination or aquifer failures which are very real possibilities in central Ottawa County. At current rate of consumption it may be a matter of when not if. Definitely, need to consider plans for such a situation if a large portion of some townships do not have access to water when the bedrock aquifer fails.

Name: Brett Little

Message

Is this going to prevent new homes from going up in 100 year floodplains as identified as FEMA zone X? Also, glad to see that nuke plant going!

Name: Nancy

Message

Hi, Matt. I've done a cursory review of the HMP. Very comprehensive. Lots of work. Good job!

The only comment I have is that in the header of Appendix B, Ottawa County is spelled "Ottowa."

Name: Christine Wistrom

Email: [REDACTED]

Message

I appreciated Mr. Wackerman's thorough explanation of the plan during the Townhall Meeting. He put it into basic, understandable language, and that is very helpful! I noted that Mr. Wackerman said that the plan looks at "vulnerabilities within the community," and as someone who sits on the State Independent Living Plan (SILP) Emergency Preparedness Planning group, I'm interested in learning more about how the plan addresses the needs of people with disabilities. Are there any people with disabilities included in the planning process?

Justin Stadt

Email: [REDACTED]

Message

I was reading over the draft plan and found areas of the plan that were not addressed for the City of Grandville. I would be willing to provide flood plain maps, news articles and other information for a large hazard to the community that was not addressed in plan.

Name: SP

Email: [REDACTED]

Message

In my opinion, equity is not stressed enough in this HMP, especially when we know there is inequitable investment in GR's 3rd ward. Equity is not explicitly defined but is mentioned in the

REDACTED FOR PUBLIC VIEW

REDACTED FOR PUBLIC VIEW

survey results about a dozen times. Consider including how this plan defines equity, underserved communities and vulnerable communities.

Black should be capitalized when talking about race – in some places this is done, but not all (p 69-70).

Racism is mentioned five time in the surveys, but not at all in the HMP. It may be important to name systemic racism as it applies especially to the civil disturbance portion of the plan (p 69). In the same section, under the May 2020 riots – include how many deaths and injuries as was included for the other instances (p 70).

In the future, producing a quick guide to the HMP may help garner more community input as most citizens are unfamiliar with mitigation language (p 172). Simplifying the workshop survey would also help get more feedback, it's heavy in emergency management terminology (the survey #1 on p 200 is more direct than the one available on the website to the public).

Consider expanding upon the economic impacts that COVID-19 has had on the area (p 128).

(Submitted comments on the website and also emailed a copy of the HMP with about 20 suggestions, in the public feedback folder)

Name

Tori Graves

Email

[REDACTED]

Message

Hello!

I was able to review parts of the Hazard Mitigation Plan and mostly focused on coastal resilience elements based on my background and current work (main feedback revolves around part 5.7.3). I would like to see a greater emphasis on coastal threats related to lake level variability and climate change, essentially highlighting that communities are predicted to see higher highs and lower lows - each bringing their own set of problems. This also means that communities may have less predictability and should be planning ahead for both scenarios. I also did not see anything that addressed how these threats may jeopardize critical infrastructure like roads, pipes, and water facilities located along the shoreline. Additionally, there needs to be a greater emphasis on coastal flooding that could result from high lake levels (see more info from NOAA: <https://coast.noaa.gov/floodexposure/#-9567386,5347367,8z/eyJiljoiZGFyaylsInliOnRydWV9>).

Thank you for the opportunity to provide feedback. I was please to see that the plan mentioned some of our research at the Great Lakes and St. Lawrence Cities Initiative. Please feel free to reach out if you have any questions.

REDACTED FOR PUBLIC VIEW

City of Grand Rapids Meeting

REDACTED FOR PUBLIC VIEW

Name (Orig User Email)	Join Time	Leave Time	Duration (h Guest
Tom Wacker twacker@asti-env.com	2/23/2022 18:13	2/23/2022 19:38	85 No
Allison Farole City of Grand Rapids	2/23/2022 18:13	2/23/2022 19:38	85 Yes
Tom Wacker twacker@asti-env.com	2/23/2022 18:20	2/23/2022 18:20	1 No
ASTI: Mega [REDACTED]	2/23/2022 18:23	2/23/2022 18:25	2 No
Janet Zahn [REDACTED]	2/23/2022 18:23	2/23/2022 19:25	62 Yes
Frank Boppel (Interpreter)	2/23/2022 18:24	2/23/2022 19:27	63 Yes
Mary Wilkins	2/23/2022 18:24	2/23/2022 19:25	61 Yes
Matt Groesser	2/23/2022 18:25	2/23/2022 19:38	74 Yes
Lou Hunt-Ottawa Emer. Mgt.	2/23/2022 18:25	2/23/2022 19:38	73 Yes
Jeff Murph [REDACTED]	2/23/2022 18:26	2/23/2022 19:26	60 Yes
Theaker# Orville	2/23/2022 18:26	2/23/2022 19:25	60 Yes
Eric Piehl [REDACTED]	2/23/2022 18:27	2/23/2022 19:28	61 Yes
John Lehman	2/23/2022 18:27	2/23/2022 19:25	59 Yes
Samantha Przy (SP)	2/23/2022 18:27	2/23/2022 19:25	59 Yes
Kera Sharpe	2/23/2022 18:28	2/23/2022 19:38	71 Yes
Ryan Sparks (Ryan iPhone)	2/23/2022 18:28	2/23/2022 19:26	58 Yes
james lax	2/23/2022 18:29	2/23/2022 18:47	18 Yes
Brian Jespe [REDACTED]	2/23/2022 18:29	2/23/2022 19:25	56 Yes
ASTI	2/23/2022 18:30	2/23/2022 19:38	69 Yes
Annabelle [REDACTED]	2/23/2022 18:35	2/23/2022 19:25	51 Yes
ASTI: Mega [REDACTED]	2/23/2022 18:25	2/23/2022 19:38	73 No

REDACTED FOR PUBLIC VIEW

Meeting ID	Topic	Start Time	End Time	User Email	Duration (M)	Participants
8.43E+10	Ottawa Co	#####	#####	msalazar@	76	20

Name (Orig	User Email	Join Time	Leave Time	Duration (M)	Guest	Recording	Consent
Tom Wack	twacker@a	#####	#####	61	No	Y	
Allison Farole	City of G	#####	#####	60	Yes	Y	
Lou Hunt-Ottawa	Emei	#####	#####	58	Yes	Y	
Kera Sharpe		#####	#####	52	Yes	Y	
ASTI:		#####	#####	71	No	Y	
ASTI- Kera Sharpe		#####	#####	51	Yes	Y	
Matt Groesser		#####	#####	54	Yes	Y	
Theaker# Orville		#####	#####	53	Yes	Y	
Ross Tibbets		#####	#####	46	Yes	Y	
Angela Maxwell		#####	#####	45	Yes	Y	
Steve Kemp		#####	#####	42	Yes	Y	
CWistrom		#####	#####	42	Yes	Y	
Nanita		#####	#####	42	Yes	Y	
Paul Hudso		#####	#####	42	Yes	Y	
Joel Roon (Joel's iPhon		#####	#####	28	Yes	Y	
Mary Grillo		#####	#####	41	Yes	Y	
Kevin Bues		#####	#####	39	Yes	Y	
Dwight Sheridan		#####	#####	39	Yes	Y	
Pete McWatters		#####	#####	35	Yes	Y	
Kera Sharp k		#####	#####	20	Yes		

APPENDIX H

Jurisdictional Action Plans

Kent County
Ottawa County

Kent County

2020 population 657,974 (up 9% from 2010)

NFIP Participant and Ongoing Compliance Program

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 High Priority

Strategy:

Primary Responsibility:

Initiatives Needed:

Implementation:

Cost(s):

Benefit(s):

Anticipated Funding:

2011 Status:

2016 Status:

2022 Status:

Thunderstorms, tornadoes

Survey needs and add sirens to regions as needed.

Emergency Management

Funding source

By 2027 or sooner, if funding is available.

Survey \$ 10,000

111 Sirens @ \$18,500 = \$2,053,500

Less potential for personal injury.

Building Resilient Infrastructure and Communities (BRIC) Grant

Sirens surveys are updated every year. To date, grant funds from the fiscal year 2007 Homeland Security Grant Program (HSGP) have been used to update and replace sirens for three jurisdictions in Kent County. Other jurisdictions have used local funds to upgrade sirens. Future funds for hazard mitigation would be used to enhance and expand upon those efforts, as well as to research new technologies.

No change due to lack of funding.

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#2 High Priority

Strategy:

Primary Responsibility:

Severe Weather Hazards

Investigate and acquire new warning technology as it becomes available.

Kent County

Initiatives Needed: Funding Source
Implementation: By 2027 or sooner, if funding is available.
Cost(s): Reverse 911 system \$100,000
6 Short-range AM/FM Transmitter
Systems @ \$50,000 \$300,000
Benefit(s): Lessened potential for personal injury.
Anticipated Funding: Federal mitigation grants as well as other funding sources if available.
2011 Status: Grant funds have been used to purchase the satellite-based EM Net system for Kent County and the City of Grand Rapids. Kent County has received two systems and provided one to the National Weather Service. Grant funds have also been used to purchase the City Watch notification system for Kent County (the system is also used in Ottawa County). Future funds for hazard mitigation would be used to enhance and expand upon those efforts, as well as to research new technologies.
2016 Status: No change due to lack of funding.
2021 Status: Completed

#3 High Priority

Strategy:

Riverine Flooding

Take measures to mitigate flood damage and reduce vulnerability to existing structures

Primary Responsibility:

Building Department

Initiatives Needed:

Funding source

Implementation:

To be considered when funding is available.

Cost(s):

12 wood frame structures @ \$40,000 = \$480,000 (Based on average property values)

Benefit(s):

Less Potential for flood damage.

Anticipated Funding:

BRIC Grant, Flood Mitigation Assistance (FMA) Grant, HMGP

2011 Status:

Hazard mitigation funding has been approved for Plainfield Township, and for the York Creek Watershed. The Shawmut Hills Watershed has applied for funding, which is currently awaiting an agreement between the City of Grand Rapids and FEMA regarding the matching grant shares. At the time of this writing, the status of other jurisdictions' progress with this strategy is still pending.

2016 Status:

No change due to lack of funding.

2022 Status:

ARPA funding will be used for some flooding mitigation projects.

#4 High Priority

Strategy:

Flood Hazard (general)

Study potential flood areas for consideration of future flood mitigation field projects. Additionally, consideration will be given to Kent County communities' participation in the National Flood Insurance Program (NFIP). Not all of the residents in some communities are eager to participate primarily due to concerns about the potential costs to those who might feel a mandate from mortgage providers to purchase insurance. Information about the actual costs of such policies and who they might benefit (or inconvenience) must be weighed against each community's risks for all types of potential flood

problems (riverine, urban, etc.) when making this decision.
Primary Responsibility: Water Resources Commissioner & engineers
Implementation: By 2027 or sooner, if funding is available.
Benefit(s): Less likelihood of future flood damage claims.
2016 Status: No known progress.
2022 Status: ARPA funding will be used for some flooding mitigation projects.

#5 High Priority Strategy:

Communication Disruption

Identify infrastructure vulnerabilities that could cause communication disruptions

Primary Responsibility: Utility Companies
Initiatives Needed: Funding source
Implementation: By 2027 or sooner, if funding is available.
Cost(s): Regional Survey \$50,000
Benefit(s): Higher security through less potential for long term interruption of communication.

Anticipated Funding: BRIC Grant

2011 Status: In 2010, the West Michigan Cyber Security Consortium was formed. The purpose of this consortium is to identify risks and vulnerabilities in the cyber arena, which includes IT and communications. Training, security software, networking, and best practices have been a focus of this group. Future hazard mitigation grant funds can be used to enhance and expand these efforts, and to explore new technologies.

2016 Status: No change due to lack of funding.

2022 Status: No known progress.

#6 High Priority Strategy:

Communication Disruption

Work with local telephone and cable utilities to develop a plan for dealing with the communication disruptions

Primary Responsibility: Utility Companies
Initiatives Needed: Funding Source
Implementation: By 2027 or sooner, if funding is available.
Cost(s): Plan \$120,000
Benefit(s): Higher security through less potential for long-term interruption of communication.

Anticipated Funding: BRIC Grant

2011 Status: In 2010, the West Michigan Cyber Security Consortium was formed. The purpose of this consortium is to identify risks and vulnerabilities in the cyber arena, which includes IT and communications. Training, security software, networking, and best practices have been a focus of this group. Future hazard mitigation grant funds can be used to enhance and expand these efforts, and to explore new technologies.

2016 Status: No change due to lack of funding.

2022 Status: No known progress.

#7 High Priority
Strategy:

Communication Disruption

In process of utilizing grants to fund an 800 MHz radio system for the entire county. This system is used by the State Police and many counties in the state of Michigan are moving toward it. Ottawa County is also moving to the 800MHZ

Primary Responsibility:

Kent County

Initiatives Needed:

This project is currently underway

Implementation:

This project is scheduled for completion before the next HMP

update. Cost(s):

Already funded

Benefit(s):

Higher security through less potential for long term interruption of communication.

Anticipated Funding:

Grant funding and millage

2011 Status:

Narrow-band radio compliance has been, and continues to be, a major project in which Department of Homeland Security grant funds are used. It is anticipated that these efforts toward narrow-band compliance will continue, using a combination of local funds, DHS grants, hazard mitigation grants (if available), and other funding sources, as these possibilities are identified.

2016 Status:

It was decided to go to the 800MHz in 2016. The project has begun but is in its infancy stages per the 2017 update of this plan.

2021 Status:

Completed

#8 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the master plan and associated zoning maps throughout the county's jurisdictions. Since this strategy can only be implemented at the township, city, or village level, its mention here concerns the giving of information and encouragement by the county to support such local plan revisions.

Primary Responsibility:

Kent County

Initiatives Needed:

Speak with boards and planning managers to encourage consideration.

Implementation:

By 2027 or sooner

Benefits:

Less potential for personal injury

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

Recommendations/information/encouragement given when individual jurisdictions update their master plans.

#9 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Emergency Managers

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury

Status:

Grant funds have been used to purchase the satellite-based EM Net system for Kent County and the City of Grand Rapids. Kent County has received two systems and provided one to the National Weather Service. Grant funds have also been used to purchase the City Watch notification system for Kent County (the system is also

used in Ottawa County). Future funds for hazard mitigation would be used to enhance and expand upon those efforts, as well as to research new technologies. New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios.

2016 Status:

2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#10 Medium Priority Strategy:

Infrastructure Strengthening

Identify potential projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance

Primary Responsibility:

Board of Commissioners

Implementation:

By 202722 or sooner

Benefit(s):

Less potential for destruction and disruption.

2016 Status:

The in 2010 formed West Michigan Cyber Security consortium has grown to over 600 agencies in the private and public sectors. Meetings are held quarterly with presenters on cyber security-related topics. In 2016 two exercises were done by the Department of Homeland Security, the first a school-based exercise held at the Kent Intermediate School District, and the second was business security related. In March of 2016 members of this committee met with US Senator Gary Peters to discuss our cyber related activities.

2022 Status:

In addition to this, a critical infrastructure project began in Kent County in 2012 and continues. This project connects surveillance cameras to a system that can be viewed on the floor of the PSAP center as well as in the EOC. 68th Street from Glen Hollow Drive to Hanna Lake Avenue project consisting of widening the existing road from four lanes to five lanes and cold milling the existing 4-lane asphalt surface and placement of two courses of HMA from Eastern Avenue to Kalamazoo Avenue; 100th Street between Hanna Lake Avenue to East Paris Avenue project consisting of hot mix asphalt cold milling and resurfacing, subbase, aggregate base, drainage, guardrail and pavement markings; 22 Mile Road from Tisdell Avenue to Harvard Avenue Kent County Road Commission will be conducting preventative maintenance work; Northland Drive North of Cedar Springs to Ritchie Avenue crush & shape project will consist of hot mix asphalt base crushing, shaping and resurfacing, aggregate shoulders and pavement markings; Algoma Avenue (Algoma Bridge #49) North of 11 Mile, South of Fonger

Street removal and replacement of bridge rail; and Pine Island Drive from 6 Mile Road to Buth Drive a 16-inch water main installation crossing Pine Island Drive at 6 Mile Road intersection and continuing north along the east side of Pine Island Drive to Buth Drive.

#11 Low Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities

Fire Department

By 2027022 or sooner

Less potential for personal injury

No progress at this time due to lack of funding.

Get Ready! Kent County 12 month citizen preparedness program available. Hosted a National Night Out educational community event on 8/2/22.

City of Grand Rapids
2020 population 198,917 (up 6% from 2010)

NFIP Participant and Program for Continued Compliance

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 High Priority

Strategy:

Primary Responsibility:

Initiatives Needed:

Implementation:

Benefit(s):

Anticipated Funding:

2011 Status:

2016 Status:

2022 Status:

Severe Weather

Investigate and acquire new warning technology as it becomes available, add sirens

Emergency Management

Funding Source

By 2027 or sooner if funding is available.

Less potential for personal injury

BRIC Grant

The City of Grand Rapids used local funds, supplemented with HSGP funding from the fiscal year 2009 grant, to upgrade sirens within the city. Future funds for hazard mitigation would be used to enhance and expand upon those efforts, as well as to research new technologies.

The City of Grand Rapids continues to improve their outdoor warning capabilities by purchasing additional sirens to enhance coverage for the city.

The City of Grand Rapids continues to improve their outdoor warning capabilities by purchasing additional sirens to enhance coverage for the city. The City of Grand Rapids has applied for BRIC funding for hazard mitigation projects.

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#2 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2011 Status:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Emergency Management

By 2027 or sooner

Less potential for personal injury

Grant funds have been used to purchase the satellite-based EM Net

system for Kent County and the City of Grand Rapids. Grant funds have also been used to purchase the City Watch notification system for Kent County. Future funds for hazard mitigation would be used to enhance and expand upon those efforts, as well as to research new technologies. New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios

2016 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.

2022 Status: FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy:
Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

Severe Weather

Identify any warning system needs in the township.
Emergency Management
By 2027 or sooner
Less potential for personal injury.
No progress at this time
New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy:
Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Board of Commissioners
By 2027 or sooner
Less potential for destruction and disruption.
No progress at this time due to lack of funding
The City of Grand Rapids has applied for BRIC and other grant funding for hazard mitigation projects.

#5 Low Priority

Strategy:
Primary Responsibility:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities
Fire Department

Implementation:	By 2027 or sooner
Benefit(s):	Less potential for personal injury.
2016 Status:	No progress at this time due to lack of funding.
2022 Status:	Residential Safety Program available including fire safety check, free smoke alarm upgrades and installations, free carbon monoxide alarm installations, one-on-one fire safety consultations, and a connection with fire department partners to assist with fire safety issues. GRFD Fire Prevention Foundation supports programs, events, and other efforts designed to enable the GRFD to operate more efficiently, promote public safety, enhance community relations, and to engage in other activities to support the Grand Rapids community. They hosted the GR Firefighter Challenge 2022 on 7/29/22.

#6 Medium Priority Strategy:

Climate Change

The recommendations provided in this section were developed with an understanding that Grand Rapids represents a complex system with differing perspectives, resources, goals, and processes. Each sector possesses unique and valuable knowledge and direction, which will be needed to understand and solve the problem that increasing resiliency to climate change represents.

Process Recommendations

- 1) Grand Rapids needs an individual(s) or organization(s) to own and champion the responsibility of building climate resiliency in our community.
- 2) The champion(s) need a directive and resources to engage the community across sectors. Existing local community climate-resiliency narratives and leaders should be highlighted.
- 3) Champion(s) should utilize resiliency concepts, issues, and strategies identified in this report to evaluate existing plans (Green Grand Rapids, etc.) to inform priority implementation.
- 4) City resiliency efforts going forward should focus on the selection, financing, and implementation of projects, as current planning documents identify existing best practices.
- 5) Underserved low-income and minority populations will be disproportionately impacted by climate change. Resiliency efforts in all aspects of community planning should recognize this.
- 6) Organizations should use economic valuation tools and comprehensive, triple bottom line impact analyses when considering major project spending.

Environmental Recommendations

Grand Rapids is in a unique position as an urban center that has aspects of a natural ecosystem within its boundaries and immediate surroundings. As such, it is important when planning for climate resiliency to consider not only solutions for the ecosystem components themselves but also those that will preserve communities' ability to interact with these resources.

7) Grand Rapids should strive to reduce GHG emissions through City operations and in the community as stated in the City's Strategic Plan.

8) Capture the "first-flush" precipitation of the 90th–95th percentile wet-weather event near where it falls.

9) Study the impact of climate change on the Grand Rapids water filtration plant.

10) Promote best practice regional settlement patterns in the Grand Rapids metropolitan area. Better integrate development with existing infrastructure (GVMC).

11) Increase watershed-level cooperation among sewer, water, and storm water authorities.

12) Establish a metro-wide system of environmental corridors, greenways, or landscapes, which create convenient, non-destructive public use of our natural environment, including bikeways, recreation areas, nature walks, and scenic preserves (GVMC).

13) Preserve and grow mixed-use and dense development neighborhoods, making essential services and businesses accessible through multimodal means of transportation (Green Grand Rapids).

14) Continue the Grand Rapids Metro Council's policy of "no new road construction in Grand Rapids," focusing instead on maintenance and "vital streets" improvement of existing roads where appropriate (GVMC).

15) Continue monitoring Great Lakes and aquifer water levels to more precisely understand the multiple causes and effects of fluctuations.

16) Water efficiency efforts should be strengthened in Grand Rapids through a variety of technological, policy, pricing, and programming means

17) P.A. 98 of 2013 alters Michigan’s wetland program. The City of Grand Rapids should advocate to the state and federal government for a robust wetlands program that at a minimum equals the previous standard.

18) Improve the quality of the Grand River and its tributaries by restoring it to a more natural state. This should involve the improvement of riparian buffers, daylighting tributary streams, continuing the development of greenways, and softening channels (Green Grand Rapids).

19) Reconnect residents and visitors to Grand Rapids urban waterways to increase citizen awareness of our fundamentally important water resources, build a sense of place, and maximize opportunities to create economic and social capital (Grand Rapids Whitewater).

20) Adopt a stronger urban canopy goal—at least 40%—and implement a program that reflects heat island, air quality, and other documented resiliency values delivered by a diverse, healthy urban tree canopy (Grand Rapids Urban Forestry Plan).

21) Engage citizens and private property owners in characterizing, managing, and growing the urban canopy through innovative programs and tools.

22) Parks, pools, splash pads, and natural and green recreation areas should be considered by City decision makers as critical climate infrastructure that enhances quality of life and makes Grand Rapids more resilient.

23) Use critical climate infrastructure such as low-impact development and green infrastructure to wholly implement the paradigm shift in storm water management best practices (Green Grand Rapids; Green Infrastructure Portfolio Standard Projects).

Social Recommendations

A unique impact of climate change is the exacerbation of existing social inequities, which disproportionately affects vulnerable populations with limited resources and mobility. Collaborative efforts and resources should be pooled to understand impacts and solutions concerning food insecurity, housing, economic uncertainty, physical displacement, and health.

24) Citizens should develop a disaster-preparedness plan of their own by using resources such as the American Red Cross.

25) Grand Rapids should expand on existing strategies to improve long-term air quality efforts by researching and forwarding more powerful policy tools, locally and statewide, such as incentives to reduce vehicle miles traveled.

26) Grand Rapids and its partners (i.e., American Red Cross, Essential Needs Task Force, Kent County Emergency Preparedness, etc.) should analyze the effectiveness of resources used by citizens during extreme heat events, such as cooling centers and ozone action alerts, in order to continue providing the most useful and efficient responses.

27) Consider mitigating the production and exposure to low-level ozone and the urban heat island when planning and developing new infrastructure.

28) Continue to improve access to food sources by developing local food infrastructure.

29) Evaluate data-driven, flexible police staffing program for correlation with seasonal and daily temperature modulations.

