

THEME	CHARLEVOIX COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE											WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities are in Bold font)	STRATEGY TYPE				
		Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Inland Flooding and Erosion	Coastal Hazards: Flooding, Erosion, Currents, Seiche, Waterspout	Extreme Temperatures	Drought	Dense Fog	Invasive Species	Space Weather & EMPs	Public Health Emergency			1. Local Planning & Regulations	2. Building & Infrastructure Projects	3. Natural Systems Protection	4. Education & Awareness Efforts	
Awareness and Preparation	1	Incorporate the County Hazard Mitigation Plan's strategies into elements of future county and local planning documents.	X	X	X	X	X	X	X	X	X	X	X	Countywide	County Planning Commission; All local jurisdictions	X	X	X	X
	1a	Regularly update Capital Improvement Plans that align with the needs of the Beaver Island Emergency Operations Plan.	X	X	X	X	X	X	X	X	X	X	Peaine and St. James Townships	Peaine and St. James Twps.	X	X			
	2	Continue to pursue interdepartmental cooperation and coordination of police, fire, rescue and EMS services to maintain community-wide service coverage.	X	X	X	X	X	X	X	X	X	X	Countywide	Local fire/EMS; CCE Central Dispatch/911, County Sheriff's Office, MDNR Fire Management	X			X	
	2a	Pursue funding and programs available for training, recruitment and retainment of first responder professionals.	X	X	X	X	X	X	X	X	X	X	Countywide	Local fire/EMS; CCE Central Dispatch/911, County EM, County Sheriff's Office, MDNR Fire Management	X			X	
	2b	Create a Beaver Island Emergency Management Team to facilitate responses to emergencies, including situations when off-island emergency personnel are not available and/or electrical, transportation, or communications services on the island are disrupted.	X	X	X	X	X	X	X	X	X	X	Peaine and St. James Townships	Peaine and St. James Townships	X			X	
	2c	Ensure there is coordinated communication amongst flight and ferry service providers during the Beaver Island Airport reconstruction (2026 est. completion).											Peaine and St. James Townships	County EM, Township Supervisors, Airport Managers, USCG				X	
	2d	Continue to conduct annual emergency scenario planning drills regarding a possible US-31 bridge outage or issue at the former Big Rock Nuclear Power Plant site.	X	X	X	X	X	X	X	X	X	X	City of Charlevoix; Hayes Township	County EM	X			X	
	2e	Maintain the relationship between the MDNR Forest Resources Division and the Local Fire Chief's organization; collaborate to utilize fire towers, fire spotters and aerial support as needed for fire prevention and response.			X							X	Countywide	Local Fire Chiefs; County EM; MDNR;			X	X	
	3	Continue to increase participation in the BeAlert mass electronic notification system.	X	X	X	X	X	X	X	X	X	X	Countywide	County EM				X	
	4	Inform the public about emergency events and shelter sites via utilization and promotion of the BeAlert mass notification systems, NOAA Weather Radio, and websites/social media.	X	X	X	X	X	X	X	X	X	X	Countywide	County EM				X	
5	Continue Charlevoix County Commission on Aging's practice of maintaining a list of elderly residents that receive "reassurance calls" during emergencies/power outages.	X	X	X	X	X	X	X	X	X	X	Countywide	Charlevoix County Commission on Aging				X		
6	Create a list of vulnerable residents on Beaver Island that would receive a "check-in" call in the event of an emergency.	X	X	X	X	X	X	X	X	X	X	Beaver Island (Peaine and St. James Townships)	Beaver Island Rural Health Center, Beaver Island Emergency Services, County Commission on Aging				X		