Recommendations: Economic

The economic impacts of a changing climate will be far-reaching, interconnected, and difficult to precisely anticipate. Grand Rapids is fortunate to have organizations and leaders who already collaborate to resolve market-based problems and increase the sustainability of businesses and organizations wherever possible. However, climate change will likely require new levels of analysis using the triple bottom line principle to consider solutions that address climate change impacts and allow the organizations, businesses, and individuals of the community to thrive.

30) Support policy proposals to increase energy efficiency at the state level, such as the energy efficiency resource standard in P.A. 295. Simultaneously move to identify and adopt a triple bottom line, balanced, community-wide efficiency target

31) Explore legal, policy, and economic frameworks that enable the City of Grand Rapids to build a more autonomous and resilient energy system. Such a system would enable Grand Rapids to pursue ambitious goals around pricing, decentralized energy systems, efficiency, and renewable energy.

32) Request that the MI Public Service Commission or another appropriate institution study climate change impacts on the energy sector, including supply, demand, infrastructure, and the energy/water resource

nexus.

33) Research and implement climate-resilient street maintenance and construction practices, particularly for materials and physical infrastructure (Sustainable Streets Task Force; Green Grand Rapids).

34) Change the transportation culture in Grand Rapids to one built around multimodal, vital streets, providing equal access for all social levels with diverse transportation requirements (Green Grand Rapids).

35) Municipal insurance, capital projects, and asset-management planning should include assessments for exposure to drought, temperature change, flooding, storms, and climate mitigation.

36) Increase the number of commercial, residential, redevelopment, and remodeling building projects certified to be sustainable (i.e., LEED, Green Built, Green Star, etc.) beyond the existing 2015 goal. Study and recommend policy tools to reduce barriers and expand use beyond early adopters (City of Grand Rapids zoning Ordinance).

37) Retain green building leadership by encouraging the construction of best-in-class green building projects (i.e., Living Building Challenge, 2030, Netzero, LEED V.4 Platinum).

38) Prepare the agricultural industry for future climate scenarios by encouraging the use of existing decision-making resources, and where possible, host resiliency informational forums.

2022 Status:

The City of Grand Rapids has applied for BRIC and other grant funding for hazard mitigation projects.

Ada Township

2020 population 14,388 (up 9% from 2010)

NFIP Participant

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 High Priority

Strategy:

Primary Responsibility:

Implementation:

Cost(s):

Benefit(s):

2011 Status:

2016 Status:

2022 Status:

Riverine Flooding

Purchase property to mitigate flood damage and reduce vulnerability to existing structures

Ada Township

Identify new properties and seek additional funding by 2016.

1 residence @ \$180,000 (Based on actual property value)

Lowering the impacts of flooding upon occupied structures.

Ada Township applied for and received funding for this strategy in 2006, and funds were used to purchase property in the floodplain. Final funds were received in 2010. Over the next 5 years, the township will assess the effectiveness of this project and identify any similar projects for potential flood mitigation.

No known progress

No known progress at this time.

#2 Medium Priority

Strategy:

Electrical Failure Hazard Strategy

Add a generator to the fire station, capable of powering the furnace and thus allowing citizens to be brought there if sheltering is needed. This addresses various weather-related hazards, or other incidents in which temporary evacuation may be required. Ada Township has primary responsibility, but is eager to coordinate with Kent County if it has a means to acquire this generator in an affordable manner. The implementation timeframe will likely take a year or two, if funds are available.

2021 Status:

Completed.

#3 Medium Priority

Emergency Communication Strategy

The Department has its own radio channel for communications. Coordinate as needed to bolster the dependability of emergency communication systems (as detail is found, this strategy might be elevated to a higher priority in the future). This strategy also includes the identification of any warning system needs in the township for severe weather preparedness.

2016 Status:

No known progress

2022 Status:

Completed

#4 Medium Priority

Strategy:

Master Plan Consideration

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. The current plan dates from 2007 and includes elements regarding hazardous materials, transportation safety, and environmental sustainability, but did not have an all-hazard mitigation focus. Ada Township will be responsible for this effort.

2016 Status:

No known progress

2022 Status:

Hazard mitigation needs and concepts being considered for the 2022 plan update.

#5 Medium Priority

Strategy:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

2016 Status:

No known progress

2022 Status:

Ada Township plans to best utilize an sustain existing infrastructure while minimizing unsustainable expansions (per 2022 Master Plan RFP)

#6 Low Priority

Strategy:

Fire - Urban and Structural

Assess and/or address any possible shortfalls in fire mitigation actions, regulations, supplies, firebreak, FIREWISE protection techniques, and risk assessment detail. Burning ordinance examination could be relevant for hazard mitigation.

2016 Status:

No known progress

2022 Status:

Public safety millage passed in 2022 to fund maintenance, equipment, and training. Get Ready! Kent County 12 month citizen preparedness program available.

Algoma Township

2020 population 12,055 (up 21% from 2010)

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1: Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps.

During the next master plan development process, Algoma Township should adjust the master plan to accommodate viable hazard-related strategies.

Primary Responsibility:

Algoma Township, Zoning Department

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury

2016 Status:

No known progress

2022 Status:

Plan updated in 2018

#2 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Emergency Management

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding

2022 Status:

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy:

Severe Weather

Identify any warning system needs in the township

Primary Responsibility:

Emergency Management

Implementation:

By 2027 or sooner

Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance

Primary Responsibility:

Board of Commissioners

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for destruction and disruption.

2016 Status:

No progress at this time due to lack of funding

2022 Status:

Water supply system extension in 2022. 2018 Master Plan contains the following infrastructure goals: water, sewer, internet, and transportation. ARPA and other grant funding may be used for infrastructure strengthening projects.

#5 Low Priority

Strategy:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities

Primary Responsibility:

Fire Department

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

Get Ready! Kent County 12 month citizen preparedness program available.

Alpine Township

2010 population 13,336 (down 5% from 2000)

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

Urban Flooding

Public education. Enforcing stronger storm water and drainage requirements. Seek grant to improve water storage area capabilities. Continue enforcement of stricter ordinances, etc. Enact long range plan for drainage issues. Construct ponds and clean out existing waterways as necessary.

Primary Responsibility:

Drain Commissioners

Implementation:

By 2027 or sooner if funding is available.

Cost(s):

Unknown at this time.

Benefit(s):

Lessened potential for flood damage.

Anticipated Funding:

BRIC Grant, FMA Grant, HMGP

2011 Status:

Hazard mitigation funds were approved for the purchase of three flood-prone structures in Alpine Township in 2006.

2016 Status:

No known progress at this time.

2022 Status:

Currently participating in the NFIP program.

#2 Medium Priority

Strategy:

Wildfire

Expanding public education and awareness

Primary Responsibility:

Fire Department

Initiatives Needed:

Secure Funding

Implementation:

By 2027 or sooner if funding is available

Cost(s):

\$3,000-\$5,000

Benefit(s):

Reduce potential for fire damage.

Anticipated Funding:

Federal grants as well as other municipal funding sources if available.

2011 Status:

No known progress beyond normal activities

2016 Status:

No known progress

2022 Status:

New Station 1 located at 1100 Henze St. NW Comstock Park, MI 49321.

#3 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community’s master plan and associated zoning maps.

During the next planning process, the Alpine Township Planning and Zoning Department should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies

Primary Responsibility:

Alpine Township , Zoning Department

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury

2016 Status:

No known progress

2022 Status:

Master Plan last updated in 2015.

#4 Medium Priority

Strategy:

Severe Weather

Work with Kent County Emergency Management to conduct spring tests of sirens and provide public education on weather effects. Add three additional sirens for public notification. Continue/expand public education, working with and supporting the efforts of local news media.

Primary Responsibility:

Emergency Managers

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding

2022 Status:

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA’s new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Strategy:

Riverine Flood Hazard

Apply for grants to increase the area available for water storage. Ensure that the condition of drains, creeks, etc. are clean and able to handle water levels. Proceed with a long range plan to remove houses in the floodplain area and improve water storage capabilities. Improve drainage ditch and pond retention.

Primary Responsibility:

Drain Commissioners

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

No known progress at this time.

#6 Medium Priority

Strategy:

Intentional Acts

Support good relationship with police and rescue individuals in our community and surrounding ones. Provide public education to minimize

risk of such occurrence. Educate ourselves as government officials.
Continue and expand efforts.
Primary Responsibility: Police Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time
2022 Status: Open House at the new Fire Station #1 and Township's 175th Anniversary celebration in July 2022 were attended by police, rescue individual, and the public.

#7 Medium Priority
Strategy:

Urban and Structural Fire Hazard

Public education. Presentations at schools and local shopping malls, etc.
Enforcement of current zoning and building ordinances to guard against the spread of fire.
Primary Responsibility: Fire Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time
2022 Status: New Station 1 located at 1100 Henze St. NW Comstock Park, MI 49321.

Bowne Township

2010 population 3,084 (up 12% from 2000)

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 High Priority

Sanitary Sewer Failure

- Strategy: Stationary generator for pumping station
- Primary Responsibility: Water Department
- Initiatives Needed: Secure funding
- Implementation: 2018
- Cost(s): \$40,000-\$50,000
- Benefit(s): Lessened potential for wastewater backup into homes and businesses
- Anticipated Funding: BRIC, Water & Waste Disposal Loan & Grant, Alto/Bowne Township DDA
- 2016 Status: Due to revising this plan this subject is now being revisited to investigate funding sources and fully understanding the consequences.
- 2022 Status: No known progress at this time.

#2 Medium Priority

Severe Weather

- Strategy: Additional tornado warning sirens in populated areas and anticipated future population centers.
Coordinate as needed to bolster the dependability of emergency communication systems.
- Primary Responsibility: Emergency Managers
- Implementation: By 2027 or sooner
- Benefit(s): Less potential for personal injury.
- 2016 Status: No progress at this time due to lack of funding
- 2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance

Primary Responsibility:

Board of Commissioners

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for destruction and disruption.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

No known progress at this time.

#4 Medium Priority

Strategy:

Flood Hazards

Consideration will be given to participation in the National Flood Insurance Program (NFIP). Not all residents are eager to participate, primarily due to concerns about the potential costs to those who might feel a mandate from mortgage providers to purchase insurance. Information about the actual costs of such policies and who they might benefit (or inconvenience) must be weighed against the community's risks from all types of potential flood problems.

Primary Responsibility:

Bowne Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for destruction and disruption

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

Not currently participating in the NFIP program.

#5 Low priority

Strategy:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities.

Primary Responsibility:

Fire Department

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time

2022 Status:

Firefighter's pasta supper in April 2022. Various social media posts interacting with the public. Get Ready! Kent County 12 month citizen preparedness program available.

Additional information, strategies, input, and concerns from the Alto Fire Department

Communication Failure:

Fire station is staffed whenever the phone service goes out.

Hazardous Materials:

All firefighters are trained to the Operational level. All hazardous materials incidents are turned over to Young's Environmental. Alto FD will assist with evacuations and, if safe to do so, will identify the hazardous material involved in an emergency event.

Tornado:

Tornado siren in place. Additional tornado sirens would prove valuable.

Wildfire:

Fire safety training at the local elementary school. Small fires are to be contained in barrels with 3/4 inch holes in the top.

Byron Township

2010 population 20,317 (up 16% from 2000)

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

Primary Responsibility:

Byron Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

No known progress at this time

#2 Medium Priority

Strategy:

Flooding

Consideration will be given to participation in the National Flood Insurance Program (NFIP). Not all residents are eager to participate, primarily due to concerns about the potential costs to those who might feel a mandate from mortgage providers to purchase insurance. Information about the actual costs of such policies and who they might benefit (or inconvenience) must be weighed against the community's risks from all types of potential flood problems.

Primary Responsibility:

Byron Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time

2022 Status:

Not currently participating in the NFIP program.

#3 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Emergency Managers

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status: No progress at this time due to lack of funding.
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy: Identify any warning system needs in the township.
Primary Responsibility: Emergency Managers
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

Severe Weather

Identify any warning system needs in the township.

Emergency Managers

By 2027 or sooner

Less potential for personal injury.

No progress at this time

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Strategy: Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Primary Responsibility: Board of Commissioners
Implementation: By 2027 or sooner
Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding.
2022 Status: No known progress at this time.

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

Board of Commissioners

By 2027 or sooner

Less potential for destruction and disruption.

No progress at this time due to lack of funding.

No known progress at this time.

#6 Low Priority

Strategy: Consideration of additional fire-related public awareness activities.
Primary Responsibility: Fire Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: Byron Township Fire Department provides smoke/carbon monoxide detector installation. On 5/14/22 they held a community meet and greet. Get Ready! Kent County 12 month citizen preparedness program available.

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities.

Fire Department

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

Byron Township Fire Department provides smoke/carbon monoxide detector installation. On 5/14/22 they held a community meet and greet. Get Ready! Kent County 12 month citizen preparedness program available.

Caledonia Township

2020 population 15,811* (up 28% from 2010)

*population figure includes the Village of Caledonia

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

Primary Responsibility:

Caledonia Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

Last plan updated in 2015.

#2 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Emergency Managers

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy:

Severe Weather

Identify any warning system needs in the township

Primary Responsibility:

Emergency Managers

Implementation:

By 2027 or sooner

Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority
Strategy:

Infrastructure Strengthening
Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

Primary Responsibility:

Board of Commissioners

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for destruction and disruption.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

No known progress at this time.

#5 Low Priority

Strategy:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities

Primary Responsibility:

Fire Department

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

Fire Department website has fire safety tips. Get Ready! Kent County 12 month citizen preparedness program available.

Village of Caledonia

2020 population 1,646* (up 9% from 2010)

**Population included in Caledonia Township*

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

Village of Caledonia

By 2027 or sooner

Less potential for personal injury.

No known progress at this time

No known progress at this time.

#2 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Flooding

Consideration will be given to participation in the National Flood Insurance Program (NFIP). Not all residents are eager to participate, primarily due to concerns about the potential costs to those who might feel a mandate from mortgage providers to purchase insurance. Information about the actual costs of such policies and who they might benefit (or inconvenience) must be weighed against the community's risks from all types of potential flood problems.

Village of Caledonia

By 2027 or sooner

Less potential for personal injury.

No progress at this time

Not currently participating in the NFIP program.

#3 Medium Priority

Strategy:

Primary Responsibility:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Emergency Managers

Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Severe Weather

Strategy: Identify any warning system needs in the township.
Primary Responsibility: Emergency Managers
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: Currently there is a grant application # HMGP 4195 for a second early warning siren to be placed at 230 S Maple. This siren would cover the southern / historic portion of the Village.
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Infrastructure Strengthening

Strategy: Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Primary Responsibility: Board of Commissioners
Implementation: By 2027 or sooner
Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding
2022 Status: No known progress at this time.

#6 Low Priority

Fire - Urban and Structural

Strategy: Consideration of additional fire-related public awareness activities.
Primary Responsibility: Fire Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No known progress at this time
2022 Status: Fire Department website has fire safety tips. Get Ready! Kent County 12 month citizen preparedness program available.

Cannon Township

2020 population 14,379 (up 8% from 2010)

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 High Priority

Strategy:	Water System Failure <u>Consider consolidating private systems and changing to public authority, or possibly just tying all three private systems together</u>
Primary Responsibility:	Water Department
Initiatives Needed:	Secure Funding
Implementation:	To be considered when funding is available.
Cost(s):	Unknown
Benefit(s):	Lessened potential for loss of water due to power failure.
Anticipated Funding:	BRIC Grant, Water & Waste Disposal Loan & Grant Program
2011 Status:	This strategy depends upon funding during times of very tight budgets. No known progress.
2016 Status:	No known progress at this time
2022 Status:	No known progress at this time.

#2 High Priority

Strategy:	Wildfire Mitigation <u>ATV set up to fight fire in wooded area and increase public education.</u>
Primary Responsibility:	Fire Department
Initiatives Needed:	Secure Funding
Implementation:	By 2016 or sooner if funding is available.
Cost(s):	\$30,000-\$40,000
Benefit(s):	Reduce potential for fire damage.
Anticipated Funding:	BRIC Grant, HMGP
2011 Status:	This strategy depends upon funding during times of very tight budgets. No known progress.
2016 Status:	No known progress at this time
2022 Status:	Cannon Township passed a fire department millage in August 2022. The township Facebook page has community outreach. The website has fire education. Fire Department website has fire safety tips. Get Ready! Kent County 12 month citizen preparedness program available.

#3 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

Cannon Township

By 2027 or sooner

Less potential for personal injury.

No known progress at this time

Hazard mitigation needs and concepts being considered for the plan update.

#4 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Emergency Managers

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Severe Weather

Identify any warning system needs in the township.

Emergency Managers

By 2027 or sooner

Less potential for personal injury.

No progress at this time

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#6 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

Board of Commissioners

By 2027 or sooner

Less potential for destruction and disruption.

No progress at this time due to lack of funding

No known progress at this time.

#7 Low Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Communication Failure

Fire Dept. has portable radios. Install a base station & repeater system to allow the township to communicate

Fire Department

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

Cannon Township passed a millage in August 2022.

#8 Low Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities

Fire Department

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

Cannon Township passed a fire department millage in August 2022. The township Facebook page has community outreach. The website has fire education. Fire Department website has fire safety tips. Get Ready! Kent County 12 month citizen preparedness program available.

Cascade Township

2020 population 19,667 (up 15% from 2010)

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

Primary Responsibility:

Cascade Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

Township hazard plan updated passed on 8/16/22.

#2 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Emergency Managers

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
Township phone system replacement
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy:

Severe Weather

Identify any warning system needs in the township.

Primary Responsibility:

Emergency Managers

Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance

Primary Responsibility:

Board of Commissioners

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for destruction and disruption.

2016 Status:

No progress at this time due to lack of funding

2022 Status:

Burton pathway from Spaulding to Patterson Ave. and Cascade pathway from Macnider Ave. to Watermark Dr. Capital Investments Program essential project: Hose replacement for the fire department. Program desirable projects: township hall generator, Medic 11 suburban replacement, Buttrick Station outbuilding, Burton Street Highway Crossing, Bobcat #2 replacement.

#5 Low Priority

Strategy:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities

Primary Responsibility:

Fire Department

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

Fire safety tips available on township website. Various community outreach events throughout the year including free home safety checks, prechool programs, and CPR training. Hosted a Parking Lot Party for the community on 7/29/22 and National Night Out on 8/2/22. Get Ready! Kent County 12 month citizen preparedness program available.

Village of Casnovia
(Kent County) 2010 population 319* (up 2% from 2000)
**Population included with Tyrone Township*

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority
Strategy:

Flooding

Consideration will be given to participation in the National Flood Insurance Program (NFIP). Not all residents are eager to participate, primarily due to concerns about the potential costs to those who might feel a mandate from mortgage providers to purchase insurance. Information about the actual costs of such policies and who they might benefit (or inconvenience) must be weighed against the community's risks from all types of potential flood problems.

- Primary Responsibility: Village of Casnovia
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time
2022 Status: Not currently participating in the NFIP program.

#2 Medium Priority
Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

- Primary Responsibility: Village of Casnovia
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No known progress at this time
2022 Status: No known progress at this time.

#3 Medium Priority

All Hazards

- Strategy: Develop actions to strengthen and maintain emergency notification systems
Primary Responsibility: Emergency Managers
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.

2016 Status: No progress at this time due to lack of funding.
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA’s new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy: Identify any warning system needs in the township.
Primary Responsibility: Emergency Managers
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA’s new Integrated Public Alert and Warning System (IPAWS).

Severe Weather

Identify any warning system needs in the township.

Emergency Managers

By 2027 or sooner

Less potential for personal injury.

No progress at this time

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA’s new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Strategy: Identify potential improvements or projects to strengthen the area’s infrastructure (of all kinds) to increase its hazard-resistance.
Primary Responsibility: Board of Commissioners
Implementation: By 2027 or sooner
Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding
2022 Status: No known progress at this time.

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area’s infrastructure (of all kinds) to increase its hazard-resistance.

Board of Commissioners

By 2027 or sooner

Less potential for destruction and disruption.

No progress at this time due to lack of funding

No known progress at this time.

#6 Low Priority

Strategy: Consideration of additional fire-related public awareness activities.
Primary Responsibility: Fire Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: Get Ready! Kent County 12 month citizen preparedness program available.

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities.

Fire Department

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

Get Ready! Kent County 12 month citizen preparedness program available.

City of Cedar Springs

2020 population 3,627 (up 3% from 2010)

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

Flooding

Consideration will be given to participation in the National Flood Insurance Program (NFIP). Not all residents are eager to participate, primarily due to concerns about the potential costs to those who might feel a mandate from mortgage providers to purchase insurance. Information about the actual costs of such policies and who they might benefit (or inconvenience) must be weighed against the community's risks from all types of potential flood problems.

Primary Responsibility:

City of Cedar Springs

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time

2022 Status:

Not currently participating in the NFIP program.

#2 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

Primary Responsibility:

City of Cedar Springs

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

Master Plan last updated in 2016.

#3 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Emergency Managers

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy: Identify any warning system needs in the township.
Primary Responsibility: Emergency Managers
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

Severe Weather

Identify any warning system needs in the township.

Emergency Managers

By 2027 or sooner

Less potential for personal injury.

No progress at this time

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Strategy: Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance
Primary Responsibility: Board of Commissioners
Implementation: By 2027 or sooner
Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding
2022 Status: Repair work on Main Street over Cedar Creek. A new wastewater treatment plant (and \$3 million into water infrastructure) was built in the last few years. They screen for toxic chemicals.

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance

Board of Commissioners

By 2027 or sooner

Less potential for destruction and disruption.

No progress at this time due to lack of funding

Repair work on Main Street over Cedar Creek. A new wastewater treatment plant (and \$3 million into water infrastructure) was built in the last few years. They screen for toxic chemicals.

#6 Low Priority

Strategy: Consideration of additional fire-related public awareness activities
Primary Responsibility: Fire Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding
2022 Status: Built new fire station with 2021 millage funds. Get Ready! Kent County 12 month citizen preparedness program available.

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities

Fire Department

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding

Built new fire station with 2021 millage funds. Get Ready! Kent County 12 month citizen preparedness program available.

Courtland Township

2020 population 9,005 (up 17% from 2010)

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 High Priority

Wildfire Hazard

Strategy:	<u>Enforce burning permit requirements with additional staff enforcement</u>
Primary Responsibility:	Courtland Township Fire Department
Initiatives Needed:	Develop Program
Implementation:	To be completed with existing staff and overtime during peak fire seasons.
Cost(s):	Unknown
Benefit(s):	Reduce potential for fire damage.
Anticipated Funding:	To be completed with existing staff resources.
2011 Status:	No known request was made for funding beyond local funds.
2016 Status:	No known progress
2022 Status:	Open burning regulations available on the township website. Regular community involvement documented and advertised on Fire Department Facebook page.

#2 Medium Priority

All Hazards

Strategy:	<u>Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.</u>
Primary Responsibility:	Courtland Township
Implementation:	By 2027 or sooner
Benefit(s):	Less potential for personal injury.
2016 Status:	No known progress at this time
2022 Status:	No known progress at this time

#3 Medium Priority

Flooding

Strategy:	<u>Consideration will be given to participation in the National Flood Insurance Program (NFIP).</u> Not all residents are eager to participate, primarily due to concerns about the potential costs to those who might feel a mandate from mortgage providers to purchase insurance. Information about the actual costs of such policies and who they might
-----------	---

benefit (or inconvenience) must be weighed against the community’s risks from all types of potential flood problems.

Primary Responsibility: Courtland Township
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time
2022 Status: Not currently participating in the NFIP program.

#4 Medium Priority

All Hazards
Strategy: Develop actions to strengthen and maintain emergency notification systems
Primary Responsibility: Emergency Managers
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA’s new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Severe Weather
Strategy: Identify any warning system needs in the township.
Primary Responsibility: Emergency Managers
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA’s new Integrated Public Alert and Warning System (IPAWS).

#6 Medium Priority

Infrastructure Strengthening
Strategy: Identify potential improvements or projects to strengthen the area’s infrastructure (of all kinds) to increase its hazard-resistance.
Primary Responsibility: Board of Commissioners
Implementation: By 2027 or sooner
Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding
2022 Status: “By encouraging new development located in proximity to existing or proposed sewer and water facilities, the Township will be in the strongest position to guide

and direct growth. For this technique to be effective, the Township must conduct the Sewer Needs Study and continually monitor the effectiveness of the mechanisms to manage the placement of utilities and infrastructure in the community” (Master Plan)

#7 Low Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities

Fire Department

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding

Regular community involvement documented and advertised on Fire Department Facebook page. Event at Deer Tracks Junction on 6/12/22. Get Ready! Kent County 12 month citizen preparedness program available.

City of East Grand Rapids
2020 population 12,132 (up 13% from 2010)

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

Primary Responsibility:

City of East Grand Rapids

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

Master Plan last updated in 2018.

#2 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Emergency Managers

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy:

Severe Weather

Identify any warning system needs in the township.

Primary Responsibility:

Emergency Managers

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time

2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority Strategy:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

Primary Responsibility:

Board of Commissioners

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for destruction and disruption.

2016 Status:

No progress at this time due to lack of funding

2022 Status:

Hall Street construction with Federal grant STPU funds through MDOT. 2021 sidewalk rehabilitation targeted the area west of Breton to the west city limit and from Boston north to Elmwood. Rehabilitation of 3,167 feet of water main, rehabilitation of 4,187 feet of sanitary sewer, rehabilitation of two sanitary sewer lift stations, and rehabilitation of 166 feet of storm sewer.

#5 Low Priority

Strategy:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities

Primary Responsibility:

Fire Department

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

Township website has information on fire inspections and fire prevention. Get Ready! Kent County 12 month citizen preparedness program available.

Gaines Township

2020 population 28,812 (up 14% from 2010)

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

Gaines Township

By 2027 or sooner

Less potential for personal injury.

No known progress at this time

Master Plan last updated in 2008.

#2 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Flooding

Consideration will be given to participation in the National Flood Insurance Program (NFIP). Not all residents are eager to participate, primarily due to concerns about the potential costs to those who might feel a mandate from mortgage providers to purchase insurance. Information about the actual costs of such policies and who they might benefit (or inconvenience) must be weighed against the community's risks from all types of potential flood problems.

Gaines Township

By 2027 or sooner

Less potential for personal injury.

No progress at this time

Not currently participating in the NFIP program.

#2 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Emergency Managers

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA’s new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy: Identify any warning system needs in the township.
Primary Responsibility: Emergency Managers
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA’s new Integrated Public Alert and Warning System (IPAWS).

Severe Weather

#4 Medium Priority

Strategy: Identify potential improvements or projects to strengthen the area’s infrastructure (of all kinds) to increase its hazard-resistance.
Primary Responsibility: Board of Commissioners
Implementation: By 2027 or sooner
Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding
2022 Status: No progress known at this time.

Infrastructure Strengthening

#5 Low Priority

Strategy: Consideration of additional fire-related public awareness activities
Primary Responsibility: Fire Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: Fire-related public awareness information posted on township website. 9/6/22 post regarding best places to place smoke detectors in your home. Get Ready! Kent County 12 month citizen preparedness program available.

Fire - Urban and Structural

Grand Rapids Township
2020 population 18,9505 (up 13% from 2010)

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community’s master plan.

Primary Responsibility:

Grand Rapids Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

Hazard mitigation needs and concepts being considered for the 2024 plan update.

#2 Medium Priority

Strategy:

Flooding

Consideration will be given to participation in the National Flood Insurance Program (NFIP). Not all residents are eager to participate, primarily due to concerns about the potential costs to those who might feel a mandate from mortgage providers to purchase insurance. Information about the actual costs of such policies and who they might benefit (or inconvenience) must be weighed against the community’s risks from all types of potential flood problems.

Primary Responsibility:

Grand Rapids Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time

2022 Status:

No known progress at this time.

#3 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Emergency Managers

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status: No progress at this time due to lack of funding.
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA’s new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy: Identify any warning system needs in the township.
Primary Responsibility: Emergency Managers
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA’s new Integrated Public Alert and Warning System (IPAWS).

Severe Weather

Identify any warning system needs in the township.

Emergency Managers

By 2027 or sooner

Less potential for personal injury.

No progress at this time

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA’s new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Strategy: Identify potential improvements or projects to strengthen the area’s infrastructure (of all kinds) to increase its hazard-resistance.
Primary Responsibility: Board of Commissioners
Implementation: By 2027 or sooner
Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding
2022 Status: Fulton Street is getting a connection to eastbound I-96. Work also includes constructing a third lane of travel on E I-96 that begins at the new Fulton Street entrance and terminates about a mile away at the Cascade Road exit. MDOT officials say the new eastbound I-96 connection will give motorists more access to the interstate and that the new connection lane will ease congestion and increase safety.

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area’s infrastructure (of all kinds) to increase its hazard-resistance.

Board of Commissioners

By 2027 or sooner

Less potential for destruction and disruption.

No progress at this time due to lack of funding

Fulton Street is getting a connection to eastbound I-96. Work also includes constructing a third lane of travel on E I-96 that begins at the new Fulton Street entrance and terminates about a mile away at the Cascade Road exit. MDOT officials say the new eastbound I-96 connection will give motorists more access to the interstate and that the new connection lane will ease congestion and increase safety.

#6 Low Priority

Strategy: Consideration of additional fire-related public awareness activities
Primary Responsibility: Fire Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: Get Ready! Kent County 12 month citizen preparedness program available.

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities

Fire Department

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

Get Ready! Kent County 12 month citizen preparedness program available.

City of Grandville

2020 population 15,750 (up 2% from 2010)

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. A Grandville 2020 Master Plan has already been produced, so it is not clear when the best opportunity will be to have hazard considerations incorporated into the plan. During the next update process, though, the Grandville Planning Commission should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.

Primary Responsibility:

City of Grandville , Zoning Department

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury

2016 Status:

No known progress at this time

2022 Status:

Master Plan last updated in 2020.

#2 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems
Promote community messaging systems

Primary Responsibility:

Emergency Managers

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy: Identify any warning system needs in the township.
Primary Responsibility: Emergency Managers
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy: Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Primary Responsibility: Board of Commissioners
Implementation: By 2027 or sooner
Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding
2022 Status: No known progress at this time.

#5 Low Priority

Strategy: Consideration of additional fire-related public awareness activities
Primary Responsibility: Fire Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: Fire Department active on Facebook and Twitter with fire-related public awareness and community involvement educational posts.

Additional hazard information and mitigation ideas:

Urban and Structural Fire: Installation of fire stops in older buildings downtown. Standpipes for the critical dune area. Smaller all-wheel drive fire apparatus.

Riverine Flooding: Dredge the Grand River to provide extra flow capacity (better able to accommodate ice flow). Rebuild the Warber Drain to increase its capacity. Seek funding for a study on ice jam mitigation.

Water System Failure: Upgrade current water system.

Electrical Failure: Offsite computer backup system. Burial of power lines.

Intentional Acts: Cameras for security. Cameras and fencing for the power plant

Hazardous Material Release: Emergency preparedness education for citizens

Grattan Township

2010 population 3,621 (up 2% from 2000)

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

Primary Responsibility:

Grattan Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

Master Plan last updated in 2013 and amended in 2018.

#2 Medium Priority

Strategy:

Flooding

Consideration will be given to participation in the National Flood Insurance Program (NFIP). Not all residents are eager to participate, primarily due to concerns about the potential costs to those who might feel a mandate from mortgage providers to purchase insurance. Information about the actual costs of such policies and who they might benefit (or inconvenience) must be weighed against the community's risks from all types of potential flood problems.

Primary Responsibility:

Grattan Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time

2022 Status:

Not currently participating in the NFIP program.

#3 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Emergency Managers

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

New technologies in notification systems have allowed for cell phone applications

for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy:
Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

Severe Weather

Identify any warning system needs in the township.

Emergency Managers

By 2027 or sooner

Less potential for personal injury.

No progress at this time

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS)

#5 Medium Priority

Strategy:

Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

Board of Commissioners

By 2027 or sooner

Less potential for destruction and disruption.

No progress at this time due to lack of funding

Cowan Lake sanitary sewer improvements scheduled, proposed sanitary forcemain along Jenks.

#6 Low Priority

Strategy:
Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities

Fire Department

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

Information on burn permits, power outages, and the township fire and safety committee available on the township website. Held annual pancake breakfast with the public on 5/30/22. Active on Facebook. Get Ready! Kent County 12 month citizen preparedness program available.

Village of Kent City

2020 population 1,229* (up 16% from 2010)

**population included in Tyrone Township*

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

Primary Responsibility:

Village of Kent City

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

Master Plan last updated in 2000 and last reviewed in 2015.

#2 Medium Priority

Strategy:

Flooding

Consideration will be given to participation in the National Flood Insurance Program (NFIP). Not all residents are eager to participate, primarily due to concerns about the potential costs to those who might feel a mandate from mortgage providers to purchase insurance. Information about the actual costs of such policies and who they might benefit (or inconvenience) must be weighed against the community's risks from all types of potential flood problems.

Primary Responsibility:

Village of Kent City

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time

2022 Status:

Not currently participating in the NFIP program.

#3 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Emergency Managers

Implementation:

By 2027 or sooner

Benefit(s): Less potential for personal injury.
2016 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA’s new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Severe Weather
Strategy: Identify any warning system needs in the township.
Primary Responsibility: Emergency Managers
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No known progress at this time
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA’s new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Infrastructure Strengthening
Strategy: Identify potential improvements or projects to strengthen the area’s infrastructure (of all kinds) to increase its hazard-resistance.
Primary Responsibility: Village Staff
Implementation: By 2027 or sooner
Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding
2022 Status: No known progress at this time.

#6 Low Priority

Fire - Urban and Structural
Strategy: Consideration of additional fire-related public awareness activities
Primary Responsibility: Fire Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: Has a volunteer fire department with Tyrone Township. Get Ready! Kent County 12 month citizen preparedness program available.

City of Kentwood

2020 population 52,036 (up 7% from 2010)

NFIP Participant

Hazard Priorities

High: Communication/Cyber Failure, Electrical Failure, Tornado, Transportation (Aircraft) Accident, Water System Failure, Severe Winter Weather

Prioritized Hazard Mitigation Strategies

1. Introduction

In 2005 the City of Kentwood, Michigan adopted, and the Federal Emergency Management Agency (FEMA) approved, a Hazard Mitigation Plan for the City as required by the Federal Disaster Mitigation Act of 2000. In early 2010 the City of Kentwood terminated its independent emergency management program and agreed to participate in the Kent County program. Because Kentwood did not participate in the planning process of the regional Kent County, Ottawa County, and City of Grand Rapids Pre-Hazard Mitigation Plan (“regional plan”), the regional plan must be amended to include a Kentwood supplement.

2. All Hazard Mitigation Plan Review

The City of Kentwood has met FEMA amendment requirements. The City of Kentwood has reviewed the Pre-Hazard Mitigation Plan – Kent County, Ottawa County, City of Grand Rapids, Michigan dated March 18, 2005 and revised March 2006 and is in agreement with the plan’s goals and mitigation strategies.

3. General Information and Unique Aspects

Kentwood is located in Kent County, southeast of Grand Rapids and east of Wyoming. The majority of the Kentwood’s topography is generally flat. Greater changes in elevations are found in the north and central portions of the City. The highest elevation within Kentwood is 805 feet above sea level, found in the central area of the City. The elevation decreases progressively in a southwestern direction, where the lowest elevation is 670 feet above sea level.

There is one river system in Kentwood – Plaster Creek, with numerous tributaries such as Whiskey Creek and Little Plaster Creek. The west half of Kentwood is served by two major drains: Heyboer Drain and the Crippen Drain, which are tributaries to Buck Creek located outside of the city limits. Each of the creek systems have associated wetlands.

Soil types in Kentwood have been identified by the U.S. Department of Agriculture. The soil type in Kentwood is loam followed by sandy soils. Silt and muck are also found in small, isolated areas.

Weather in Kentwood is the same as that of Kent County and the City of Grand Rapids, consistent with non-coastal, western areas of Michigan. The major land use in Kentwood is residential; however, industrial and commercial land uses have a significant presence.

The Kent County Landfill is a 72-acre, closed landfill centrally located within Kentwood, and adjacent to

numerous residential developments. The landfill is listed as a U.S. Environmental Protection Agency Superfund site and is currently being remediated due to soil and groundwater impacts.

Approximately 1.7 miles of Interstate 96 is located in the northeast corner of Kentwood. The interstate serves as a primary transportation route to locations outside of Kentwood. Other major thoroughfares include Broadmoor, East Paris, 28th Street, and 44th Street.

A portion of CSX Railroad is located within Kentwood. The railroad is for freight transportation; there is no passenger rail transportation within the city. The Gerald R. Ford International Airport is located adjacent to Kentwood along the southeastern border in the City of Grand Rapids and Cascade Township. The airport offers numerous flights each day to various national/international locations. A public bus transportation system is offered to residents with connections to five surrounding cities (Grand Rapids, Grandville, Walker, East Grand Rapids, and Wyoming).

The following list of facilities and infrastructures have been identified as critical to providing essential products and services to the general public, preserving the welfare and quality of life of the community, and assuring public safety, emergency response, and disaster recovery.

Schools	Water/Sewer Structures
Public Facilities	Government Buildings
Fire Stations (3)	Community Activities Center
Justice Center	Public Works Facilities
City Hall	Electrical Power and Utilities
Library	Roads

The following top hazards were identified by respondents to the survey questionnaire:

- | | |
|---------------------------|-----------------------|
| 1. Communication Failures | 4. Electrical Failure |
| 2. Tornadoes | 5. Aircraft Accident |
| 3. Water System Failure | 6. Winter Hazards |

Ninety-three percent (93%) of the survey respondents agreed with the goals listed in the regional plan. Ninety-six percent (96%) agreed with the identified Kentwood goals:

- To protect citizens, especially special needs groups, such as the youth and elderly;
- To protect transportation infrastructure and ensure access for emergency response vehicles;

- To train for and coordinate communications and response activities, both internally and across jurisdictions;
- To protect and improve infrastructure in future planning; and
- To create effective education and communication systems between the public and officials.

Hazard Mitigation Actions

Ninety-six percent (96%) of those responding to the survey questionnaire agreed with Kentwood's mitigation actions:

#1 Educate the public about non-emergency hazards, identify tools for citizen mitigation, and encourage personal ownership of mitigation strategies.

#2 Assure that warming and cooling centers have adequate backup power generators.

#3 Accurately identify flood-prone areas. Restrict building permits in floodplain areas. Relocate, elevate or purchase structures in floodplain and other flood-prone areas.

#4 Train all essential services personnel (first responders and Emergency Operations Center staff) in an incident command/management system in coordination with the National Incident Management System (NIMS) requirements so that all incidents are handled in a coordinated, consistent manner.

#5 Enforce and maintain construction codes to ensure buildings' ability to withstand severe weather.

#6 Enforce and maintain construction codes and standards to maintain and preserve a safe and orderly community that mitigates development of blighted conditions, older structures and neighborhoods and eliminates potential dangers while maintaining public services and quality of life.

#7 Ensure access of emergency vehicles to and from affected areas.

#8 Ensure access to needed additional tools, supplies and equipment for emergency response.

#9 Maintain school/city collaboration.

#10 Replace/enhance public warning systems (sirens, City Watch, cable TV)

#11 Evaluate the need for emergency shelters for hazard prone areas.

#12 Maintain adequate staffing in emergency services and organize emergency support teams.

#13 Assure adequate wastewater collection pumping capacity.

#14 Assure adequate water system distribution capacity and reliability.

City of Lowell

2020 population 4,237 (up 12% from 2010)

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps.

City of Lowell , Zoning Department

By 2027 or sooner

Less potential for personal injury

No known progress at this time

Master Plan last updated in 2007.

#2 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Develop actions to strengthen and maintain emergency notification systems
Promote community messaging systems

Emergency Managers

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

Severe Weather

Identify any warning system needs in the township.

Emergency Managers

By 2027 or sooner

Less potential for personal injury.

2016 Status: No progress at this time
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority
Strategy:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

Primary Responsibility:

Board of Commissioners

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for destruction and disruption.

2016 Status:

No progress at this time due to lack of funding

2022 Status:

The city was awarded \$132,000 from a state grant program to help pay for a portion of the \$350,000 Foreman Street sanitary sewer replacement project.

#5 Low Priority

Strategy:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities

Primary Responsibility:

Fire Department

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

Lowell Area Fire Department participates in many community events every year. Their website has information about the city department, open burning in the city, and community events it has participated in. The department's Facebook page is very active with updates on community involvement (9/11/22 weekend they did the GR stair climb and the Neighbors United walk. There are also public awareness posts like the 9/1/22 post reminding the public to test their smoke detectors. Get Ready! Kent County 12 month citizen preparedness program available.

Lowell Township

2020 population 6,765 (up 14% from 2010)

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

Primary Responsibility:

Lowell Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

Master Plan updated in 2022.

#2 Medium Priority

Strategy:

Flooding

Consideration will be given to participation in the National Flood Insurance Program (NFIP). Not all residents are eager to participate, primarily due to concerns about the potential costs to those who might feel a mandate from mortgage providers to purchase insurance. Information about the actual costs of such policies and who they might benefit (or inconvenience) must be weighed against the community's risks from all types of potential flood problems.

Primary Responsibility:

Lowell Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time

2022 Status:

Not currently participating in the NFIP program.

#3 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Emergency Managers

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

New technologies in notification systems have allowed for cell phone applications

for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy:
Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

Severe Weather

Identify any warning system needs in the township.
Emergency Managers
By 2027 or sooner
Less potential for personal injury.
No known progress at this time
New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#5 Medium priority

Strategy:
2022 Status:

Sanitary Sewer Failure Hazard

Attach temporary generator to pumping station, we have a very small and simple public sewer system.
No known progress at this time.

#6 Medium Priority

Strategy:
Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Board of Commissioners
By 2027 or sooner
Less potential for destruction and disruption.
No known progress at this time
No known progress at this time.

#7 Low Priority

Strategy:
Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities
Fire Department
By 2027 or sooner
Less potential for personal injury.
No known progress at this time
Lowell Township Fire Protection and Emergency Services millage was passed on 8/2/22. Lowell Area Fire Department participates in many community events every year. Their website has information about the city department, open burning in the city, and community events it has participated in. The department's Facebook page

is very active with updates on community involvement (9/11/22 weekend they did the GR stair climb and the Neighbors United walk. There are also public awareness posts like the 9/1/22 post reminding the public to test their smoke detectors. Get Ready! Kent County 12 month citizen preparedness program available.

Additional Input, Concerns, and Strategies from the Alto Fire Department:

Water System Failure: No public water system is available.

Tornado: An emergency generator at the fire station is usable for temporary housing of people displaced by tornados and bad weather. A tornado siren is in place. Able to monitor weather conditions from various points in the township.

Wildfire: Distribute pamphlets. Display fire trucks and rescue vehicles when possible. Expand public education and awareness. Fire safety training at the local elementary school. Small fires are to be contained in barrels with 3/4 inch holes in the top of the screen. No burning without permits.

Nelson Township

2010 population 4,764 (up 14% from 2000)

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan in 2017.

Nelson Township

By 2027 or sooner

Less potential for personal injury.

No known progress at this time

Master Plan last updated in 2007.

#2 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

At present, the Township is not connected to an audible emergency warning system that would alert residents. We plan to research to see if there is any grant funding available to help provide this service.

Emergency Managers

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Severe Weather

Identify any warning system needs in the township.

Emergency Managers

By 2027 or sooner

Benefit(s): Less potential for personal injury

2016 Status:

- The Township will have a Damage Assessment Team trained in early 2017.
- It has identified emergency shelters within the Township.
- It has attempted to identify residents that would need assistance in the case of an extreme weather event such those using oxygen generators. Residents have been reluctant to divulge this information.

2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA’s new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority Strategy:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area’s infrastructure (of all kinds) to increase its hazard-resistance.

Primary Responsibility:

Board of Commissioners

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for destruction and disruption

2016 Status:

At present, the Township does not have any major infrastructure. It has no water or sewer system. The Village of Sand Lake does. There are no major bridges, dams or other structures that are located in the Township that need to be hardened.

2022 Status:

No known progress at this time.

#5 Low Priority Strategy:

Flooding

The Township is aware of surface flooding caused by extreme rain events and works with the Kent County Drain and Road Commissions to ensure existing drains and ditching are maintained and improved as necessary

Primary Responsibility:

Road Commissioners

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for destruction and disruption

2016 Status:

In 2016, a review of the flood prone areas in Kent County was conducted as part of the Kent County FEMA Resilience Study. At that time, Nelson Township did not rank as an area that warranted consideration to be included in the National Flood Insurance Program (NFIP). No flood maps were prepared for the Township as a result of the review.

2022 Status:

Not currently participating in the NFIP program.

Oakfield Township

2020 population 6,107 (up 6% from 2010)

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 High Priority

Strategy:	Wildfire Hazards <u>Control of all burning through permits and increased enforcement</u>
Primary Responsibility:	Oakfield Township Fire Department
Initiatives Needed:	Develop program
Implementation:	To be completed with existing staff and overtime during peak fire seasons
Cost(s):	Unknown
Benefit(s):	Reduce potential for fire damage
Anticipated Funding:	To be completed with existing staff resources.
2011 Status:	No known request was made for funding beyond local funds
2016 Status:	No known progress
2022 Status:	Information on fire danger levels and burn permits available on the Township website.

#2 Medium Priority

Strategy:	All Hazards <u>Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.</u>
Primary Responsibility:	Oakfield Township
Implementation:	By 2027 or sooner
Benefit(s):	Less potential for personal injury.
2016 Status:	No known progress at this time
2022 Status:	No known progress at this time.

#3 Medium Priority

Strategy:	Flooding <u>Consideration will be given to participation in the National Flood Insurance Program (NFIP).</u> Not all residents are eager to participate, primarily due to concerns about the potential costs to those who might feel a mandate from mortgage providers to purchase insurance. Information about the actual costs of such policies and who they might benefit (or inconvenience) must be weighed against the community's
------------------	---

risks from all types of potential flood problems.
Primary Responsibility: Oakfield Township
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time
2022 Status: Participating in the NFIP since 9/3/20

#4 Medium Priority

All Hazards
Strategy: Develop actions to strengthen and maintain emergency notification systems
Primary Responsibility: Emergency Managers
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Severe Weather
Strategy: Identify any warning system needs in the township.
Primary Responsibility: Emergency Managers
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No known progress at this time
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#6 Medium Priority

Infrastructure Strengthening
Strategy: Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Primary Responsibility: Board of Commissioners
Implementation: By 2027 or sooner
Benefit(s): Less potential for destruction and disruption.
2016 Status: No known progress at this time
2022 Status: No known progress at this time.

#7 Low Priority

Strategy:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities, Locating vulnerable areas in the township, reducing these areas (with grant assistance) Investigation/prevention plans for businesses

Primary Responsibility:

Fire Department

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

Oakfield Township has an active Facebook page from which they post public awareness information and education (like the 3/12/22 post reminding the public to check their smoke detectors when they change their close for daylight savings time.) Get Ready! Kent County 12 month citizen preparedness program available.

Plainfield Township

2020 population 33,535 (up 8% from 2010)

NFIP Participant

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 High Priority

Strategy:

Jurisdiction:

Primary Responsibility:

Initiatives Needed:

Implementation:

Cost(s):

Benefit(s):

Anticipated Funding:

2011 Status:

Riverine Flooding

Purchase property vulnerable to flooding as funds become available

Plainfield Charter Township

Kent County

Funding Source

To be considered when funding is available

\$130,000 per residential lot @ 63 lots = \$8,190,000

(Based on average property values)

Less potential for flood damage.

BRIC Grant, FMA Grant, HMGP

Plainfield Township expects to purchase at least eight houses - possibly as many as 13 - whose proximity to the Grand River has left them plagued by seasonal flooding. After a delay of a year and a half, the Township Board voted to proceed with using a \$1.1 million grant from the Federal Emergency Management Agency to buy and demolish up to 13 houses that are most in danger of damage from flooding. The cost to the township could be about \$23,500 for title transfers and other work, after \$15,000 was spent a few years ago on engineering and appraisals. The 13 homes that can be bought with the grant are on Konkle and Willow Drives, Abrigador Trail and Riverbank Street. In this voluntary program, homeowners will be offered 75 percent of their homes' appraised value, which is all the federal grant will pay. The township does not plan to provide the other 25 percent.