THEME	CHARLEVOIX COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE												WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities are in Bold font)	STRATEGY TYPE			
		Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Inland Flooding and Erosion	Coastal Hazards: Flooding, Erosion, Currents, Seiche, Waterspout	Extreme Temperatures	Drought	Dense Fog	Invasive Species	Space Weather & EMPs	Public Health Emergency	1. Local Planning & Regulations			2. Building & Infrastructure Projects	3. Natural Systems Protection	4. Education & Awareness Efforts	
Awareness and Preparation	7	Continue to develop Emergency Action Plans as needed for large public events.	X	X	X	X	X	X	X	X	X	X	X	Countywide	County EM	X			
	8	Post MDNR Fire Danger Status via BeAlert messaging and social media (Facebook).			X									Countywide	County EM				X
	9	Assess local fire suppression access points and equipment regularly; pursue improvements as needed			X									Countywide	Local Fire Chiefs; County EM; MDNR;	X	X	X	
	9a	Ensure there is at least one accessible standpipe for fire trucks to draft water from Thumb Lake			X									Hudson Township	Hudson Township Fire Dept., County EM		X		
	9b	Establish official, managed and labeled fire lanes on Beaver Island.			X									Beaver Island (Peaine and St. James Townships)	Beaver Island Fire Department, Townships, MDNR, Road Commission	X	X		
	9c	Create a plan of action within the BI Emergency Operations Plan and/or the Northern Lake MI Islands Collaborative for management of the outer island trails systems for fire control access and evacuation routes. Only Trout Island and Squaw/Ojibwe Island are occupied.			X									St. James Township	St. James Township, Beaver Island Fire Department, MDNR	X			
	9d	Once Beaver Island's "Create a Community Wildfire Protection Plan" (CWPP) grant is created, apply for related grants to implement the plan. Part of this plan would be to add two buried 30,000 gallon water tanks (in addition to the existing tank at the east side fire hall) at the south and west ends of the Island, to provide water sources for firefighting use.			X									Beaver Island (Peaine and St. James Townships)	Beaver Island Fire Department, Townships, MDNR	X	X		
	9e	Maintain access locations to Lake Michigan and two inland lakes as water sources for the Beaver Island Fire Department.			X									Beaver Island (Peaine and St. James Townships)	Beaver Island Fire Department, Townships, MDNR	X			
	9f	Introduce an ordinance which encourages proper road and driveway construction for vehicle and fire equipment access. Especially in areas that close down for the winter months and do no maintan Fire Dept. access routes.			X									Countywide	Local governments, fire departments	X	X	X	X
	9g	Develop additional fire stations where needed.			X									Countywide	Local governments, fire departments		X	X	
	10	Provide information on fire safety prevention to guests at parks and campgrounds			X									Countywide	County EM, MDNR, fire departments, campground managers			X	X
11	Work with campground managers to ensure they are aware of evacuation plans/routes and areas of refuge. Ensure routes are accessible to people with mobility, sight or hearing impairments.	X	X	X	X	X	X	X				X	Countywide	County EM, MDNR, local fire departments, private/local government campgrounds	X			X	

THEME	CHARLEVOIX COUNTY HAZARD MITIGATION STRATEGIES		HAZARD TYPE														WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities are in Bold font)	STRATEGY TYPE			
			Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Inland Flooding and Erosion	Coastal Hazards: Flooding, Erosion, Currents, Seiche, Waterspout	Extreme Temperatures	Drought	Dense Fog	Invasive Species	Space Weather & EMPs	Public Health Emergency	1. Local Planning & Regulations	2. Building & Infrastructure Projects	3. Natural Systems Protection			4. Education & Awareness Efforts			
Awareness and Preparation	12	Provide information on fire safety and prevention to residents.			X				X													
	12a	Promote awareness of vegetation/fuel management for fire prevention around homes and other structures.			X				X								Countywide	County EM, local fire departments, local governments			X	X
	12b	Encourage safe disposal of yard and organic waste (i.e., recycling or composting) rather than through open burning.			X				X								Countywide	County EM, local fire departments, local governments			X	X
	12c	Remind residents to check the MDNR's burn permit website to determine if a permit is needed or if there are restrictions in effect.			X				X								Countywide	County EM, local fire departments, local governments	X		X	X
	13	Identify communities with the county that have an interest in becoming a Firewise USA® community. Each applicant must create a board/committee, complete a community wildfire risk assessment and a 3-year action plan to reduce ignition risk to homes, and complete annual educational and risk reduction actions.			X												All Townships	Local fire department chiefs; County EM; MDNR;			X	X
	14	Stay informed about any changes pertaining to the operation and management of the Boyne River Dam, Boyne Falls Dam, or East Jordan Dam.				X											Boyne City, Village of Boyne Falls, Boyne Valley Township, City of East Jordan, South Arm Township	County EM, local governments	X	X	X	X
	15	Utilize the Elk River Chain-of-Lakes (ERCOL) hydrology study tool completed in 2022 by the USACE to evaluate and prepare for potential impacts to the watershed in various scenarios.				X											Six Mile Lake in South Arm Township	Charlevoix County Drain Commissioner, Antrim County Drain Commissioner, EGLE			X	X
	16	Continue the preparedness practice of conducting the annual statewide tornado drill.		X													Countywide	County EM	X			X
	17	Investigate the feasibility of upgrading the three existing manual tornado sirens (in the 3 cities) to the 800MHz operating system. This would allow for automatic tornado warning messages to be sent to all communities in the county via the BeAlert notification system.		X													Countywide	County EM		X		X
	18	Investigate the feasibility of installing additional tornado sirens in the county		X													Outskirts of the City of East Jordan; South Arm Township; Charlevoix Township; Melrose Township	County EM, local governments		X		X
	19	Continue to promote participation in the NWS SKYWARN Storm Spotter program.	X	X		X	X			X							Countywide	County EM				X
	20	Continue to share the County Road Commission's snow removal and road maintenance schedules/plans with communities	X														Countywide	Charlevoix County Road Commission	X			X
21	Continue to provide and promote Charlevoix County COA's Senior Residential Snow Removal Program, providing reduced cost snow removal for income-limited seniors	X											X			Countywide	Charlevoix County Commission on Aging	X			X	
22	Evaluate additional designated sites to temporarily store cleanup debris from downed trees after storm events.	X	X		X											Countywide	Community DPWs, Road Commission, County EM	X				