Township Planner Peter Elam said that the offers, though short of full value, will be favorable to homeowners in many cases, allowing them to get rid of flood-prone, older homes without having to go to market.

Banks are likely to jump at the chance to get rid of five homes that are in foreclosure. However, at least three residents have stated they are not

interested in selling, according to Elam. When the grant program was nearly complete in July 2009, several homeowners said they liked their locations near the river despite repeated flooding. However they also said they might sell for the right price. After the township worked for years on the grant, the FEMA money was tied up in Congress and then in the state. Title work could further stretch the purchases out. Township officials especially want to buy four homes on Konkle Drive that are accessed by a dirt road through the former Grand Isle Golf Course. The township is trying to buy much of the course, which is in the river's flood plain, for a park. Elam is working on another FEMA grant for a similar program that would allow the purchase of 15 other homes in the flood plain.

2016 Status: No known progress at this time
2022 Status: No known progress at this time.

#2 High Priority Strategy:

Water System Failure

We are focusing on **improving security** at the plant and remote locations. Our aim is to deter illegal activities at our sites and detect any attempts to interfere with our ability to deliver safe drinking water. We are also upgrading our fixed-base radio system to improve reliability of our primary communications system.

Primary Responsibility: Water Department
Initiatives Needed: Secure Funding
Implementation: By 2027 or sooner if funding is available.
Cost(s): Unknown \$5,000-10,000 for radio system
Benefit(s): Less potential for loss of system pressure. Anticipated
Anticipated Funding: BRIC Grant, Water & Waste Disposal Loan & Grant Program
2011 Status: In 2008, the West Michigan Water Security Consortium was formed. The purpose of this consortium is to identify risks and vulnerabilities in the water security arena. The consortium also focuses upon sharing information and communication among its members, which include both public and private stakeholders. Training, security software, networking, and best practices have been a focus of this group. Future hazard mitigation funds might be used to enhance and expand those efforts, as well as to explore new technologies.

2016 Status: No known progress at this time
2022 Status: 20 year water distribution system capital improvement project underway.

#3 High Priority Strategy:

Wildfire

Provide information regarding fire safety to the homes that are most at risk

Primary Responsibility: Fire Department
Needed: Secure Funding

Implementation: By 2027 or sooner if funding is available.
Cost(s): Approximately \$2000 for brochures
Benefit(s): Reduce potential for fire damage.
Anticipated Funding: HMGP as well as possible municipal funding
2011 Status: This strategy depends upon funding during times of very tight budgets.
No known progress.
2016 Status: No known progress at this time
2022 Status: Wildfire preparedness and educational materials available on the township website.

#4 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

The township did develop a Flood Mitigation plan in 2007 and has taken more steps toward the consideration of hazard mitigation needs and concepts in its planning processes than many other communities have.

The township's most recent master plan was completed in 2008 and has included some consideration of local hazards. The next update of the community's master plan process should build upon this commendable start.

Primary Responsibility:

Plainfield Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

Hazard mitigation needs and concepts being considered for the 2017 plan update.

#5 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Emergency Managers

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#6 Medium Priority

Strategy:
Primary Responsibility:

Severe Weather

Identify any warning system needs in the township.
Emergency Managers

Benefit(s):
2016 Status:
2022 Status:

Less potential for personal injury.
No known progress at this time
New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#7 Medium Priority

Strategy:
Primary Responsibility:
Implementation:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

Benefit(s):
2016 Status:
2022 Status:

Board of Commissioners
By 2027 or sooner
Less potential for destruction and disruption.
No known progress at this time
No known progress at this time.

#8 Low Priority

Strategy:
Primary Responsibility:
Implementation:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities, Locating vulnerable areas in the township, reducing these areas (with grant assistance)
Investigation/prevention plans for businesses

Benefit(s):
2016 Status:
2022 Status:

Fire Department
By 2027 or sooner
Less potential for personal injury.
No known progress at this time
Township website has fire safety educational resource documents. Get Ready! Kent County 12 month citizen preparedness program available. Participated in Kent County Sheriff's Office's National Night Out educational community event on 8/2/22.

Additional hazard-related information and considerations:

Water System Failure:

In the "What We Have Now" category: a back-up generator with capacity to operate the plant and wells to meet the average day's demand on the system; back-up generators to operate several of our pump stations; the Well Head Protection

program; interconnections with Grand Rapids and Rockford; equipment to perform emergency excavations including lights for night operations; back-up excavation equipment at the Building & Grounds Dept.; and hand-held communications units. We also have a comprehensive contingency plan in place. We are focusing on improving security at the plant and remote locations. Our aim is to deter illegal activities at our sites and detect any attempts to interfere with our ability to deliver safe drinking water. We are also upgrading our fixed-base radio system to improve the reliability of our primary communications system.

Riverine Flood Hazard:

Zoning. Possible purchase of structures within the floodway.

Dam Failure:

Possible purchase of structures within the floodway.

City of Rockford

2020 population 6,579 (up 15% from 2010)

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan. The city has a longer-term (2020) master plan. During an eventual update process for this plan, the Rockford City Planning Commission should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.

Primary Responsibility:

City of Rockford

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

Master Plan last updated in 2020.

#2 Medium Priority

Strategy:

Flooding

Consideration will be given to participation in the National Flood Insurance Program (NFIP). Not all residents are eager to participate, primarily due to concerns about the potential costs to those who might feel a mandate from mortgage providers to purchase insurance. Information about the actual costs of such policies and who they might benefit (or inconvenience) must be weighed against the community's risks from all types of potential flood problems.

Primary Responsibility:

City of Rockford

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time

2022 Status:

Not currently participating in the NFIP program.

#3 Medium Priority

Strategy:
Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

All Hazards

Develop actions to strengthen and maintain emergency notification systems
Emergency Managers
By 2027 or sooner
Less potential for personal injury.
No progress at this time due to lack of funding.
New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy:
Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

Severe Weather

Identify any warning system needs in the township.
Emergency Managers
By 2027 or sooner
Less potential for personal injury.
No known progress at this time
New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Strategy:

Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Board of Commissioners
By 2027 or sooner
Less potential for destruction and disruption.
No progress at this time due to lack of funding
Master Plan advises encouraging the use of green infrastructure elements such as bio-swales, rain gardens, and native plantings for all development and street projects.

#6 Low Priority

Strategy:
Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities
Fire Department
By 2027 or sooner
Less potential for personal injury.
No known progress at this time

2022 Status:

City website has information on fire inspections, burn ordinances/open fires, fire department tours, national fire prevention week, and how to create an escape plan. Get Ready! Kent County 12 month citizen preparedness program available.

Village of Sand Lake

2020 population 1,407* (down 1% from 2010)

*Population included in Nelson Township

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

Primary Responsibility:

Village of Sand Lake

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

Master Plan last updated in 2015.

#2 Medium Priority

Strategy:

Flooding

Consideration will be given to participation in the National Flood Insurance Program (NFIP). Not all residents are eager to participate, primarily due to concerns about the potential costs to those who might feel a mandate from mortgage providers to purchase insurance. Information about the actual costs of such policies and who they might benefit (or inconvenience) must be weighed against the community's risks from all types of potential flood problems.

Primary Responsibility:

Village of Sand Lake

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time

2022 Status:

Not currently participating in the NFIP program.

#3 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Emergency Managers

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status: No progress at this time due to lack of funding.
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.

#4 Medium Priority

Severe Weather
Strategy: Identify any warning system needs in the township.
Primary Responsibility: Emergency Managers
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No known progress at this time
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA’s new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Infrastructure Strengthening
Strategy: Identify potential improvements or projects to strengthen the area’s infrastructure (of all kinds) to increase its hazard-resistance.
Primary Responsibility: Village Staff
Implementation: By 2027 or sooner
Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding
2022 Status: No known progress at this time.

#6 Low Priority

Fire - Urban and Structural
Strategy: Consideration of additional fire-related public awareness activities
Primary Responsibility: Fire Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No known progress at this time
2022 Status: Village website has information about the fire department and burn permits. Get Ready! Kent County 12 month citizen preparedness program available.

Solon Township

2020 population 6,496 (up 9% from 2010)

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

Solon Township

By 2027 or sooner

Less potential for personal injury.

No known progress at this time

Master Plan last updated in 2018.

#2 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Flooding

Consideration will be given to participation in the National Flood Insurance Program (NFIP). Not all residents are eager to participate, primarily due to concerns about the potential costs to those who might feel a mandate from mortgage providers to purchase insurance. Information about the actual costs of such policies and who they might benefit (or inconvenience) must be weighed against the community's risks from all types of potential flood problems.

Solon Township

By 2027 or sooner

Less potential for personal injury.

No progress at this time

Not currently participating in the NFIP program.

#3 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Emergency Managers

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA’s new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy:
Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

Severe Weather

Identify any warning system needs in the township.

Emergency Managers
By 2027 or sooner

Less potential for personal injury.

No known progress at this time

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA’s new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Strategy:
Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area’s infrastructure (of all kinds) to increase its hazard-resistance.

Board of Commissioners
By 2027 or sooner

Less potential for destruction and disruption.

No progress at this time due to lack of funding

No known progress at this time.

#6 Low Priority

Strategy:
Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities

Fire Department
By 2027 or sooner

Less potential for personal injury.

No known progress at this time

Solon Fire Department connects with the public through education, fire safety inspections, fire suppression, fire investigations, emergency medical services, emergency management and disaster response, hazardous materials mitigation and response. The Township’s Facebook page shares public awareness and community involvement posts.

Sparta Township

2020 population 9,395* (up 3% from 2010)

*Population includes the Village of Sparta

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

Primary Responsibility:

Sparta Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

No known progress at this time.

#2 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Emergency Managers

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy:

Severe Weather

Identify any warning system needs in the township.

Primary Responsibility:

Emergency Managers

Implementation:

By 2027 or sooner

Benefit(s): Less potential for personal injury.
2016 Status: No known progress at this time
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority
Strategy:

Infrastructure Strengthening
Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

Primary Responsibility:

Board of Commissioners

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for destruction and disruption.

2016 Status:

No progress at this time due to lack of funding

2022 Status:

No known progress at this time.

#5 Low Priority

Strategy:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities

Primary Responsibility:

Fire Department

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

Sparta Michigan Fire Department website has information on burn permits. Their Facebook page is active with Department updates, training updates, and public awareness posts like the 3/13/22 post reminding the public to check their smoke alarms. Get Ready! Kent County 12 month citizen preparedness program available.

Village of Sparta

2020 population 4,473* (up 8% from 2010)

**Population included in Sparta Township*

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

Primary Responsibility:

Village of Sparta

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

Master Plan last updated in 2015.

#2 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Village of Sparta

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy:

Severe Weather

Identify any warning system needs in the township.

Primary Responsibility:

Emergency Managers

Implementation:

By 2027 or sooner

Benefit(s): Less potential for personal injury.
2016 Status: No known progress at this time
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority
Strategy:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

Primary Responsibility:

Board of Commissioners

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for destruction and disruption.

2016 Status:

No progress at this time due to lack of funding

2022 Status:

No known progress at this time.

#5 Low Priority

Fire - Urban and Structural

Strategy:

Consideration of additional fire-related public awareness activities

Primary Responsibility:

Fire Department

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

Sparta Michigan Fire Department website has information on burn permits. Their Facebook page is active with Department updates, training updates, and public awareness posts like the 3/13/22 post reminding the public to check their smoke alarms. Get Ready! Kent County 12 month citizen preparedness program available.

Spencer Township
2010 population 3,960 (up 8% from 2000)

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

Primary Responsibility:

Spencer Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

No known progress at this time.

#2 Medium Priority

Strategy:

Flooding

Consideration will be given to participation in the National Flood Insurance Program (NFIP). Not all residents are eager to participate, primarily due to concerns about the potential costs to those who might feel a mandate from mortgage providers to purchase insurance. Information about the actual costs of such policies and who they might benefit (or inconvenience) must be weighed against the community's risks from all types of potential flood problems.

Primary Responsibility:

Spencer Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time

2022 Status:

Not currently participating in the NFIP program.

#3 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Emergency Managers

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

New technologies in notification systems have allowed for cell phone applications

for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy:
Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

Severe Weather

Identify any warning system needs in the township.
Emergency Managers
By 2027 or sooner
Less potential for personal injury.
No known progress at this time
New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Strategy:

Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Board of Commissioners
By 2027 or sooner
Less potential for destruction and disruption.
No progress at this time due to lack of funding
No known progress at this time.

#6 Low Priority

Strategy:
Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities
Fire Department
By 2027 or sooner
Less potential for personal injury.
No known progress at this time
Spencer Township Fire Department website has information on open burn permits and community engagement via their News page. The Township has a Facebook page educational and public awareness posts.

Tyrone Township

2020 population 5,021* (up 6% from 2010)

**Population includes the Villages of Casnovia and Kent City*

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

Primary Responsibility:

Tyrone Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

Master Plan in process of a 2021 update.

#2 Medium Priority

Strategy:

Flooding

Consideration will be given to participation in the National Flood Insurance Program (NFIP). Not all residents are eager to participate, primarily due to concerns about the potential costs to those who might feel a mandate from mortgage providers to purchase insurance. Information about the actual costs of such policies and who they might benefit (or inconvenience) must be weighed against the community's risks from all types of potential flood problems.

Primary Responsibility:

Tyrone Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time

2022 Status:

Not currently participating in the NFIP program.

#3 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Emergency Managers

Implementation:

By 2027 or sooner

Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy: **Severe Weather**
Identify any warning system needs in the township.
Primary Responsibility: Emergency Managers
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No known progress at this time
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Strategy: **Infrastructure Strengthening**
Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Primary Responsibility: Board of Commissioners
Implementation: By 2027 or sooner
Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding
2022 Status: Helping the Grand Valley Metro Council develop the next Metropolitan Transportation Plan for the region.

#6 Low Priority

Strategy: **Fire - Urban and Structural**
Consideration of additional fire-related public awareness activities
Primary Responsibility: Fire Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No known progress at this time
2022 Status: The Tyrone Township Fire Department has purchased a new pumper/rescue truck. Kent County 12 month citizen preparedness program available.

Vergennes Township
2020 population 4,741 (up 13% from 2010)

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

Vergennes Township

By 2027 or sooner

Less potential for personal injury.

No known progress at this time

Master Plan updated in 2017.

#2 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Flooding

Consideration will be given to participation in the National Flood Insurance Program (NFIP). Not all residents are eager to participate, primarily due to concerns about the potential costs to those who might feel a mandate from mortgage providers to purchase insurance. Information about the actual costs of such policies and who they might benefit (or inconvenience) must be weighed against the community's risks from all types of potential flood problems.

Vergennes Township

By 2027 or sooner

Less potential for personal injury.

No progress at this time

Not currently participating in the NFIP program.

#3 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Emergency Managers

By 2027 or sooner

Less potential for personal injury.

2016 Status: No progress at this time due to lack of funding.
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy: Identify any warning system needs in the township.
Primary Responsibility: Emergency Managers
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No known progress at this time
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

Severe Weather

Identify any warning system needs in the township.

Emergency Managers

By 2027 or sooner

Less potential for personal injury.

No known progress at this time

2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Strategy: Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Primary Responsibility: Board of Commissioners
Implementation: By 2027 or sooner
Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding
2022 Status: No known progress at this time.

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

Board of Commissioners

By 2027 or sooner

Less potential for destruction and disruption.

No progress at this time due to lack of funding

No known progress at this time.

#6 Low Priority

Strategy: Consideration of additional fire-related public awareness activities
Primary Responsibility: Fire Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No known progress at this time
2022 Status: Lowell Area Fire Department participates in many community events every year. Their website has information about the city department, open burning in the city, and community events it has participated in. The department's Facebook page is very active with updates on community involvement (9/11/22 weekend they did the GR stair climb and the Neighbors United walk. There are also public awareness posts like the 9/1/22 post reminding the public to test their smoke detectors. Get Ready! Kent County 12 month citizen preparedness program available.

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities

Fire Department

By 2027 or sooner

Less potential for personal injury.

No known progress at this time

2022 Status: Lowell Area Fire Department participates in many community events every year. Their website has information about the city department, open burning in the city, and community events it has participated in. The department's Facebook page is very active with updates on community involvement (9/11/22 weekend they did the GR stair climb and the Neighbors United walk. There are also public awareness posts like the 9/1/22 post reminding the public to test their smoke detectors. Get Ready! Kent County 12 month citizen preparedness program available.

City of Walker

2020 population 24,909 (up 6% from 2010)

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

City of Walker

By 2027 or sooner

Less potential for personal injury.

No known progress at this time

Master Plan last updated in 2020.

#2 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

City of Walker

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

Severe Weather

Identify any warning system needs in the township.

Emergency Managers

By 2027 or sooner

Less potential for personal injury.

No known progress at this time

2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

Emergency Managers

By 2027 or sooner

Less potential for destruction and disruption.

No progress at this time due to lack of funding

Walker seeks to implement a cost-effective program consisting of both bridge removal and preventative maintenance measures to maximize the useful service life and safety of the local bridges under its jurisdiction. This is accomplished by performing as-needed bridge projects based upon results of biennial bridge inspections. Walker's preservation of stormwater assets strategy is to maintain, repair, replace, and upgrade stormwater assets on an as-needed basis. Project opportunities identified in the Stormwater Asset Management Plan have also been included in the Capital Improvement Plan for funding considerations.

#5 Low Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities

Fire Department

By 2027 or sooner

Less potential for personal injury.

No known progress at this time

City of Walker website has information on fire prevention, residential burning, fire safety, community events, and training and inspections. The website has a FAQ section for public information. The Fire Department Facebook page has community involvement and public awareness posts like the 9/9/22 post reminding residents to put candles out before going to sleep and using battery-operated flameless candles.

City of Walker Fire Department Input, Concerns, and Strategies:

Extreme Temperatures:

Through our emergency plan we have planned for sheltering in the event of extreme temperatures. We can also check on the elderly with the help of the police department.

Thunderstorms:

We have an early warning system in Walker utilizing outdoor sirens. We have a protocol that determines when the sirens are to be activated in cooperation with the rest of Kent County. We also have an emergency operations plan for dealing with severe weather. We have established

protocols based on National Weather Service information for public notification through the media.

Wildfire:

We try to keep our residents in wildfire risk areas informed of proper preventive measures. We have a fire department with equipment and operating procedures for handling wildfires. We also have mutual aid agreements with neighboring fire departments to assist us with their wildfire firefighting equipment.

Severe Winter Weather:

We have an early warning system in place utilizing outdoor warning sirens. We have established protocols based on National Weather Service information for public notification through the media.

Tornado:

We have an early warning system in place utilizing outdoor warning sirens. We also have an emergency operations plan for tornadoes, in conjunction with Kent County. We have established protocols based on National Weather Service information for public notification through the media.

Urban and Structural Fire:

We have an established fire department with equipment and operating procedures to control a structural or urban fire incident. We also have an established fire prevention and public fire education program to educate business owners and homeowners in the prevention of fires. Our fire codes also help us reduce the risk of structure fires and so do our Construction Codes. Our building department issues building permits only on projects that are being constructed according to the codes and ordinances. Once construction begins the projects are periodically inspected by the building department and the fire department. When construction is complete and the building is occupied the fire department conducts annual maintenance inspections of our commercial and industrial occupancies to reduce the risk of fire and injuries from fires by proper storage and maintenance in the building.

Other Fire Hazards:

We have codes and ordinances that prohibit these types of fires. The fire department also has the equipment and procedures to effectively handle these types of fires should they occur despite our efforts to prevent them. We do allow the burning of branches, twigs and other lawn materials during specific periods of time and under very strict guidelines.

Urban Flood:

Our emergency operations plan does provide for a process for sandbagging if necessary along the banks of the Grand River. We have a very extensive storm water system. We also have ordinances and codes that address storm water issues, including retention and detention as well as the flow of water into streams and rivers. We are proposing some improvements to the York Creek Watershed to reduce the risk and impact of downstream flooding. We are looking at the possibility of reducing the flooding prospects in our York Creek watershed. The plan being proposed is still in development.

Electrical Failure:

We would rely on Consumers Energy for any public electrical infrastructure failures. All of the City's buildings have back-up

generators. The fire department has 10 portable generators available for emergency situations in our community. We also have an emergency operating plan to aid us in these situations. We are currently upgrading our backup system for our Public Safety Building that includes Fire Headquarters, Police Headquarters and Court. Currently only certain systems and areas of this building were supplied by the generator. After further evaluation we have been told the backup generator can handle the entire building so changes are being made to accomplish that.

Communications Failure:

In the event of a failure of our communications system, both Kent County and Grand Rapids can assist us.

We are constructing a new fire station remote from our City Hall. We propose to equip this building as an Emergency Operations Center as well as having back up communications capabilities.

Intentional Acts:

We have trained our personnel to the Operations level for Weapons of Mass Destruction. They also have been trained in Unified command, Incident Command and NIMS.

Sanitary Sewer Failure:

Our sanitary sewer system is owned and maintained by Grand Rapids Water and Sewer Dept. Any failure or emergencies involving the sewer system would be handled by them.

Water System Failure:

Our water system is owned and maintained by Grand Rapids Water Dept. Any loss of water would be dealt with by them.

Transportation Hazards:

We have developed transportation plans for vehicular as well as railroad incidents. We know the most common routes used to transport hazardous materials. We also have been able to determine the 25 most common hazardous materials transported through our city and the MSDS sheets for those products. Continue to update our plans as we receive new information on hazardous materials being transported through our city .

Hazardous Material Hazard:

The Walker Fire Department personnel are all trained to the Hazardous Materials Operations level. We also contract with the city of Wyoming to provide us with Hazardous Materials response at the technician and specialist level. We also can utilize Grand Rapids Haz Mat Response team as part of our mutual aid agreements. We have site plans written through LEPC as well as Firefighter Right To Know on many of our buildings that have hazardous materials on site. We also have a plan for transportation incidents and truck terminal incidents. We continue to upgrade our hazmat response plans and survey our city to find any new occupancies that have hazardous materials on their premises

2011 Status:

The City of Kentwood prepared a survey questionnaire (City of Kentwood Hazard Mitigation Plan Survey – 2010) that asked a wide range of questions concerning the opinions of the public regarding natural and human caused hazards, agreement with regional and local (Kentwood) goals, agreement with proposed Kentwood mitigation actions, and methods for providing hazard information to the public. A Hazard Mitigation Plan Workshop was held on May 7, 2010. Eleven

(11) members of the Local Planning Team reviewed the planning process and requirements and completed the survey questionnaire. At the meeting on June 15, 2010 a presentation was made to the Safety Committee of the Kentwood City Commission about the update/amendment requirements. The Safety Committee meetings are open, public meetings. Copies of the survey questionnaire were distributed.

In June the Kentwood Hazard Mitigation Plan Survey was mailed to approximately 250 people who had been identified as “community leaders.” In addition, the survey was posted on the City’s website for broader public input, and an article in the June 21, 2010 Grand Rapids Press further publicized the process and provided the web address for public access to the survey. As of the July 31, 2010 deadline, eighty-four

(84) surveys had been completed and returned.

On September 10, 2010 the Local Planning Team met to review the regional Kent County, Ottawa County, and City of Grand Rapids Pre- Hazard Mitigation Plan, evaluate responses to the Kentwood survey questionnaire, and prepare a draft supplement to the regional plan. The Local Planning Team recommended that the Kentwood City Commission, by resolution:

Adopt the regional Kent County, Ottawa County, and City of Grand Rapids Pre-Hazard Mitigation Plan;

Adopt the Kentwood amendment to the regional Kent County, Ottawa County, and City of Grand Rapids Pre-Hazard Mitigation Plan;

Request review of the Kentwood amendment by the Michigan State Police/Emergency Management Division and Federal Emergency Management Agency, Region V officials and approval contingent upon adoption by Kent County, Ottawa County, and the City of Grand Rapids; and Request that Kent County, Ottawa County, and the City of Grand Rapids adopt the City of Kentwood amendment (supplement) to the regional plan.

The Kentwood City Commission held a public hearing on the proposed Kentwood amendment to the Kent County, Ottawa County, and City of Grand Rapids Pre-Hazard Mitigation Plan on September 20, 2010 and adopted Resolution 69-2010 to approve the proposed Kentwood amendment and adopt the regional plan with the Kentwood amendment.

2016 Status:

No known progress at this time

2022 Status:

Carry Forward

City of Wyoming
2020 population 76,501 (up 6% from 2010)

NFIP Participant

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Dam Failure, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

City of Wyoming

By 2027 or sooner

Less potential for personal injury.

No known progress at this time

Hazard mitigation needs and concepts considered for the 2019 plan update.

#2 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Emergency Managers

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

Severe Weather

Identify any warning system needs in the township.

Emergency Managers

By 2027 or sooner

Less potential for personal injury.

2016 Status: No known progress at this time
2022 Status: New technologies in notification systems have allowed for cell phone applications for citizens. The applications are provided by the National Weather Service, American Red Cross, as well as many of the local media outlets. Emergency management has been making a rigorous effort via informational releases from our public information officers, as well as local media venues for the purchase and use of NOAA weather radios and smartphone apps.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority
Strategy:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

Primary Responsibility:

Board of Commissioners

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for destruction and disruption.

2016 Status:

No progress at this time due to lack of funding

2022 Status:

2022 Federal Resurfacing Projects: 36th St, Burlington Ave to Clyde Ave; Eastern Ave, 36th St to 44th St

2022 Wyoming Resurfacing Projects: Fisher Ave, 54th St to South End; Plaster Creek Blvd, Buchanan Ave to Division Ave.

Beverly Street Railroad Crossing, Watermain Construction on 8 streets, sanitary sewer lining in various locations, Mallard's Cove Storm Enclosure, Non-motorized train construction at Plaster Creek Blve from Buchanan Ave to Division Ave, and crack sealing preventative maintenance.

#5 Low Priority

Strategy:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities

Primary Responsibility:

Fire Department

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress at this time

2022 Status:

Provide fire safety education, host tours, and are involved in community event. Community education includes school programs and station tours. Get Ready! Kent County 12 month citizen preparedness program available.

City of Wyoming Fire Department Input, Concerns, and Strategies:

Wildfire:

Although the City of Wyoming does not have large areas of open space, the city does have a burning ordinance that prohibits any open burning.

Tornado:

The City of Wyoming currently has Emergency Management Warning Sirens which cover approximately 90% of the City. These sirens are controlled, via radio, through the Grand Rapids Fire Department dispatch center. To provide coverage with EM Warning sirens to the remainder (approximately 10%) of the city and to replace older units.

- Severe Winter Weather:** The City of Wyoming has its own Public Works department which provides for all snow and ice removal in the City.
- Urban and Structural Fire:** The City of Wyoming provides fire safety education and code enforcement inspections. The City is also served by a combination fire department.
- Electrical Failure:** All the essential service buildings in the City of Wyoming are equipped with automatic backup generators.
- Intentional Acts:** - The Wyoming Fire Department Team is equipped and trained to handle CBRNE and WMD incidents. Team members are also part of the State Regional Response Team Network (RRTN).
- Hazardous Material:** The Wyoming Fire Department also operates a Hazardous Materials Response team.
- Water System Failure:** The City of Wyoming has its own water and public works facilities with emergency action plans in place.
- Sanitary Sewer Failure:** The City of Wyoming has its own Sanitary Sewer department with emergency plans in place.
- Thunderstorms:** The Red Cross currently has predetermined evacuation sites for any residents that may be displaced by a flood and/or severe storms.

Ottawa County

2020 population 296,200 (up 12% from 2010)

NFIP Participant

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 High Priority

Severe Weather - Thunderstorms, Tornadoes

Strategy:

Assist in adding sirens to regions as requested by jurisdictions.

Primary Responsibility:

Emergency Management

Initiatives Needed:

Funding source

Implementation:

Update sirens By 2027 or sooner, add sirens as requested by jurisdictions.

jurisdictions Benefit(s):

Less potential for personal injury.

Anticipated Funding:

BRIC Grant

2011 Status:

Since the last edition of this plan, Ottawa County has added 13 warning sirens to its system totaling 73 sirens. Sirens were also upgraded to 2-way sirens so that all are now 2-way.

2016 Status:

No additional sirens added change due to lack of funds.

Park Twp. applied for a hazard Mitigation grant for a siren but was not selected.

2022 Status:

New technology has enabled Ottawa County Central Dispatch (OCCD) to activate the sirens for a countywide warning as well as a warning just for the north or south sections of the county.

#2 High Priority

Severe Weather - Emergency Notification

Strategy:

Investigate and acquire new warning technology.

Primary Responsibility:

Ottawa County

Initiatives Needed:

Funding source

Implementation:

By 2027 or sooner if funding is available.

Cost(s):

Reverse 911 system \$100,000;

Benefit(s):

Less potential for personal injury.

Anticipated Funding: Federal mitigation grants as well as other funding sources if available.
 2011 Status: A "reverse 911" system was purchased, named CityWatch. It is an automatic call handler that calls multiple phone lines per minute and is used for notification purposes, capable of covering the entire county. One AM transmitter was also purchased. Other grant funds have been used to purchase the satellite-based EM Net system for Ottawa County.

2016 Status: Ottawa Emergency Management retired the antiquated CityWatch system and purchased RAVE's emergency notification system instead which includes IPAWS. Rave was chosen so that Emergency Management could work seamlessly with the countywide 911 system that already works with RAVE Smart 911 products.

2022 Status: New technology has enabled Ottawa County Central Dispatch (OCCD) to activate the sirens for a countywide warning as well as a warning just for the north or south sections of the county.
 FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 High Priority Strategy:

Flood - Riverine

Take measures to mitigate flood damage and reduce vulnerability to existing structures.

Primary Responsibility:

Building Inspector

Initiatives Needed:

Funding Source

Implementation:

To be considered when funding is available.

Benefit(s):

Less Potential for flood damage.

Anticipated Funding:

BRIC Grant, FMA Grant.

2011 Status:

So far, homeowners have elevated 5 houses on Van Lopik and 1 house on Limberlost.

2016 Status:

One additional home has been elevated and one property is rebuilding a garage which will be equipped with floodgates per MDEQ and township zoning requirements.

(For further detail see Robinson Township in this section.)

2022 Status:

No known progress at this time.

#4 High Priority Strategy:

Urban Flooding

Identify infrastructure vulnerabilities resulting in urban flooding.

Primary Responsibility:

Ottawa County Road Commission

Initiatives Needed:

Funding Source

Implementation:

By 2027 or sooner if funding is available.

Benefit(s):

Less potential for urban flooding in several areas of the county.

Anticipated Funding:

BRIC Grant, FMA Grant

Potential Project Areas:

1. Coolidge Street west of 16th Avenue, Sec 26 Chester Township:

Remove and replace dual 95x67 metal culverts with an adequately sized concrete box culvert. History : Upstream parcel floods, house and outbuilding at risk. Frequent Coolidge overtopping reported.

2. Riley from 136th Avenue to Butternut Drive, Sec 7 Holland Township:

Relocate/enclose Drain #30 which is located along the north side of Riley either side of the West Ottawa Public School access drive. History: This open drain is close to the existing road and slopes are extremely steep, creating a hazard for riparian residential housing and the nearby West Ottawa Elementary School. This drain is often the recipient of dumped garbage, which slows storm water drainage for upstream flood-prone areas such as the Chesapeake Manor Subdivision.

3. Ottawa Beach Road at Anchorage Marina, Sec 27 Park Township: Install new culvert under Ottawa Beach Road and storm drain for the northwest quadrant of the new crossing. History: Frequent flooding of Anchorage Marina and high water levels on property upstream of a failing 36" metal culvert. The deteriorating culvert resulted in a sinkhole in the pedestrian path in 2004.

4. Main Street from Arch to Jackson. Marne, MI located in Sec 35 Wright Township: Install storm drainage outlet to Dayton Drain or other acceptable storm water drainage system. A county Drain should be established. History: Existing Main Street storm at this location has no outlet, which causes flooding of a public road and private property .

5. Leonard Road approx 570' west of 68th Ave., Polkton Township: Existing 10.3x6.2' steel beam type drainage structure located under Leonard has developed sinkholes after periods of high flow. The structure should be replaced with one that is adequately sized. Also, a storm sewer should be placed to the west along the north side of the road to ease the flooding problem at the intersection of Church Street. History: repeated patching of culvert approaches has been necessary, and ponding of water on the north side of Leonard at Church Street is a danger to the traveling public.

6. 104th and Perry. Sec 23,24,25,26 Holland Township: Remove and replace the drainage structures in Drain 4 and 43 located under Perry and 104th and rebuild as one structure with associated pedestrian path and intersection improvements. History: Drain 15 and 17 at this location has had a history of overtopping Perry Street. CMP type road crossings at this location are undersized and in questionable condition. A deep open drain between Perry and 104th is a safety concern for pedestrian path and public road users. Flood levels on developed private property are a concern to the east of 104th Avenue.

7. 64th Avenue north of Adams Street. Drenthe, Sec 26/27 Zeeland Township: Remove and replace the dual 96" diameter metal culverts located under 64th approximately ¼ mile north of Adams with a single concrete box culvert. History: 64th Ave is a primary road and a main corridor for north-south traffic. The condition of the culvert and high velocities in the stream are causing sinkholes in the asphalt road surface above. The metal culverts are perched, causing erosive scour at their downstream end. The culverts also catch debris at their upstream end, limiting capacity and raising upstream flood levels. The Zeeland Fire

Station at the NW quad of 64th and Adams uses 64th as the primary corridor north for emergency services.

8. South Shore Drive 175' west of Park Street. Sec 34 Park Township: Remove and replace the drainage structure under South Shore Drive in the Kelly Lake Intercounty Drain. History: This concrete slab structure is deteriorated and has multiple openings. South Shore Drive is one of only 2 emergency access outlets for Macatawa, MI. Multiple openings have a history of catching debris, which reduces the capacity of the stream and raises upstream flood levels. A single span structure is proposed, with some sheeting work necessary along the banks, to tie into existing private sheet piling. Proposed work must take into account downstream sediment, and basin maintenance that is regularly performed by the Intercounty Drainage Board.

9. Riley Street ¼ mile west of 152nd Avenue. Sec 11/14 Park Township: Remove and replace the drainage structure under Riley Street in the Number 37 County Drain. History: The original structure was extended with 2-chamber timber box at each end, causing obstruction collection and an associated untimely rise in upstream flood levels. A single span structure is proposed. Riley Street is a main east–west corridor with growing demands due to residential development in Park and Holland Townships and the location of the new West Ottawa Middle School complex at 152nd and Riley.

10. State Street east of 130th Avenue. Sec 9/16 Crockery Township: Remove and replace the triple 81x59” metal culverts located under State Street with a single opening concrete box culvert. History: Sink holes are occurring on road shoulders at structure after periods of high flow. Culvert is perched at the south (downstream end), causing erosive scour of the stream bottom and contributing to culvert undermining.

2022 Status:

Culvert replacement on 16th Avenue and Riley Street. Culvert improvement planned for 104th Avenue at Perry Street and Beeline Street at Greenly Street.

Work continued on the \$5.4 million South Shore Drive project to upgrade infrastructure; it includes watermain, sanitary sewer and storm sewer work, ADA sidewalk ramps and reconstruction of the roadway.

#5 High Priority

Strategy:

Primary Responsibility:

Initiatives Needed:

Implementation:

Benefit(s):

Anticipated Funding:

Communication/Cyber Failure

Identify infrastructure vulnerabilities.

Utility Companies

Funding Source

By 2027 or sooner if funding is available.

Higher security through less potential for long term interruption of communications.

BRIC Grant

2011 Status: In 2010, the West Michigan Cyber Security Consortium was formed. The purpose of this consortium is to identify risks and vulnerabilities in the cyber arena, which includes IT and communications. Training, security software, networking, and best practices have been a focus of this group. Future hazard mitigation grant funds can be used to enhance and expand these efforts, and to explore new technology.

2016 Status: The West Michigan Cyber Security consortium has grown to over 600 agencies in both the private and public sector. Meetings and held quarterly with presenters on cyber security related topics. In 2016 two exercises were done by the Department of Homeland Security. In March of 2016 members of this committee met with US Senator Gary Peters to discuss our cyber-related activities.

2022 Status: 2021 presentations from Cybersecurity and Infrastructure Security Agency (CISA) and Secure Ideas on emerging threats in the cyber landscape.

#6 High Priority Strategy:

Communication Disruption

A communication tower is needed in some portions of the county to assure coordination for public safety where signals aren't as strong as others.

Primary Responsibility: Ottawa County Central Dispatch

Initiatives Needed: Funding source

Implementation: By 2027 or sooner if funding is available.

Cost(s): Unknown

Benefit(s): Higher security through less potential for long term interruption of communications.

Anticipated Funding: BRIC Grant

2011 Status: This strategy depends upon funding during times of very tight budgets. No known progress at this time. .

2016 Status: Ottawa County is adding communication tower capacity in 3 locations at the time of this writing, in part, to accommodate the 800MHz project. Ottawa County Central Dispatch uses an extended version of Smart911.

2022 Status: Since the 2017 HMP, three public safety communications towers (Chester Township 6405, Grand Haven Water Tank Hill 6406, Jamestown Township. 6412) and one new site (Holland Water Tank Site) to improve comms/coverage have been built.

#7 High Priority Strategy:

Electrical Failure

Work with local utility companies to develop a plan for dealing with communication disruptions.

Primary Responsibility: Ottawa County

Initiatives Needed: Funding source

Implementation: By 2027 or sooner if funding is available.

Benefit(s): Higher security through less potential for long-term interruption of communication.

Anticipated Funding: Federal mitigation grants as well as other funding sources if available.

2011 Status: The West Michigan Cyber Security Consortium was formed which provided opportunity to build relationships with especially the private sector in the region.

2016 Status: Consumers Energy, the company that provides electricity and gas to most

of the region, has implemented an outreach program for emergency managers and PSAPs that is working very well, especially prior to, and during inclement weather.

Ottawa Co. has met with Consumers Power to establish clear and consistent lines of communication for power outages in Ottawa County.

2022 Status:

#8 High Priority
Strategy:

Electrical Failure

A portable 75 kw generator to provide backup power for OCRC Public Utilities operated sanitary sewer lift stations and water metering stations during power outages. OCRC Public Utilities currently operates approximately 30 lift/metering stations and has only one portable generator for backup power. 50 kw generators stations for OCRC Hudsonville and Coopersville garages are needed to assure timely emergency services for the public during power shortages. Existing 5000 watt portable generators are sufficient only to open doors and provide minimal lighting.

Primary Responsibility:

Ottawa County Road Commission

Initiatives Needed:

Secure Funding

Implementation:

By 2027 or sooner if funding is available.

Cost(s):

\$50,000

Benefit(s):

Safer operations with lower potential for security breach.

Anticipated Funding:

Federal Mitigation grants as well as other funding sources if available.

2011 Status:

This strategy depends upon funding during times of very tight budgets. No known progress at this time. .

2016 Status:

Same

2022 Status:

Completed

#9: Medium priority
Strategy:

All Hazards - Master Plan Consideration

Give consideration to hazard mitigation needs and concepts in the next update of the master plan and associated zoning maps throughout the county's jurisdictions. Since this strategy can only be implemented at the township, city, or village level, its mention here concerns the giving of information and encouragement by the county to support such local plan revisions.

Primary Responsibility:

Ottawa County

Initiatives Needed:

Speak with boards and planning managers to encourage consideration.

2022 Status:

Metropolitan Planning Organizations report updated in 2020.

#10: Medium priority
Strategy:

All Hazards - Infrastructure Strengthening

Identify potential projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

2016 Status:

A critical infrastructure project began in Ottawa County in 2013 and continues. This project connects surveillance cameras to a system that can be viewed on the floor of the PSAP center as well as the EOC.

2022 Status:

The Road Commission's 2023- 2027 Strategic Improvement Plan (SIP) is now in development and the draft version is available for

review on the OCRC's website.

New gas-fired combined cycle electric generation power plant built on the east side of the city.

Improvements to the Holland Area Water Reclamation Facility (WRF) were completed.

Allendale Township

2020 population 20,708 (up 28% from 2010)

NOTE: The township's economy is predominantly oriented around Grand Valley State University (GVSU), which is also the predominant organization involved in local funding and implementation activities for hazard mitigation projects since most of that population is connected with the university. University enrollment (2016-2017) included 25,460 students (both graduate and undergraduate) and nearly 3,500 support staff and faculty. The university enrollment exceeds the township's permanent (census) by several thousand. Because of the prominence of GVSU within the township and the fact that the university's activities affect most of the township's population, most of the hazard mitigation strategies listed here for the township are either, or also under the charge of the university.

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 High Priority

Strategy:

Primary Responsibility:

Implementation:

2022 Status:

All Hazards

Master Plan consideration. The next update of this plan should include a consideration of hazard mitigation concepts and strategies.

Allendale Township although coordination with Ottawa County Emergency Management is likely.

Proceed through 2027

The Planning Commission is currently in the process of updating the Master Plan

#2 High Priority

Strategy:

Primary Responsibility:

Implementation:

2016 Status:

2022 Status:

All Hazards

Develop actions to strengthen and maintain emergency notification systems serving the township beyond the Grand Valley State University campus.

Allendale Township

Coordination with Ottawa County Emergency Management

Ottawa County Central Dispatch and Emergency Management provide emergency notification via EM Net, sirens, and Rave notification system (capable of IPAWS). Project complete.

Completed

#3: Medium Priority

Strategy:

Primary Responsibility:

2016 Status:

2022 Status:

Infrastructure Protection

Identify potential improvements or projects to identify and strengthen the area's infrastructure (other than GVSU) to increase its hazard-resistance, in addition to those potential improvements already studied/proposed for the GVSU campus.

Board of Commissioners

Focus has been on GVSU. No known progress at this time. .

Applied for BRIC funding for pressure sewer improvements.

The Michigan Department of Transportation awarded a state Transportation Economic Development Fund (TEDF) Category F grant of \$375,000 to the Ottawa County Road Commission to improve 68th Avenue from M-45 to the Grand River. The Ottawa County Road Commission rehabbed the 68th Avenue bridge over the Grand River.

#4 Low Priority

Strategy:

Primary Responsibility:

2022 Status:

Fire Preparedness

Consideration of additional fire-related public awareness and training activities beyond those already covered by Grand Valley State University and its students and campus area.

Fire Department

Broke ground on new fire station in May 2022. Fire Prevention Open House in 2021

Blendon Township

2020 population 7,081 (up 23% from 2010)

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

All Hazards

Master Plan consideration. During the next planning process, the Blendon Township Planning Commission should give consideration to hazard mitigation concepts and concerns and adjust the master plan to accommodate viable hazard-related strategies.

Primary Responsibility:

Blendon Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2022 Status:

Master Plan updated in 2018.

#2 Medium Priority

Strategy:

All Hazards

Enhance emergency notification. Develop actions to strengthen and maintain emergency notification systems.

Primary Responsibility:

Emergency Management

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No known progress within the township due to lack of funding, however the township depends on the county EOC and Dispatch Center for emergency notification which works quite well.

2022 Status:

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy:

Severe Weather

Identify any warning system needs in the township.

Primary Responsibility:

Emergency Management

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

An updated outdoor warning siren is desirable, however there is no known progress due to lack of funding.

2022 Status:

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

Board of Commissioners

By 2027 or sooner

Less potential for destruction and disruption.

No known progress.

Culvert improvement planned for 96th Avenue at Van Buren Street.

#5 Low Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities.

Fire Department

By 2027 or sooner

Less potential for personal injury.

No known progress.

Smoke alarm public awareness in March 2019. Fire Prevention Open House in 2021

Chester Township

2020 population 2,096 (up 4% from 2010)

Not a NFIP Participant

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 High Priority

Strategy:

Extreme Temperature, Tornado, and Severe Winter Weather

Identify additional emergency shelter sites by adding back-up power to these sites.

Primary Responsibility:

Emergency Management

Initiatives Needed:

Funding source

Implementation:

By 2027 or sooner if funding is available.

Cost(s):

\$40,000 for one generator.

Benefit(s):

Less potential for personal injury.

Anticipated Funding:

BRIC Grant

2016 Status:

This strategy depends upon funding during times of very tight budgets. No known progress due to lack of funding

2022 Status:

No known progress. No national shelter systems are in the township but two emergency shelters with stand-by power and infrastructure are at the fire station and township hall.

#2 High Priority

Strategy:

Winter Weather Hazard

Purchase a four wheel drive medical-rescue apparatus for fire department. Keep listing of private individuals with snowmobiles available for use in emergency.

Primary Responsibility:

Chester Township Fire Department Initiatives Needed:

Funding source

Implementation:

By 2027 or sooner if funding is available.

Cost(s):

4WD Rescue Vehicle \$30,000

Benefit(s):

Reduce potential for personal injury

Anticipated Funding:

Federal mitigation grants as well as other funding sources if available.

2016 Status:

This strategy depends upon funding during times of very tight budgets. No known progress.

2022 Status: Completed

#3 High Priority

Strategy:

Primary Responsibility:

Implementation:

Cost(s):

Benefit(s):

Anticipated Funding:

2016 Status:

2022 Status:

Communication Disruption

Secure funding for a low band radio system and Ham radio system.

Chester Township Fire Department, Emergency Management

Initiatives Needed: Funding source

By 2027 or sooner if funding is available.

Unknown, \$3,000-5,000.

Higher security through less potential for long term interruption of communication.

BRIC Grant

No known progress at this time due to lack of funding.

Public Safety communication tower built.

#4 High Priority

Strategy:

Primary Responsibility:

Implementation:

Cost(s):

Benefit(s):

Anticipated Funding:

2016 Status:

2022 Status:

Urban and Structural Fire Hazards

Continue upgrading of fire department equipment and apparatus.

Chester Township Fire Department Initiatives Needed:

Secure funding

By 2027 or sooner if funding is available.

Unknown \$50,000-\$75,000.

Reduce potential for fire damage.

BRIC Grant

This strategy depends upon funding during times of very tight budgets. No known progress at this time. .

Purchased a 4wd rescue vehicle using local funding. The township has identified and fitted with connections several water supplies using local funding. They have drilled a large diameter deep well at the fire station. Other large diameter wells were identified and fitted with valves and fittings. Other wells have been identified and waiting on funding to install valves and fittings. This has been done using local funding.

#5 High Priority

Strategy:

Primary Responsibility:

Initiatives Needed:

Implementation:

Cost(s):

Benefit(s): Anticipated

Funding: 2016 Status:

2022 Status:

Extreme Temperature Hazard

Educate township residents on the risks of extreme temperature.

Identify the at-risk residents and aid them in installing the equipment necessary to survive.

Chester Township

Funding source

By 2027 or sooner if funding is available.

\$3000-\$5000

Less potential for personal injury.

Grants as well as other funding sources if available.

Ottawa County purchased NOAA Weather radios for at-risk communities/residents.

Ice Safety awareness in 2018

#6 High Priority

Strategy:
Primary Responsibility:
Initiatives Needed:
Implementation:
Cost(s):
Benefit(s):
Anticipated Funding:

Sanitary Sewer Failure

Acquire permanent stand-by power for sewer system.
Chester Township
Secure funding By 2027 or sooner if funding is available.
Unknown \$40,000-\$50,000
Less potential for a wastewater spill.
BRIC Grant, Water & Waste Disposal Loan & Grant Program
This strategy depends upon funding during times of very tight budgets.
No known progress at this time.
No known progress at this time.

2016 Status:
2022 Status:

#7 High Priority

Strategy:
Primary Responsibility:
Initiatives Needed:
Implementation:
Cost(s):
Benefit(s): Anticipated
Funding:

Shoreline Flooding and Erosion Hazard

A sewer system is needed at Crockery Lake.
Drain Commissioner
Secure funding
To be considered when funding is available.
Unknown
Less erosion potential.
BRIC Grant, Water & Waste Disposal Loan & Grant Program
This strategy depends upon funding during times of very tight budgets. No
known progress at this time.
No known progress at this time.

2016 Status:
2022 Status:

#8 High Priority

Strategy:
Primary Responsibility:

Implementation:
Benefit(s): Anticipated
Funding: 2011 Status:

Wildfire Hazard

1) Identify and develop additional rural water supplies.
2) Purchase new four wheel drive brush truck for fire department
Chester Township Fire Department
Initiatives Needed: Secure funding
By 2027 or sooner if funding is available.
Reduce potential for fire damage.
Federal mitigation grants as well as other funding sources if available.
This strategy depends upon funding during times of very tight budgets. No
known progress at this time. .
A brush truck was purchased in 2011 with local funds.
Completed

2016 Status:
2022 Status

:

#9 High Priority

Strategy:

Primary Responsibility:
Initiatives Needed:
Implementation:
Cost(s):
Benefit(s): Anticipated
Funding:

Drought

1) Drilling a large diameter deep well at the fire station.
2) Identify and acquire permission to use existing private deep wells in the
township for fire suppression and purchase fitting to adapt private wells.
Chester Township
Funding source
By 2027 or sooner if funding is available.
\$50,000 - \$100,000
Reduce potential for fire damage
Federal mitigation grants as well as other funding sources if available.
This strategy depends upon funding during times of very tight budgets.

2022 Status:

No known progress at this time. .
Completed

Chester Township Additional Input

Severe Weather:

We are educating our residents on the hazards of thunderstorms and wind with a safety trailer, flyer, and newsletter. We have 2 warning sirens (1 in Conklin, 1 at Crockery Lake), with a county-wide siren test monthly from spring through fall. There is stand-by power at the fire station and township hall if emergency shelter is needed. We are involved in the weather watch program which trains spotters to identify and notify for early warning of a weather hazard.

Actions: Warning sirens added to populated areas of the township. Identifying additional emergency shelter sites and adding backup power and infrastructure to these sites.

Extreme Temperatures:

Two emergency shelter sites are available for extreme temperature hazards. The fire station and township hall have stand-by power, air conditioning, heat, water and sewage.

Actions: Educate the township residents on the risks of extreme temperature. Identify the at risk residents and aid them in installing the equipment necessary to survive in extreme temperature hazards.

Drought:

Burning permits for outside burning are not issued. Fire Department tanker trucks used to transport water for livestock. Fresh water is available at the fire station and township hall. Large diameter deep well at the fire station.

Actions: Identify and acquire permission to use existing private deep wells in the township. Purchase fitting to adapt private wells for fire department use. Purchase new tanker-pumper apparatus and brush truck for fire department.

Severe Winter Weather:

Two emergency shelters with stand-by power and infrastructure are at the fire station and township hall. Medical emergencies are responded to by the fire department on a first responder level of care. Ottawa County Road Commission will clear our roads.

Actions: Identify additional emergency shelter sites and purchase equipment for stand-by power for these sites. Purchase a four wheel drive medical-rescue apparatus for the fire department. Keep a listing of private individuals with snowmobiles available for use in emergencies.

Shoreline Flooding:

We have an inland lake with high density residential in low lying areas. We would provide emergency shelters for persons whose homes were flooded or whose septic systems failed.

Wildfire:

Burn permits are required for outside burning. Permits are not issued during high risk conditions. Fire department responds to wildfires. DNR can be called to assist if needed. Education through newsletter. Some rural water supplies have been developed.

Urban and Structural Fire:	<p><u>Actions:</u> Identify and develop additional rural water supplies.</p> <p>Zoning requirements for spacing of structures are enforced. Building codes enforced. Multiple building complexes are reviewed by building inspector and fire chief. Intervention by fire department through 911 notification. Mutual aid agreements to bring in extra help as needed. Fire prevention training through safety trailer. <u>Actions:</u> Continue upgrading fire department equipment and apparatus.</p>
Other Fire Hazards:	<p>Burn permits are not issued for these types of items. Zoning is in place to limit this hazard. Intervention by fire department. Hazmat team response to help identify unknown materials.</p> <p><u>Actions:</u> Continuing to upgrade the fire department equipment and apparatus.</p>
Riverine Flood:	<p>Chester Township works with the Ottawa County Drain Commission and Road Commission to address the need for maintaining the drains in the township. The drains are kept open and cleared.</p> <p><u>Actions:</u> Work with other jurisdictions to maintain multijurisdictional drains and waterways. Enforce flood plain restrictions. Secure funding for the clearing of multijurisdictional waterways. Secure funding to raise or remove buildings in a riverine flooding area.</p>
Urban Flooding:	<p>Zoning requires high density development to install storm drains and retention areas.</p> <p><u>Actions:</u> Secure funding to replace and upgrade existing storm drains in areas of existing high density structures.</p>
Electrical Failure:	<p>The fire station and township hall both have stand-by power and can serve as emergency shelters. The sewer system has portable stand-by power. Many individuals in the township have their own stand-by power.</p> <p><u>Actions:</u> Identify and develop additional emergency shelters in the township. Install stand-by power and infrastructure at these sites. Install permanent stand-by power for the sewer system.</p>
Communications Failure:	<p>The telephone company in our area has battery back-up in case of a power outage. In the event of an extended outage a generator is used on their system. Cell phones are available but may not be reliable. Ottawa County Central Dispatch has back-up systems in place for emergency communication.</p> <p><u>Actions:</u> Secure funding for a low band or Ham radio system.</p>
Sanitary Sewer Failure:	<p>Notify Ottawa County Road Commission for service.</p> <p><u>Actions:</u> Permanent stand-by power for sewer system.</p>
Public Health Hazard:	<p>Response by Fire Department and by Hazmat team, if needed. Response by the Ottawa County Health Department. Evacuation if needed.</p> <p>Emergency shelters with appropriate infrastructure. Response by EPA and DEQ if needed.</p> <p><u>Actions:</u> Ensure that the public is aware of the emergency and what to do.</p>
Hazardous Material:	<p>Continue to maintain and increase training of fire department personnel.</p> <p>Response by the fire department and by the Hazmat team, if needed.</p> <p>Response by a clean-up contractor. Most sites have an existing plan.</p>

Actions: Evacuate people in danger. Response by EPA and DEQ. Identify all sites and develop a plan for each of them. Continue training for all first responders. Secure funding for fire department safety equipment and apparatus.

Transportation Hazard:

Response by fire department through 911 activation. Response by Sparta/Rockford ambulance. Mutual aid from surrounding fire departments and ambulance services. Response from Ottawa County Sheriff's Department and Michigan State Police.

Actions: Secure funding for fire department equipment and apparatus.

City of Coopersville

2020 population 4,389 (up 3% from 2010)

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2022 Status:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

City of Coopersville

By 2027 or sooner

Less potential for personal injury.

Master plan updated in 2017.

Goal 9.3: Provide storm sewer service to meet the present and future needs of the community.

- Objective 9.3.1: Coordinate service additions with future land use and development.
- Objective 9.3.2: Conduct necessary studies and improve storm drainage throughout the city.
- Objective 9.3.3: Encourage low-impact development techniques, such as permeable pavement in parking lots or bio swales, to minimize impacts of development on the storm water system

#2 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Enhance emergency notification. Develop actions to strengthen and maintain emergency notification systems.

Emergency Management

By 2027 or sooner

Less potential for personal injury.

No known progress due to lack of funding.

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Severe Weather

Identify any warning system needs in the township.

Emergency Management

By 2027 or sooner

Benefit(s): Less potential for personal injury.
2016 Status: Coopersville lost its' ability to sound the sirens themselves for the city only, however they work well with the county EOC and Dispatch Center for emergency notification. Coopersville did replace one siren since 2011.
2022 Status: FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority
Strategy:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

Primary Responsibility:

Board of Commissioners

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for destruction and disruption.

2016 Status:

No known progress.

2022 Status:

Grove Street bridge over Deer Creek selected for state bridge building program.

#5 Low Priority

Fire - Urban and Structural

Strategy:

Consideration of additional fire-related public awareness activities.

Primary Responsibility:

Fire Department

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

Generator, smoke alarm, and fireworks awareness in 2022.

Crockery Township

2020 population 4,572 (up 15% from 2010)

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1: Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. During the next master plan development process, Crockery Township should adjust the master plan to accommodate viable hazard-related strategies.

Primary Responsibility:

Crockery Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

No update since 2013.

#2 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems.

Primary Responsibility:

Emergency Management

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

Thanks to a grant in 2018, the emergency response department is now equipped with new devices that automatically perform CPR on patients. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy:

Severe Weather

Identify any warning system needs in the township.

Primary Responsibility:

Emergency Management

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status: No progress at this time due to lack of funding.
2022 Status: Need: replace the existing outdoor warning siren at the Fire Station and place additional warning sirens at population centers. FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority
Strategy:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance. B

Primary Responsibility:

Board of Commissioners.

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for destruction and disruption.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

Ottawa County Road Commission received funding for Cleveland St. over Crockery Creek overflow in Fiscal Year 2024 from the MDOT Local Bridge Program.

#5 Low Priority

Fire - Urban and Structural

Strategy:

Consideration of additional fire-related public awareness activities.

Primary Responsibility:

Fire Department

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

Smoke alarm awareness posts and open burning awareness.

City of Ferrysburg

2020 population 3,064 (up 6% from 2010)

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 High Priority

Strategy:

Primary Responsibility:

Initiatives Needed:

Implementation:

Cost(s):

Benefit(s):

Anticipated Funding:

2011 Status:

2016 Status:

2022 Status:

Winter Weather Hazards

Education, advanced snow removing equipment, and shelters with generators.

Emergency Management

Funding source

To be considered when funding is available.

Unknown, cost range of \$50,000-\$100,000.

Reduce potential for personal injury

BRIC Grant

This strategy depends upon funding during times of very tight budgets.
No known progress.

A snow plow truck was purchased in 2015 by Ferrysburg Board of Public Works.

Purchased a new snowplow truck, as well as an ATV for off road fires/EMS incidents.

#2 High Priority

Strategy:

Primary Responsibility:

Initiatives Needed:

Implementation:

Cost(s):

Benefit(s):

Anticipated Funding:

2011 Status:

2016 Status:

2022 Status:

Fire - Urban and Structural

Specialized firefighting equipment, new radios, additional inspections

Fire Department

Funding source

By 2016 or sooner if funding is available.

Unknown \$75-\$100,000

Reduce potential for fire damage.

BRIC Grant

This strategy depends upon funding during times of very tight budgets.
No known progress.

A first responder truck was purchased in 2016.

Thanks to a grant in 2018, the emergency response department is now equipped with new devices that automatically perform CPR on

patients.

#3 High Priority

Strategy:
Primary Responsibility:
Initiatives Needed:
Implementation:
Cost(s):
Benefit(s):
Anticipated Funding:
2011 Status:
2016 Status:

Sanitary Sewer Failure

Additional pump stations alarms and generators.
Water Department
Funding source
By 2016 or sooner if funding is available.
Alarms \$10,000, Generators \$40,000
Less potential for a wastewater spill
BRIC Grant, Water & Waste Disposal Loan & Grant Program
This strategy depends upon funding during times of very tight budgets.
No known progress.
Generators have been installed at all lift station locations. Project complete.

#4 Medium Priority

Strategy:
Primary Responsibility:
Implementation:
Benefit(s):
2022 Status:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.
City of Ferrysburg
By 2027 or sooner
Less potential for personal injury.
Master Plan updated in 2018.

#5 Medium Priority

Strategy:
Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

All Hazards

Enhance emergency notification. Develop actions to strengthen and maintain emergency notification systems.
Emergency Management
By 2027 or sooner
Less potential for personal injury.
No known progress due to lack of funding.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#6 Medium Priority

Strategy:
Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

Severe Weather

Identify any warning system needs in the township.
Emergency Management
By 2027 or sooner
Less potential for personal injury
No known progress
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#7 Medium Priority

Strategy:
Primary Responsibility:
Implementation:
Cost(s):
Benefit(s):

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Board of Commissioners
By 2016 or sooner
\$10,000,000
Less potential for destruction and disruption.

2011 Status: No progress at this time due to lack of funding.
2016 Status: Engineering inspection was done on Smith's Bridge. Conclusion was that it needs replacement. Inspection needed for Ridge Avenue bridge.
2022 Status: West Spring Lake Road bridge over Smiths Bayou selected for state bridge building program. Work was completed on U.S. 31 bridge over the south channel of the Grand River, the M-104 curving connector bridge from U.S. 31 over the Spring Lake channel and the U.S. 31 bridge over Third Street in 2021

#8 Low Priority

Strategy: Consideration of additional fire-related public awareness activities.
Primary Responsibility: Fire Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: School education and open houses have helped to educate the public. Mutual Aid agreements are in place.
2022 Status: Scrap Tire Recycling event in 2020.

Ferrysburg Additional Input (in conjunction with Spring Lake Twp.)

Sanitary Sewer Failure: Additional pump station alarms
Transportation Hazard: Media, education, hazmat, mobile medical teams. Additional medical equipment.
Intentional Acts: 2016: CRASE education in the schools has taken place since the last update.
Electrical Failure: Generators have been purchased and installed at all lift station locations in Ferrysburg.
Water System Failure: Tied into Grand Rapids water system, media and education. More security, alarms, and surveillance equipment.
Shoreline Flooding: Sea walls, education, media. Generators, pumping stations

Georgetown Township
2020 population 54,091 (up 15% from 2010)

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 High Priority

Strategy:

Primary Responsibility:

Initiatives Needed:

Implementation:

Cost(s):

Benefit(s):

Anticipated Funding:

2011 Status:

2016 Status:

2022 Status:

All Hazards

Additional training with our emergency service people.

Emergency Management

Funding source

To be considered when funding is available.

Staff overtime

Lessened potential for personal injury.

BRIC Grant

This strategy depends upon funding during times of very tight budgets.

No known progress

No known progress

No known progress at this time.

#2 High Priority

Strategy:

Primary Responsibility:

Initiatives Needed:

Implementation:

Cost(s):

Benefit(s):

Anticipated Funding:

2016 Status:

2022 Status:

Fire - Wildfire

Control of all burning through permits and increased enforcement.

Fire Department

Develop program

To be completed with existing staff and overtime during peak fire seasons.

Unknown

Reduce potential for fire damage.

To be completed with existing staff resources. BRIC Grant.

No known request was made for funding beyond local funds.

Environmental Sustainability Center collects scrap tires

#3 Medium priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

Georgetown Township

By 2027 or sooner

Less potential for personal injury.

2016 Status: No known progress
2022 Status: Updated Master Plan in 2021

#4 Medium priority

All Hazards

Strategy: Develop actions to strengthen and maintain emergency notification systems.

Primary Responsibility: Emergency Management

Implementation: By 2027 or sooner

Benefit(s): Less potential for personal injury.

2016 Status: No progress at this time

2022 Status: FEMA's new Integrated Public Alert and Warning System (IPAWS).

#5 Medium priority

Severe Weather

Strategy: Identify any warning system needs in the township.

Primary Responsibility: Emergency Management

Implementation: By 2027 or sooner

Benefit(s): Less potential for personal injury.

2016 Status: No progress at this time

2022 Status: FEMA's new Integrated Public Alert and Warning System (IPAWS).

#6 Medium priority

Infrastructure Strengthening

Strategy: Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

Primary Responsibility: Board of Commissioners

Implementation: By 2027 or sooner

Benefit(s): Less potential for destruction and disruption.

2016 Status: No progress at this time

2022 Status: The Road Commission received funding through the Local Bridge Program to rehabilitate the Barry Street bridge over the east branch of Rush Creek in 2018

#7 Low priority

Fire - Urban and Structural

Strategy: Consideration of additional fire-related public awareness activities.

Primary Responsibility: Fire Department

Implementation: By 2027 or sooner

Benefit(s): Less potential for personal injury.

2016 Status: No progress at this time due to lack of funding.

2022 Status: Georgetown Fire Prevention Open House in 2021

Georgetown Township Additional Input

Flood Mitigation: Study potential flood areas for consideration of future flood mitigation field projects.

Drought: No preventive measures are in place.

Tornado: Updating and improving the siren program in Georgetown Twp.

- Winter Weather:** Measures that are in place include good communication between emergency management and all of the area's utility providers.
- Wildfire:** A large fire of this type is not likely to happen, since development patterns promote early detection and limit a fire's spread. Control of all burning can be handled by permits. All state DNR burning bans should be followed.
- Urban/Structural Fire:** Inspections during the construction of any structure. Following all guidelines, whether state codes or local codes. Continued training on residential firefighting.
- Other Fire Hazards:** No burning of trash, leaves, garbage, or dirty burning materials. Enforcement of all burning ordinances.
- Thunderstorms:** Emergency Services are provided at the county level as well as township level. Quick notification of any severe weather is a priority throughout the year. One example is the siren program, both county-wide and township-wide. Additional training for emergency services personnel. Upgrading siren coverage, where not in place.
- Electrical Failure:** Generator backup at the Grandville sewage plant. Flooding problems: sandbagging or possible diversion of water.
-

City of Grand Haven

2020 population 11,035 (up 6% from 2010)

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2022 Status:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

City of Grand Haven

By 2027 or sooner

Less potential for personal injury.

In the process of updating Master Plan

#2 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Emergency Management

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

Public Safety communication tower built.

#3 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Severe Weather

Identify any warning system needs in the township.

Emergency Management

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

Board of Commissioners

By 2027 or sooner

Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding.
2022 Status: The intersection of Harbor Island Drive and U.S. 31, near Hall's Sport Center, was raised 3.5 feet by the Grand Haven Department of Public Works. Work was completed on U.S. 31 bridge over the south channel of the Grand River, the M-104 curving connector bridge from U.S. 31 over the Spring Lake channel and the U.S. 31 bridge over Third Street in 2021

#5 Medium Priority

Strategy:

Sanitary Sewer Failure

Continuing evaluation of providing emergency power to sewer lift stations by portable generators or the provision of emergency power to lift stations.

Primary Responsibility:

Water Department

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

Water main, sanitary sewer and storm sewer were placed along Grand Haven Road north and south of Stonewood Drive,

#6 Low Priority

Strategy:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities

Primary Responsibility:

Fire Department

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

Thanks to a grant in 2018, the emergency response department is now equipped with new devices that automatically perform CPR on patients. A new fire truck at the Grand Haven Department of Public Safety replaced a 39-years-old truck.

Grand Haven Township

2020 population 18,004 (up 18% from 2010)

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 High Priority	Sanitary Sewer Failure
Strategy:	<u>Continuing evaluation of the provision of emergency power to sewer lift stations by portable generators or the provision of emergency power to lift stations.</u>
Primary Responsibility:	Emergency Management, Drain Commissioner
Initiatives Needed:	Secure funding
Implementation:	By 2027 or sooner
Cost(s):	Unknown \$40,000-\$50,000
Anticipated Funding:	BRIC Grant, Water & Waste Disposal Loan & Grant Program
Benefit(s):	Less potential for wastewater spill
2011 Status:	This strategy depends upon funding during times of very tight budgets. No known progress.
2016 Status:	No progress at this time
2022 Status:	Purchased 1 generator for a lift station.
#2 Medium Priority	Water System Failure
Strategy:	<u>Continue to evaluate capacity and demand.</u>
Primary Responsibility:	Northwest Ottawa Water System
2016 Status:	Grand Haven Township is part of the Northwest Ottawa Water System. There is an interconnect between the Northwest Ottawa Water System and the Grand Rapids Water Plant (which is located in Grand Haven Township).
2022 Status:	Four century-old shoreline wells revealed by Lake Michigan erosion were removed from the beach at Grand Haven State Park, funded by Northwest Ottawa Water System's replacement fund
#3 Medium Priority	All Hazards
Strategy:	<u>Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.</u>

Primary Responsibility: Grand Haven Township
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2022 Status: Master Plan updated in 2019

#4 Medium Priority

Strategy: **All Hazards**
Develop actions to strengthen and maintain emergency notification systems.

Primary Responsibility: Emergency Management
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: FEMA's new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Strategy: **Severe Weather**
Identify any warning system needs in the township.

Primary Responsibility: Emergency Management
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: FEMA's new Integrated Public Alert and Warning System (IPAWS).

#6 Medium Priority

Strategy: **Infrastructure Strengthening**
Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

Primary Responsibility: Board of Commissioners
Implementation: By 2027 or sooner
Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding.
2022 Status: Work was completed on U.S. 31 bridge over the south channel of the Grand River, the M-104 curving connector bridge from U.S. 31 over the Spring Lake channel and the U.S. 31 bridge over Third Street in 2021

#7 Low priority

Strategy: **Fire - Urban and Structural**
Consideration of additional fire-related public awareness activities.

Primary Responsibility: Fire Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: Township bought property for future fire/rescue station.

Grand Haven Township Additional Input

Shoreline Flooding: The lake level and lakeshore dune erosion activity are monitored.

Wildfire:

Grand Haven Township is cooperates with the Michigan Department of Natural Resources - Fire Division in a program known as “Firewise.” This educational and prevention program seeks to educate residents on the dangers of wildfires and what homeowners can do to prevent wildfires and to mitigate and limit the dangers to structures located in remote or hard-to-reach areas.

Sanitary Sewer Failure:

Currently, the Grand Haven Township regional sewer authority handles prevention activities. In the event of a power failure, the Department of Public Works (DPW) has a couple of emergency generators that can be utilized to maintain operational capabilities of sewer lifts. Potential actions: Continuing evaluation of providing emergency power to sewer lift stations by portable generators or the provision of emergency power to lift stations.

City of Holland

2020 population 34,378 (up 4% from 2010)

NFIP Participant

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

All Hazards

Strategy:

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan

Primary Responsibility:

City of Holland

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury

2016 Status:

The city is updating its Community Master plan and has added the construct of resiliency. This is in process.

2022 Status:

Five year review completed in 2021.

#2 Medium Priority

All Hazards

Strategy:

Develop actions to strengthen and maintain emergency notification & warning

Primary Responsibility:

Emergency Management

Implementation:

A. Identify any warning system needs in the township.
B. Identify seniors and other vulnerable households; educate on risks and responsibilities in conditions with extreme high and low temperatures. Employ neighborhood watch programs to check on at-risk populations.
C. Provide enhancements to emergency shelters to include generators and access to supplies in case of brownouts or widespread power outages.

Benefit(s):

Less potential for personal injury.

2016 Status: Warning needs have been identified. The city is attempting to secure funding for a PA system in addition to their sirens, especially for the annual Tulip Time Festival that raises the population in Holland significantly for a week each year. Consideration and planning is being invested in providing additional outdoor warning sirens with voice capabilities in core areas of the City around Hope College, the principle shopping district and Civic Center Corridor. Further investment will be funding based.

2022 Status: Attempts to secure funding is ongoing.

#3 Medium Priority
Strategy:

Severe Weather

A. Provide information on actions the public can take to prevent or reduce wind damage.

B. Educate the public about emergency shelters and how to seek appropriate shelter.

C. Provide information and support for the installation of lightning strike prevention systems for structures.

D. Identify flood prone areas and vulnerable populations.

Primary Responsibility:

City of Holland, Emergency Management

Implementation:

Ongoing

Benefit(s):

Less potential for personal injury.

2016 Status:

A.-C. Much public awareness and education is done throughout the year and particularly during the annual fire safety open house in the fall. Other progress at this time is unknown.
D. Flood prone areas have been identified and are watched closely during times of intense rainfall and high water tables in the lake, drains and river.

2022 Status:

Launched in May of 2020, the MiHollandCAM located at Holland State Park is a unique partnership with multiple government agencies including the City of Holland, Michigan DNR, NOAA, and Park Township. Biggby Coffee of Holland & Zeeland sponsored the camera. The primary use for the camera is to show current weather conditions to inform visitors of high-risk water conditions.
FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority
Strategy:

Tornado

A. Continue to test emergency warning sirens and supplement current system with other means of notification.

B. Implement NIXEL or other form of all hazard electronic notification system in addition to outdoor

warning sirens.

C. Identify and supply emergency shelters for post event needs of the public.

D. Educate and prepare all City of Holland Public Safety, Transportation Services and Parks personnel to respond safely and effectively to areas impacted by a tornado.

E. Educate and prepare damage assessment personnel.

Primary Responsibility:

City of Holland, Emergency Management

Implementation: Ongoing

Benefit(s):

Less potential for destruction

2016 Status:

This is an ongoing strategy. Emergency Management plans that incorporate these strategies are reviewed on an annual basis.

2022 Status:

Improvements to the Holland Civic Center will incorporate capacity to shelter displaced residents.

Monthly siren testing happens every first Friday of the month beginning in April and concluding in October. Currently there are 30 national shelter system facilities in Holland.

#5 Medium Priority

Severe Winter Weather

Strategy:

A. Provide advanced warning and public service announcements on how to prepare for a forecasted event.

B. Create a network or watch program that provides for checks on vulnerable populations.

C. Continue to maintain and prepare Transportation Services personnel to respond to such events with enhancements and technology that keep roads and streets accessible for emergency access.

- Prepare to mobilize transportation services in periods of extreme cold.

Primary Responsibility:

City of Holland

Implementation:

Ongoing

Benefit(s):

Improve the response of the community members to potential severe winter events. Furthermore, enhance transportation abilities of emergency responders during weather events.

2016 Status:

This process is ongoing. Public warning enhancements such as NIXEL or RAVE Alert will enhance this when available.

2022 Status:

FEMA's new Integrated Public Alert and Warning System (IPAWS)..

#6 Medium Priority

Urban Flooding

Strategy:

A. Relocate the portion of the storm sewer that is currently located under buildings (Holland USA, commercial building on the north side of West 17th Street between

Homestead and Diekema).

B. 18th and 19th Between Central and Columbia Ave Area is prone to flooding; a mitigation strategy needs to be developed.

C. Improve or replace crossing to improve drainage crossing on Azalea at South Shore Drive. Improvements to drain to prevent flooding and structural failure.

D. Improve the Holland Heights Drain, from approximately East 12th and Cambridge and running westerly to US-31. 5. Hope Avenue between East 8th and East 16th: Tie this portion of Hope Ave storm sewer into Paw Paw Relief Drain.

E. Reduce or prevent flooding in the area of Lela Intercounty Drain, from its north outlet into Lake Macatawa (north of Graafschap Road) to the south terminus at 40th and Columbia. Maplewood Intercounty Drain, South of East 24th Street.

F. Add detention capacity in several locations from East 24th Street south to the M-40 Midway Drain, located between Myrtle and Old Orchard (on the east and west), on streets such as Bay, Blackbass, Midway, Central Bay and South Shore Drive. Reduce or prevent flooding potential in these areas.

G. Pine Avenue North of West 7th Street: Address flooding problems and critical infrastructure threats as a result to the HBPW Power Generating Station.

H. The Tulip Intercounty Drain from the southern city limits (Ottawa Avenue, south of US-31) to the northern city limits (Country Club between East 16th and East 24th Streets); and "old" drainage course north of US-31 between Ottawa Avenue and US-31 (Rolling Meadows): Reduce or prevent flooding in these areas as a result of current conditions in the drains.

I. East branch of the Weller Drain—beginning south of West 32nd Street on the either side of the Clarewood Condominiums between Graafschap and Lugers, to a point north of 32nd Street where it joins the west branch of the Weller Drain: Reduce or prevent flooding in this area and associated sections because of the current.

J. There are additional projects referenced in the City's updated storm sewer master plan. These will be completed based on available funding.

Primary Responsibility: Drain and Road Commissioners, City of
 Implementation: Holland By 2027 or sooner
 Benefit(s): Less potential for damage to infrastructure (roads) and property.
 2016 Status: Item C has been completed. Other items are pending and still valid. Further progress on these projects could be enhanced through additional funding and grants.
2022 Status: B. Work concluded on a \$1.3 million 19th Street reconstruction project, which included new pavement, concrete curb & gutters and sidewalk
 D. Work began on a \$1.8 million reconstruction project of Hope Avenue from 16th Street to Paw Paw Drive. The project involves construction of a new roadway with concrete curb and gutters, storm drainage, utility improvements and some storm sewer work along Paw Paw Drive. Paw Paw Bridge work included deck rehab, repairs to bridge beams, joint replacement, and improvements to the approaches.
 E. Work concluded on a \$2.45 million 16th Street, LanE Avenue to Kollen Park, reconstruction project, which includes replacing the Maplewood Inter-County Drain culvert
 G. Pine Avenue Storm Sewer project.
 J. The City was recipient to grant funding from the Michigan Department of Environmental Quality's (MDEQ) Stormwater, Asset Management and Wastewater (SAW) Program. Sanitary sewer main projects resulted in the lining of 1.4 miles of sanitary sewer in 2021.

#7 Medium Priority
 Strategy:

Hazardous Material Release

A. Develop and implement an effective leak detection program which includes education and monitoring.

B. Continue to educate public safety responders about pipeline safety and response on an annual basis

Primary Responsibility: Emergency Management
 Implementation: By 2027 or sooner
 Benefit(s): Less potential for injuries or loss of life
 2016 Status: No known progress at this time
2022 Status: Environmental Sustainability Center collects hazardous materials.

#8 Medium Priority
 Strategy:

Water System Failure

A. Install valves and piping on the beach near the low lift station at the water plant to utilize a 36" concrete drain line as an emergency intake.

B. Install emergency generator to provide backup power to plant and pumps.

1. Install two backup generators at two major water pumping stations at approximately \$75,000.

2. Install a water supply interconnect with Wyoming Water Supply to provide emergency water supply to each entity

Primary Responsibility:

City of Holland - HBPW

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for injuries or loss of life

2016 Status:

No known progress at this time

2022 Status:

Upgrades to lift station completed.

#9 Medium Priority

Strategy:

Sanitary Sewer Failure

A. Provide 15 backup generators at sewage lift stations. Projected cost is \$40,000 per station.

B. Extend and replace a force main from the west end (Old Orchard to Myrtle), to alleviate wet weather issues.

C. Provide and implement a grant program to assist residents in removing footing drains and sump pumps from the sanitary sewer.

D. Install second bypass pump at the head of treatment plant to assist with water flows during wet weather events and as an emergency backup pump.

Primary Responsibility:

City of Holland - HBPW

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for property damage

2016 Status:

No known progress at this time

2022 Status:

Sewer main improvement project to line 5.4 miles of sanitary sewer was started in 2018 and completed in fiscal year 2020. The City of Holland installed a water supply interconnect with Wyoming Water Supply to provide emergency water supply to each entity. 15 backup generators have been procured for sewage lift stations. New bypass pump for the head of treatment plant has been installed. The city installed pump station emergency generators.

#10 Medium Priority

Strategy:

Shoreline Erosion/flooding

A. Provide early warning assistance as needed.

B. Develop automatic community wide flood assistance program to assist residents after an event.

C. Provide maintenance and improvements on all drains to Lake Macatawa.

D. Educate residents on basement flood prevention strategies and improvements that can be made to prevent or minimize basement flooding

Primary Responsibility: Drain Commissioner, Emergency Management
Implementation: By 2027 or sooner
Benefit(s): Less potential for property damage, injuries, or loss of life
2016 Status: No known progress at this time
2022 Status: No known progress at this time

#11 Medium Priority

Strategy:

Wildfire

- A. Implement FireWise program where appropriate.
- B. Manage burn practices and fuel load management.
- C. Consideration of additional fire-related public awareness and training activities.
- D. Assess and/or address any possible shortfalls in fire mitigation actions, regulations, supplies, firebreak, staffing, FIREWISE protection techniques, and risk assessment detail.

2016 Status: There has been no action on this however it remains a valid concern. The city will continue to monitor the rural/urban interface and implement these strategies were appropriate and economically feasible. The City has worked with public and private entities to manage controlled burning of invasive plant life in the Macatawa Marsh. Such practices reduce fire load in the marsh near populated areas.

2022 Status: Environmental Sustainability Center collects scrap tires. Annual fire safety/prevention week.

#12 Low Priority

Strategy:

Fire - Urban and Structural

- A. Continue to deliver and enhance fire prevention inspections and fire and life safety education programs.
- B. Inspect and maintain all fire alarm and sprinkler systems as required by code.
- C. Advocate, incentive and promote the installation of automatic sprinkler systems in public and private occupancies.
- D. Continue to provide and maintain an adequate and effective public safety response to fires.

Primary Responsibility: County Building Inspector, Fire Department
Implementation: Ongoing
Benefit(s): Less potential for property damage and personal injury.
2016 Status: This process is ongoing. The city could benefit from funding for installation of residential sprinkler systems in rental properties.
2022 Status: Demonstration showing the benefit of having a residential sprinkler system in 2018.

#13 Low Priority

Strategy:

Drought

- A. Educate and prepare residents to implement no-burn policies.
- B. Develop water conservation policies in preparation for drought

Primary Responsibility: events.
Fire Department
Implementation: Ongoing
Benefit(s): Less potential for property damage and personal injury.
2016 Status: No known progress at this time
2022 Status: A. City of Holland's Open Burning Regulations website and FAQs.
B. Plans to offer waste reduction programs and rate incentives that promote efficient use of utility services through technologies and behaviors.

Holland Township

2020 population 38,276 (up 7% from 2010)

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 High Priority

Strategy:

Primary Responsibility:

Initiatives Needed:

Implementation:

Cost(s):

Benefit(s):

Anticipated Funding:

2011 Status:

2016 Status:

2022 Status:

Electrical Failure

Standby generators for the fire department.

Emergency Management

Funding source

By 2016 or sooner if funding is available.

\$40,000

Safer operations with lower potential for security breach

BRIC Grant

This strategy depends upon funding during times of very tight budgets.

No known progress.

No known progress

No known progress at this time.

#2 High Priority

Strategy:

Primary Responsibility:

Initiatives Needed:

Implementation:

Cost(s):

Benefit(s):

Anticipated Funding:

2011 Status:

2016 Status:

2022 Status:

Sanitary Sewer Failure

Standby generators for lift stations

Emergency Management, Drain Commissioner

Secure funding

By 2016 or sooner if funding is available.

Unknown \$40,000-\$50,000

Less potential for a wastewater spill.

BRIC Grant, Water & Waste Disposal Loan & Grant Program

This strategy depends upon funding during times of very tight budgets.

No known progress.

No known progress

Holland BPW installed a new 36-inch water transmission main in Lakewood Boulevard and North River Avenue. Holland Township replaced existing water main and storm sewer in Lakewood Boulevard.

#3 Medium Priority

All Hazards

Strategy: Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.
Primary Responsibility: Holland Township
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury
2016 Status: No progress at this time. Last known plan update was 2006.
2022 Status: Master Plan updated in 2020

#4 Medium Priority

All Hazards

Strategy: Develop actions to strengthen and maintain emergency notification systems.
Primary Responsibility: Emergency Management
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: FEMA's new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Severe Weather

Strategy: Identify any warning system needs in the township
Primary Responsibility: Emergency Management
Implementation: Installation of outdoor warning sirens.
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: FEMA's new Integrated Public Alert and Warning System (IPAWS).

#6 Medium Priority

Infrastructure Strengthening

Strategy: Identify potential improvements or projects to strengthen the area's infrastructure of all kinds) to increase its hazard-resistance.
Primary Responsibility: Board of Commissioners
Implementation: By 2027 or sooner
Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding.
2022 Status: River Avenue corridor just north of the Unity Bridge connecting the city of Holland and Holland Township is being targeted for redevelopment by Holland Township officials

#7 Low Priority

Flood Mitigation

Strategy: Study potential flood areas to generate future flood mitigation field projects.
Primary Responsibility: Water Resources Commissioner & engineers
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: Culvert improvement planned for 104th Avenue at Perry Street and Beeline Street at Greenly Street

City of Hudsonville

2020 population 7,629 (up 7% from 2010)

NFIP Participant

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2022 Status:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan

City of Hudsonville

By 2027 or sooner

Less potential for personal injury.

No Master Plan update since 2015.

#2 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Emergency Management

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Severe Weather

Identify any warning system needs in the township

City of Hudsonville

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

Completed

#4 Medium Priority

Strategy:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance

Primary Responsibility: Board of Commissioners
Implementation: By 2027 or sooner
Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding.
2022 Status: Hudsonville/Jamestown booster station upgrades. Corporate Grove lift station upgrades. Highland Drive lift station replacement. Kiel St. water main replacement. Lincoln St. water main replacement. Maple Street water main replacement. School Avenue water main replacement. Van Buren Street water main replacement.

#5 Low priority

Strategy: Consideration of additional fire-related public awareness activities
Primary Responsibility: City of Hudsonville
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: Fire Prevention Open House in 2021

Jamestown Township

2020 population 9,630 (up 37% from 2010)

NFIP Participant

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

Primary Responsibility:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan

Jamestown Township Implementation:

By 2027 or sooner

Less potential for personal injury

No known progress at this time

Master Plan updated in 2019.

#2 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Emergency Management

By 2027 or sooner

Less potential for personal injury

No progress at this time due to lack of funding.

Public Safety communication tower built.

#3 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Severe Weather

Identify any warning system needs in the township

Emergency Management

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's

Primary Responsibility: infrastructure (of all kinds) to increase its hazard-resistance
Board of Commissioners
Implementation: By 2027 or sooner
Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding.
2022 Status: Culvert replacement on 16th Avenue and Riley Street

#5 Low priority

Strategy: Fire - Urban and Structural
Consideration of additional fire-related public awareness activities
Primary Responsibility: Fire Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: Fire Prevention Open House in 2021. Fire Safety & Prevention Resources on website.

Olive Township

2020 population 5,007 (up 6% from 2010)

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan

Primary Responsibility:

Olive Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury

2016 Status:

No known progress at this time

2022 Status:

No known progress at this time.

#2 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Emergency Management

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy:

Severe Weather

Identify any warning system needs in the township

Primary Responsibility:

Emergency Management

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance

Primary Responsibility:

Board of Commissioners

Implementation: By 2027 or sooner
Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding.
2022 Status: Bridge improvement planned for 144th Street at Van Buren Street.

#5 Low priority

Strategy: Consideration of additional fire-related public awareness activities
Primary Responsibility: Fire Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: Acquired new rescue truck in 2022. Open burning awareness.

Park Township

2020 population 18,625 (up 5% from 2010)

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan

Park Township

By 2027 or sooner

Less potential for personal injury

No known progress at this time

Master Plan updated in 2017.

#2 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Emergency Management

By 2027 or sooner

Less potential for personal injury

No progress at this time due to lack of funding.

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Severe Weather

Identify any warning system needs in the township

Emergency Management

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

Launched in May of 2020, the MiHollandCAM located at Holland State Park is a unique partnership with multiple government agencies including the City of Holland, Michigan DNR, NOAA, and Park Township. Biggby Coffee of Holland & Zeeland sponsored the camera. The primary use for the camera is to show current weather conditions to inform visitors of high-risk water conditions. .

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance

Board of Commissioners

By 2027 or sooner

Less potential for destruction and disruption.

No progress at this time due to lack of funding.

Holland BPW installed a new 36-inch water transmission main in Lakewood Boulevard and North River Avenue. The Historic Ottawa Beach Society was awarded the Historical Society of Michigan's 2018 State History Award in restoration/preservation for the restoration of the historic pump house building into the Pump House Museum and Learning Center.

#5 Low priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities

Fire Department

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

Station Open house in 2019

Polkton Township

2020 population 2,565 (up 6% from 2010)

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan

Primary Responsibility:

Polkton Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury

2016 Status:

No known progress at this time

2022 Status:

No known progress at this time.

#2 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Emergency Management

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy:

Severe Weather

Identify any warning system needs in the township

Primary Responsibility:

Emergency Management

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance

Primary Responsibility: Board of Commissioners
Implementation: By 2027 or sooner
Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding.
2022 Status: The Ottawa County Road Commission rehabbed the 68th Avenue bridge over the Grand River.

#5 Low priority

Strategy: Consideration of additional fire-related public awareness activities
Primary Responsibility: Fire Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: Generator, smoke alarm, and fireworks awareness in 2022.

Port Sheldon Township

2020 population 5,206 (up 23% from 2010)

NFIP Participant

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan

Primary Responsibility:

Port Sheldon Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury

2016 Status:

No known progress at this time

2022 Status:

Master Plan updated in 2017

#2 Medium Priority

Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Emergency Management

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

Port Sheldon participates in a "911" emergency notification system for County residents. On average, approximately 2 to 3 percent of the County's response to 911 calls comes from the Port Sheldon Township area.

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#3 Medium Priority

Strategy:

Severe Weather

Identify any warning system needs in the township

Primary Responsibility:

Emergency Management

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status: FEMA’s new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area’s infrastructure
(of all kinds) to increase its hazard-resistance

Board of Commissioners

By 2027 or sooner

Less potential for destruction and disruption.

No progress at this time due to lack of funding.

Culvert improvement planned for 160th Avenue north of Van Buren Street.

#5 Low priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities

Fire Department

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

Conducted a Fire Prevention open house in 2019.

Robinson Township

2020 population 6,382 (up 5% from 2010)

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 High Priority

Riverine Flooding

Strategy:

- A. Purchase property vulnerable to flooding as funds become available
- B. Elevate homes prone to flooding when loans for homeowners become available
- C. Further study potential flood areas and develop specific future flood mitigation field projects.

Primary Responsibility:

Robinson Township

Initiatives Needed:

Funding source

Implementation:

To be considered when funding is available.

Cost(s):

\$130,000 per residential lot @ 54 lots = \$7,020,000 (Based on average property values)

Benefit(s):

Less Potential for flood damage.

Anticipated Funding:

BRIC Grant, FMA Grant, HMGP

2011 Status:

- A. Six flood-prone parcels were purchased by the Michigan Department of Transportation. Grant funding enabled the township to further purchase 1 home and 1 parcel on Limberlost Lane and 8 homes and 8 parcels on Van Lopik Ave.
- B. Six homes were been elevated

2016 Status:

There are 20 homes remaining on Limberlost Lane and 15 on Van Lopik Ave. One additional home has been elevated and currently one property on Limberlost Lane is rebuilding a garage which will be equipped with flood gates per MDEQ and Township zoning requirements.

2022 Status:

No known progress at this time.

#2 High Priority

Urban Flooding

Strategy:

- A. Blacktop and raise Buchanan St. near and east of 112th Ave above the high water level.
- B. Blacktop and raise Johnson St. east of the 11500 block to 104th Ave and Pierce St. between 120th and 112th Ave. The roads east and west of these locations are higher than high water levels.
- C. Install new drain to reroute water from properties located in the

Primary Responsibility: Southwest corner of Lincoln and 136th area.
 D. Resolve flooding and road damage where the Bass Creek crosses Winans St.
 Drain Commission
 Initiatives Needed: Funding source
 Implementation: To be considered when funding is available.
 Cost(s): Unknown
 Benefit(s): Less potential for flood damage.
 Anticipated Funding: BRIC Grant, FMA Grant, HMGP
 2016 Status: A. Buchanan Street near and east of 112th Ave was raised and blacktopped in 2013.
 B. No known progress due to lack of funding
 C. No known progress due to lack of funding
 D. This has been corrected with new culvert placement, raising of roadbed and blacktopping in 2014.
2022 Status: No known progress at this time.

#3 Medium priority
Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps.

Primary Responsibility:
 Initiatives Needed:
 Implementation:
 Benefit(s):
 2011 Status:

Robinson Township
 Funding source
 To be considered when funding is available.
 Less potential for flood damage.
 The township produced and adopted a FEMA-approved flood mitigation plan and subsequently adopted the Ottawa County Hazard Mitigation plan. During any future master plan update process, the Robinson Township Planning Commission should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.

2016 Status:

This is not part of the current master plan but is included in the materials for the next update.

2022 Status:

In the process of updating Master Plan

#4 Medium Priority

Severe Weather

Strategy:
 Primary Responsibility:
 Implementation:
 Benefit(s):
 2016 Status:
2022 Status:

Identify any warning and/or notification system needs in the township.

Emergency Management

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Infrastructure Strengthening and the Public Health Hazard

Strategy:

Install public water and sewage system along two river roads on Van Lopik and Limberlost Lanes. Identify potential improvements or projects to strengthen the area's infrastructure to increase its hazard-resistance

Primary Responsibility:

Board of Commissioners

Implementation: By 2027 or sooner
Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding.
2022 Status: Culvert improvement planned for Osborn Street 950' west of 104th Avenue

#6 Medium Priority

Strategy:

Communication Failure

Develop actions to strengthen and maintain emergency notification systems. Coordinate as needed to bolster the dependability of emergency communication systems.

Primary Responsibility:

Utility Companies, Emergency Management

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for destruction and disruption.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

No known progress at this time.

#7 Low Priority

Strategy:

Fire - Wildfire

Consideration of additional fire-related public awareness and training activities.

Primary Responsibility:

Fire Department

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for destruction and disruption.

2016 Status:

Robinson Township purchased new brush truck to better combat wildfires

2022 Status:

No known progress at this time.

Spring Lake Township
2020 population 15,296 (up 7% from 2010)

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 High Priority

Strategy:

Severe Winter Weather

Education, advanced snow removing equipment, and shelters with generators.

Primary Responsibility:

Spring Lake Township

Initiatives Needed:

Funding source

Implementation:

To be considered when funding is available.

Cost(s):

Range of \$50,000-\$100,000.

Benefit(s):

Reduce potential for personal injury

Anticipated Funding:

BRIC Grant

2011 Status:

This strategy depends upon funding during times of very tight budgets.
No known progress.

2016 Status:

Education is ongoing, otherwise no known progress

2022 Status:

No known progress at this time.

#2 High Priority

Strategy:

Electrical Failure

Provide emergency stand-by power to Station 1 & 2 to provide communication between Spring Lake fire department stations and the Sheriff Department.

Primary Responsibility:

Fire Department, Sheriff Department

Initiatives Needed:

Funding source

Implementation:

By 2027 or sooner if funding is available.

Cost(s):

\$40,000

Benefit(s):

Safer operations with lower potential for security breach

Anticipated Funding:

BRIC Grant

2011 Status:

This strategy depends upon funding during times of very tight budgets.
No known progress.

2016 Status:

Spring Lake currently has three portable generators that have to be re-located from lift station to lift station. We need to provide on-site stand-by power at these addresses (listed in order of general priority):

Fruitport Rd.

Priority 1: 17854 174th, 18290 Swiss Drive, 18125 West Spring Lake Road, 17724 Fruitport Road, 339 North Lake, 15844 Leonard Road, 18550

Priority 2: 17000 West Spring Lake Road, 16074 Highland, 18000 Trudy, 15394 Kelly Street, 16531 152nd, 17312 148th, 15968 Baird Drive, 15473 Cleveland, 18983 Fruitport Road.

Priority 3: 17960 Hiawatha, 18137 Lovell, 17824 Oakwood, 17632 Oakwood, 17580 Fruitport Road, 15314 Krueger, 18349 Fruitport Road, 18199 Fruitport Road, 18061 Fruitport Road, 18059 Hammond Bay, 14991 Saddlebrook.

2022 Status:

Station 1 and 2 in Spring Lake now have standby power. Spring Lake also added 2 portable generators for lift stations and all stations are now monitored.

#3 High Priority Strategy:

Sanitary Sewer Failure

A. Sewer lift station bypass valves installed in various locations to prevent further damage from power outages or other events. Lower sewer line across the Lloyds Bayou channel where low water and dredging has expose line and make it subject to boat damage with sewer flowing into the waterways. Dry hydrants installed into the dune land part are to control and extinguish possible dune land fire and to prevent damage to residential areas and erosion from burnt dune grass.

B. Additional pump stations alarms and generators

Primary Responsibility:

Drain Commissioner

Initiatives Needed:

Secure funding

Implementation:

By 2027 or sooner if funding is available.

Cost(s):

A. \$10,000 for hydrant, \$30,000 for line adjustment

B. Alarms \$10,000, Generators \$40,000

Benefit(s):

Less potential for a wastewater spill.

Anticipated Funding:

BRIC Grant, Water & Waste Disposal Loan & Grant Program

2011 Status:

This strategy depends upon funding during times of very tight budgets.

2016 Status:

No known progress.

2022 Status:

No known progress.

Station 1 and 2 in Spring Lake now have standby power. Spring Lake also added 2 portable generators for lift stations and all stations are now monitored.

#4 Medium Priority

Strategy:

Fire Hazards

Primary Responsibility:

The extension of water lines to the US-31 highway right-of-way for

Initiatives Needed:

large scale incident where hazmat and gas tanker accidents are possible

Spring Lake Township Fire Department

Secure funding

Implementation: To be considered when funding is available
Cost(s): Unknown
Benefit(s): Reduce potential for fire damage.
Anticipated Funding: BRIC Grant
2011 Status: No known request was made for funding beyond local funds.
2016 Status: No known progress
2022 Status: No known progress at this time.

#5 Medium Priority
Strategy:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan.

Primary Responsibility:

Spring Lake Township

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury

2011 Status:

A township master plan was developed in 2008. During the next plan update process, the Spring Lake Township Planning Commission should adjust the master plan to accommodate viable hazard-related strategies.

2016 Status:

No known progress at this time.

2022 Status:

Master Plan updated in 2021

#6 Medium Priority
Strategy:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Primary Responsibility:

Emergency Management

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#7 Medium Priority
Strategy:

Severe Weather

Identify any warning system needs in the township

Primary Responsibility:

Emergency Management

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#8 Medium Priority
Strategy:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance

Primary Responsibility:

Board of Commissioners

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for destruction and disruption.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

Bridge work on M-104 and US31.

#9 Low Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities.

Fire Department

By 2027 or sooner

Less potential for personal injury.

Open house given each year during Fire Prevention Week.

Public safety open house 2022 and weekly fire awareness posts.

Village of Spring Lake
2020 population 2,483 (up 7% from 2010)

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Riverine Flooding

- Strategy: Dredge the river from the railroad bridge east to 104th.
- Primary Responsibility: Spring Lake Village
- Implementation: By 2027 or sooner
- Cost(s): Unknown
- Benefit(s): Less potential for flooding and injury due to boating on the river and debris at a shallow depth.
- 2016 Status: No progress at this time due to lack of funding.
- 2022 Status:** No known progress at this time.

#2 Medium Priority

All Hazards

- Strategy: Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan
- Primary Responsibility: Spring Lake Village
- Implementation: By 2027 or sooner
- Benefit(s): Less potential for personal injury
- 2016 Status: No known progress at this time
- 2022 Status:** No known progress at this time.

#3 Medium Priority

All Hazards

- Strategy: Develop actions to strengthen and maintain emergency notification systems
- Primary Responsibility: Emergency Management
- Implementation: By 2027 or sooner
- Benefit(s): Less potential for personal injury
- 2016 Status: No progress at this time due to lack of funding.
- 2022 Status:** FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Severe Weather

- Strategy: Identify any warning system needs
- Primary Responsibility: Emergency Management
-

Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No progress at this time due to lack of funding.
2022 Status: FEMA's new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority
Strategy:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance

Primary Responsibility:

Village Staff

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for destruction and disruption.

2016 Status:

No progress at this time due to lack of funding.

2022 Status:

Work was completed on U.S. 31 bridge over the south channel of the Grand River, the M-104 curving connector bridge from U.S. 31 over the Spring Lake channel and the U.S. 31 bridge over Third Street in 2021

#6 Low priority

Strategy:

Fire - Urban and Structural

Consideration of additional fire-related public awareness activities

Primary Responsibility:

Fire Department

Implementation:

By 2027 or sooner

Benefit(s):

Less potential for personal injury.

2016 Status:

Fire Open House given each year for the public.

2022 Status:

Public safety open house 2022 and weekly fire awareness posts.

Tallmadge Township
2020 population 8,802 (up 16% from 2010)

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan

Tallmadge Township

By 2027 or sooner

Less potential for personal injury

No known progress at this time

Master Plan updated in 2020.

#2 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Emergency Management

By 2027 or sooner

Less potential for personal injury

No progress at this time due to lack of funding.

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Severe Weather

Identify any warning system needs

Emergency Management

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance

Board of Commissioners

By 2027 or sooner

Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding.
2022 Status: Ottawa County Road Commission received funding for Hayes Street over Sand Creek Tributary in Fiscal Year 2024 from the MDOT Local Bridge Program.

#6 Low priority

Strategy: Consideration of additional fire-related public awareness activities
Primary Responsibility: Fire Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: Fire Open House given each year for the public.
2022 Status: Wildfire and fire alarm awareness in 2022.

Wright Township

2020 population 3,190 (up 1% from 2010)

Hazard Priorities

High:	Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
Medium:	Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
Low:	Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan

Wright Township

By 2027 or sooner

Less potential for personal injury

No known progress at this time

Master Plan was updated in 2018.

#2 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Emergency Management

By 2027 or sooner

Less potential for personal injury

No progress at this time due to lack of funding.

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#4 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Severe Weather

Identify any warning system needs

Emergency Management

By 2027 or sooner

Less potential for personal injury.

No progress at this time due to lack of funding.

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Infrastructure Strengthening

Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance

Board of Commissioners

By 2027 or sooner

Benefit(s): Less potential for destruction and disruption.
2016 Status: No progress at this time due to lack of funding.
2022 Status: Ottawa County Road Commission received funding for Hayes Street over Sand Creek Tributary and 48th Ave. 1/4 mile north of Roosevelt Street in Fiscal Year 2024 from the MDOT Local Bridge Program.

#6 Low priority

Strategy: Consideration of additional fire-related public awareness activities
Primary Responsibility: Fire Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: Fire Open House given each year for the public.
2022 Status: Wildfire and fire alarm awareness in 2022.

City of Zeeland

2020 population 5,510 (up 1% from 2010)

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 High Priority

Strategy:

Primary Responsibility:

Implementation:

Cost(s):

Benefit(s): Anticipated

Funding: 2016 Status:

Severe Weather (temporary power outage)

Add generators for City Hall and Public Safety Buildings

Emergency Management

Needed Funding source

By 2016 or sooner if funding is available.

2 Generators @ \$40,000 = \$80,000

Less potential for personal injury.

BRIC Grant

Generator was installed at the Police/Fire/Rescue building in 2012. The City Hall building still needs to be done. The city requested the state for hazard mitigation funding but were told that this grant was not available for generators unless it was for police, fire, hospitals, potable water systems or sanitary sewer systems. The city will have to fund the generator so this project is considered complete.

#2 High Priority

Strategy:

Urban Flooding

Replace the culvert at 104th Street. Our experience shows that the cross-sectional area of the culverts would have to be increased. A bridge span would be appropriate in this project using a prefabricated bridge section. This should help eliminate some "upstream" flooding that we have experienced in the past.

Primary Responsibility:

Road Commission

Implementation:

Needed: Funding source

Cost(s):

By 2016 or sooner if funding is available.

Benefit(s): Anticipated

Bridge Span - \$500,000

Funding:

Less potential for flood damage.

BRIC Grant, FMA Grant, HMGP

2016 Status:

104th Avenue culvert replacement project is completed.

#3 Medium priority

Strategy:

Electrical Failure (major)

A. Develop a plan to recover from a major power failure in the city of Zeeland. Determine critical power needs to support hospital, home medical needs, waste water treatment plant, and others.

B. Install an emergency power generator as a secondary power source when a power failure occurs to provide standby power at lift stations with a generator 295 Royal Park Drive.

C. Install an emergency power generator as a secondary power source when a power failure occurs to provide standby power at lift stations 644 Rich Avenue.

D. Install an emergency power generator as a secondary power source when a power failure occurs, 115 Carlton Avenue.

E. Obtain a portable generator for Street Maintenance Facility, 600 East Roosevelt.

Primary Responsibility:

Emergency Management, Utility Companies

Initiatives Needed:

Funding source

Implementation:

By 2027 or sooner if funding is available.

Benefit(s):

Less potential for personal injury.

Anticipated Funding:

BRIC Grant

2016 Status:

B. 295 Royal Park Drive: Emergency power generator has been installed at lift station

C. 644 Rich Avenue: Emergency power generator has been installed at lift station

D. 155 Carlton Avenue: Emergency power generator has been installed at lift station

2022 Status:

No known progress at this time.

#4 Medium Priority

Strategy:

Urban Flooding

A. Cleaning ditch banks and ditching:

a) 215 N. Centennial to 373 N. State

b) 245 S. Woodlawn Ct. to 279 So. Division

c) 250 South Jefferson

d) 277-104th Avenue

e) 420 East Riley

f) 475 No. Centennial to 555 No. State

g) 509 E. Washington to 215 N. Centennial

B. Water Resources Commissioner & engineers to review and update the flood plain maps: Huizenga subdivision.

<p>Primary Responsibility: Implementation: Benefit(s): Anticipated Funding: 2016 Status: 2022 Status:</p>	<p><u>C. Floodplain benching in vacant lot. Provide more storm water storage to avoid flooding, Parcels #70-16-24-400-008, #70-17-18-300-047, #70- 17-18-400-047, and #70-17-17-300-026. Enlarge ex pond to provide more storm water storage to avoid flooding, Parcel #70-16-24-400-050. Regional pond to provide more storm water storage to avoid flooding, Parcel #70-17-17-101-023. Floodplain benching along ditch 1,500 ft.</u> Water Resources Commissioner and engineers Needed: Funding source By 2027 or sooner if funding is available. Less potential for flood damage. BRIC Grant, FMA Grant, HMGP No known progress at this time No known progress at this time.</p>
---	---

#5 Medium Priority
Strategy:

Intentional Acts

- A. 8943 Riley (generating facility): Install cameras, door and gate alarms and connect this to the 24/7 city dispatch center. Zeeland BPW needs security at the substations and generating facilities to reduce the possibility of water contamination and power outages by unknown forces.
 - B. 9984 Perry (electric substation): Install cameras, door and gate alarms and connect this to the 24/7 city dispatch center.
 - C. 320 North Fairview (electric substation): Install cameras, door and gate alarms and connect this to the 24/7 city dispatch center.
 - D. 347 East Washington (generating facility and electric substation): Install cameras, door and gate alarms and connect this to the 24/7 city dispatch center.
 - E. 3697 80th Avenue (water tank): Install cameras, door and gate alarms and connect this to the 24/7 city dispatch center. Zeeland BPW needs security at the water tanks, substations, and generating facilities to reduce the possibility of water contamination and power outages by unknown forces.
 - F. 495 West Washington Avenue (pumping facility and water storage tanks): Install cameras, door and gate alarms and connect this to the 24/7 city dispatch center.
 - G. 115 North Carlton (water tank): Install cameras, door and gate alarms and connect this to the 24/7 city dispatch center.
-

Primary Responsibility:	Individual locations Needed:	Funding source
Implementation:	By 2027 or sooner if funding is available.	
Benefit(s):	Security for critical infrastructure	
Anticipated Funding:	BRIC Grant	
2016 Status:	A. Cameras and connections completed in 2015 B. Cameras and connections added in 2016 C. Cameras and connections added in 2016 D. Cameras and connections added in 2015. Fencing to be expanded in 2017. Security gates to be added By 2027. E. Cameras and connections to be added By 2027. F. Cameras and connections added in 2016 G. Cameras and connections added in 2016	
2022 Status:	Completed.	

#6 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan

City of Zeeland

By 2027 or sooner

Less potential for personal injury

No known progress at this time. Last known update was in 2011.

Master Plan was updated in 2020

#7 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

All Hazards

Develop actions to strengthen and maintain emergency notification systems

Emergency Management

By 2027 or sooner

Less potential for personal injury

No known progress at this time due to lack of funding.

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#8 Medium Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

2016 Status:

2022 Status:

Severe Weather

Identify any warning system needs

Emergency Management

By 2027 or sooner

Less potential for personal injury.

No known progress at this time due to lack of funding.

Added one permanent outdoor warning siren in Zeeland Township.

#9 Medium priority

Strategy:

Hazardous Materials Release

A. Develop and conduct response training for a hazardous material release in the city of Zeeland.

B. Acquire equipment for responders to safely operate in an area

of hazardous materials release in the city of Zeeland.
C. Develop and conduct exercises to test capabilities for hazardous material release in the city of Zeeland.

Primary Responsibility: Emergency Management
Initiatives Needed: Funding Source
Implementation: By 2023 or sooner
Cost(s): TBD
Benefit(s): Less potential for injury for both responders and community.
Quicker recovery from incident.
Anticipated Funding: BRIC Grant
2022 Status: **New Action Plan**

#10 Low priority
Strategy:

Fire - Urban and Structural
Consideration of additional fire-related public awareness activities

Primary Responsibility: Fire Department
Implementation: By 2027 or sooner
Benefit(s): Less potential for personal injury.
2016 Status: No known progress at this time
2022 Status: Fireworks and smoke alarm awareness in 2022.

Zeeland Township

2020 population 12,008 (up 20% from 2010)

Not a NFIP Participant

Hazard Priorities

- High:** Communication/Cyber Failure, Electrical Failure, Tornado, Riverine Flooding, Thunderstorm Hazards, Urban Flooding, Severe Winter Weather
- Medium:** Climate Change, Extreme Temperatures, Urban/Structural Fire, Intentional Act, Transportation Accident, Hazardous Materials Release, Water System Failure, Epidemic, Sanitary Sewer System Failure, Extreme Temperatures, Public Health Hazard
- Low:** Drought, Earthquake, Fire/General, Wildfires, Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Landslide, Dam Failure

Prioritized Hazard Mitigation Strategies

#1 High Priority

Strategy:

Severe Weather, Extreme Temperatures

A. Tabletop exercises and communication planning

B. Continued training in ICS and mass casualty

Primary Responsibility:

Zeeland Charter Township

Initiatives Needed:

A. Establish a protocol for exercises and annual review of communications planning

B. Funding source (\$3000-\$5000)

Implementation:

Ongoing with annual review

Benefit(s):

Less potential for personal injury

Anticipated Funding:

A. This will be done during regular business hours with current staff

B. Grants as well as other funding sources if available

2016 Status:

A. Zeeland Charter Township conducts a tabletop exercise in April each year. In the exercise, evacuation planning, hazardous material sites, means of communication, routes of travel, and related topics are discussed.

B. This strategy depends upon funding during times of very tight budgets.

2022 Status:

With the adoption of the Support Emergency Operations Plan (2019), Zeeland Fire/Rescue will conduct at least one tabletop exercise to evaluate the effectiveness of the plan.

#2 High Priority

Strategy:

Public Health Emergency

Upgrade of the public health and hospital emergency communication systems

Primary Responsibility:

Zeeland Charter Township, Utility Companies

Initiatives Needed:

Secure funding

Implementation:

By 2027 or sooner if funding is available

Cost(s):

Unknown \$10,000-\$15,000

Benefit(s): Less potential for the spread of disease
 Anticipated Funding: BRIC Grant, American Rescue Plan Act
 2016 Status: This strategy depends upon funding during times of very tight budgets.
2022 Status: Ottawa County Department of Public Health Strategic Communications (2020-21):

- Assisted with the development of the regional Vaccinate West Michigan website.
- Utilized social media, including Twitter and Facebook.
- Participated in local media interviews and stories.
- Developed weekly/biweekly COVID-19 bulletins.
- Managed emergency operations center communications.
- Held community presentations, webinars and Facebook Live Q&A sessions.
- Managed COVID-19 call center.
- Developed television and radio advertising.
- Provided epidemiology updates and reports.
- Created COVID-19 response website and data dashboard.
- Sent targeted communications using electronic and phone messaging for COVID 19 cases and contacts.

#3 High Priority

Sanitary Sewer Failure
Additional standby power, generators and portable pumps
 Primary Responsibility: Zeeland Charter Township Fire Department
 Initiatives Needed: Secure funding
 Implementation: By 2027 or sooner if funding is available
 Cost(s): Unknown \$40,000-\$50,000.
 Benefit(s): Less potential for a wastewater spill.
 Anticipated Funding: BRIC Grant, Water & Waste Disposal Loan & Grant Program
 This strategy depends upon funding during times of very tight budgets.
 2016 Status: No known progress at this time. .
2022 Status: MDOT is investing \$66 million to rebuild eastbound and westbound I-196 from west of Byron Rd. in Zeeland to 32nd Ave. in Hudsonville. Work also includes culvert replacement, sewer and drainage improvements, and bridge work.

#4 Medium Priority

All Hazards
Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan
 Primary Responsibility: Zeeland Township
 Implementation: By 2027 or sooner
 Benefit(s): Less potential for personal injury
 2016 Status: No known progress at this time
2022 Status: Master Plan updated in 2020.

#5 Medium Priority

Strategy:
Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

All Hazards

Develop actions to strengthen and maintain emergency notification systems
Emergency Management
By 2027 or sooner
Less potential for personal injury
No progress at this time due to lack of funding.
FEMA's new Integrated Public Alert and Warning System (IPAWS)..

#6 Medium Priority

Strategy:
Primary Responsibility:
Implementation:
Benefit(s):
2016 Status:
2022 Status:

Severe Weather

Identify any warning system needs
Emergency Management
By 2027 or sooner
Less potential for personal injury.
No progress at this time due to lack of funding.
FEMA's new Integrated Public Alert and Warning System (IPAWS)..

#7 Medium Priority

Strategy:
Primary Responsibility:
Implementation:
Cost(s):
Benefit(s):

2016 Status:
2022 Status:

Infrastructure Failure

Additional stand-by power, generators, and portable pumps
Zeeland Township
By 2027 or sooner
\$40,000-\$50,000
Less potential for disruption of essential services Anticipated Funding: Grants as well as other funding sources if available
No progress at this time due to lack of funding.
Howard Miller Building: Four new boilers are on line. All new glycol pumps and hot water heat pumps are on line. Back-up generator installed and complete. All insulation installations are complete. The new venting and combustion air chase way on the north side of the building is complete. The new building automation system is fully operational and includes controls for future snow melt. Staff training on systems also complete.

#9 Low priority

Strategy:

Primary Responsibility:
Implementation:
Benefit(s):
Anticipated Funding:
2016 Status:
2022 Status:

Fire - Urban and Structural

Fire training in the use of foam and other water enhancing operations.
Continuing education
Fire Department
By 2027 or sooner
Less potential for personal injury
BRIC Grant
No known progress at this time
Developed a sustainable Smoke and CO detector program where Smoke and CO detectors are readily available to the residents of the city at little or no cost through state and local partnerships.

Grand Valley State University

Hazard Priorities

- High:** Utility Failure/Leak, Intentional Act, Fire - Structural, Riverine Flooding, Urban Flooding, Structural Fire
- Medium:** Hazardous Materials Release, Communication/Cyber Failure, Electrical Failure, Severe Winter Weather, Public Health Hazard, Tornado
- Low:** Nuclear Power Plant Accident, Shoreline Flooding/Erosion, Earthquake, Drought, Wildfires, Landslides, Dam Failure, Transportation Accidents, Sanitary Sewer System Failure, Extreme Temperatures

– **GVSU Threat Hazard Identification and Risk Assessment (THIRA):**

CO / Gas leaks
Explosives / Bomb Devices
Fires
Floods
Hazmat accident/spill
IT - Cyber Attack / Virus / Breach / Failure
Medical Emergencies / Death of Student or Staff
Person with a Gun / Active Shooter
Power Outage
Severe Weather - Tornadoes/ Lightning / Snow / Ice
Suicide
Vehicle Accidents

SOURCE: Grand Valley Emergency Management Advisory Committee (GV-EMAC) October 2015

GVSU Prioritized Hazard Mitigation Strategies

#1 High Priority

Strategy:
 Primary Responsibility:
 Initiatives Needed:
 Implementation:
 Benefit(s):

All Hazards

Campus Emergency Coordination
 GVSU: Department of Public Safety
 Planning and training
 By 2027 or sooner if funding is available
 A team of trained individuals will be able to assist students to shelter locations during storms as a response, but more importantly, they will train individuals in what to do to either mitigate the hazard or teach them what to do prior to the arrival of first responders.
 GVSU, grants

Anticipated Funding:

2016 Status: GVSU has begun training a core group of full time staff to act as building coordinators to prepare for, mitigate, and respond to all hazards and various critical incidents. This team of 125 individuals is in need of equipment and identifying vests.

2022 Status: Comprehensive Emergency Management Plan updated in 2020

#2 Low Priority

Strategy:

Primary Responsibility:

Implementation:

Benefit(s):

Anticipated Funding:

2016 Status:

All Hazards

Assistance Center

GVSU: Department of Public Safety

By 2027 or sooner if funding is available.

Protection of property

GVSU, grants

GVSU has considered planning for an assistance center to house a short-term area that could be used for all hazards. This area, however, lacks the ability to operate during power outages.

2022 Status: No known progress at this time. .

#3 High Priority

Strategy:

Primary Responsibility:

Initiatives Needed:

Implementation:

Benefit(s): Anticipated

Funding: 2016 Status:

Intentional Acts

Countering violent extremism

GVSU Police

Planning and training

By 2027 or sooner if funding is available.

Protection of life and property

GVSU, grants

GVSU has seen an uptick in on-campus protests. There is a lack of ability for persons to secure themselves during a critical incident due to classroom doors lacking any type of locking mechanism. The University operates a fully trained Police Department. This department has been training annually in active shooter prevention and provided seminars on active shooter defense. The department does lack protective gear to respond to such incidents.

2022 Status: GVSU has installed “area of rescue assistance phones” in their newer buildings. Classroom locks have been installed. Cameras and license plate readers have been installed at all 3 entries to the GVSU campus.

#4 High Priority

Strategy:

Primary Responsibility:

Initiatives Needed:

Implementation:

Benefit(s):

Anticipated Funding:

2016 Status:

Severe Weather - Emergency Notification

Investigate and acquire new warning technology.

Emergency Management

Funding source

By 2027 or sooner if funding is available.

Less potential for personal injury.

BRIC Grant

GVSU continues to develop actions to strengthen and maintain emergency notification systems serving both on and off campus residents. The university has worked to mitigate various gaps that

previously existed. There remains an inability to control signs and marquees to announce an emergency. The university library's fire announcement system is capable of announcing alerts, but is not yet set to do so.

2022 Status:

GVSUAlert! system by email, text or phone call.

FEMA's new Integrated Public Alert and Warning System (IPAWS).

#5 Medium Priority

Strategy:

Primary Responsibility:

Initiatives Needed:

Implementation:

Benefit(s):

Anticipated Funding:

2016 Status:

Intentional Acts / Infrastructure Protection

Surveillance/Detection

GVSU Police

Surveillance cameras

By 2027 or sooner if funding is available.

Protection of property

GVSU, grants

GVSU has three campus entries. The ability to detect vehicles in pursuit of investigative leads is lacking because these three entries are not monitored or recorded. The university has several of its' cameras connected to the critical infrastructure protection system implemented by the county since the last update of this plan which is helpful. GVSU would like to install cameras at their stadium as well (houses approximately 30,000 people.)

2022 Status:

Completed

#6 Medium Priority

Strategy:

Primary Responsibility:

Initiatives Needed:

Implementation:

Benefit(s):

Anticipated Funding:

2016 Status:

Fire - Urban and Structural

Rescue assistance for disabled people

Fire Department

Surveillance cameras

By 2027 or sooner if funding is available.

Protection of property

GVSU, grants

GVSU has continued to implement fire safety concepts. One area lacking at the university is the evacuation of persons with disabilities. Consideration has begun to create areas of rescue assistance, so those persons have a safe means of sheltering during a fire.

2022 Status:

Evacuation of Persons With Disabilities protocols in staff emergency procedures powerpoint.

GVSU Project Summary

Mitigation Action, Program, Project	Hazard	Priority	Benefit	Estimated Cost
#1 Campus Emergency Coordination	All Hazards	High	The team should have a simple go bag to help during various emergencies. Having a vest will help identify them to the public	\$8,400
#2 Assistance Center	All Hazards	Low	Install generators for the pre-planned Assistance Center	\$19,000
#3 Classroom Locks	Intentional Acts	High	Having the ability to secure classrooms during an active shooter incident increases survivability	\$50,000
#4 Emergency Notification	Severe Weather	High	The front marquee would be a great place for emergency notifications to reach even visiting persons to campus	\$8,000
#5 Install camera detection at all three entries to campus	Intentional Acts / Infrastructure Protection	Medium	Having the ability to monitor and record the three entries would be invaluable to investigative leads	\$20,000
#6 Rescue Assistance	Fire - Structural	Medium	Create areas of rescue assistance for individuals with disabilities	\$15,000