THEME	CHARLEVOIX COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE											WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities are in Bold font)	STRATEGY TYPE					
		Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Inland Flooding and Erosion	Coastal Hazards: Flooding, Erosion, Currents, Seiche, Waterspout	Extreme Temperatures	Drought	Dense Fog	Invasive Species	Space Weather & EMPs	Public Health Emergency			1. Local Planning & Regulations	2. Building & Infrastructure Projects	3. Natural Systems Protection	4. Education & Awareness Efforts		
Awareness and Preparation	23	Consider developing a program to lease out generators to residents in the event of a power outage.	X	X	X	X	X						X	X	Countywide	Local governments, County EM, Charlevoix County Commission on Aging	X			
	24	Utilize resources offered by the Great Lakes Water Safety Consortium to increase beach safety awareness and incident prevention at public beaches					X								Cities of Charlevoix, East Jordan, and Boyne City; Townships of Charlevoix, Hayes, Peaine and St. James	Local jurisdictions, MDNR, County EM				X
	25	Ensure that County residents, particularly vulnerable populations, have access to healthy, affordable food options.	X						X	X			X		Countywide		X	X	X	X
	25a	Continue to provide and promote the Charlevoix County Commission on Aging's home meal delivery and senior center meal programs	X										X		Senior Centers in Charlevoix, Beaver Island, Boyne City and East Jordan; home-delivered meals available to any county resident age 60+	Charlevoix County Commission on Aging	X			X
	25b	Create community gardens in shared open spaces and/or school locations to promote learning about growing local food, native pollinating plants, and provide access to fresh produce.							X	X			X		Countywide	Local governments, local schools, churches, senior living facilities, parks		X	X	X
	25c	Continue to provide and improve food assistance programs and emergency food programs to help communities prepare for unanticipated emergencies, but also increase regular food accessibility.	X											X	Countywide	Food pantries; NMCAA; COA; school districts (school meal programs)	X			X
	26	Continue programs and services offered by the Health Dept. of Northwest Michigan, such as: immunizations; beach monitoring; permitting processes for proper location and installation of water wells and septic systems; and education about cleaning, monitoring and maintaining septic systems				X								X	Countywide	HDNM, County EM	X		X	X
	27	Continue rely on the MDHHS for guidance via the State Pandemic Plan and information about new or emerging disease threats.												X	Countywide	HDNM, County Medical Care Facility, Assisted Living Facilities, Munson Hospital - CHX, County EM	X			X
	28	Maintain adequate levels of PPE for healthcare workers and first responders, and long-term care facilities.												X	Countywide	County EM; local fire & EMS; Assisted living fac.; Munson Hospital	X			
	29	Identify structures on properties that have had been impacted by flooding; consider applying for FEMA hazard mitigation assistance grants related to flood mitigation, such as innovative stormwater management solutions; property acquisition; structure demolition, elevation, relocation or retrofitting; dry flood proofing; or project scoping				X	X								Countywide	County EM, Local Governments, Drain Commissioner, MI EGLE	X	X	X	X

THEME	CHARLEVOIX COUNTY HAZARD MITIGATION STRATEGIES										WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities are in Bold font)	STRATEGY TYPE				
	Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Inland Flooding and Erosion	Coastal Hazards: Flooding, Erosion, Currents, Seiche, Waterspout	Extreme Temperatures	Drought	Dense Fog	Invasive Species	Space Weather & EMPs			Public Health Emergency	1. Local Planning & Regulations	2. Building & Infrastructure Projects	3. Natural Systems Protection	4. Education & Awareness Efforts
Awareness and Preparation	30	Document where flooding and erosion has impacted or may impact areas of cultural assets on Beaver Island, and create a work plan for necessary site protection.										Beaver Island (Peaine and St. James Townships)	Township governments, Beaver Island Historical Society, Grand Traverse Band of Ottawa and Chippewa Indians	X			X
	31	Promote the benefits of natural shoreline and streambank restoration; identify priority shoreline and streambank restoration sites.										Countywide	Charlevoix Conservation District, Tip of the Mitt Watershed Council, Lake Associations	X		X	X
	32	Consider developing a drought communication plan/early warning system to facilitate timely communication of local drought conditions/outlook to officials, emergency responders, and the public.										Countywide	County EM, Charlevoix Conservation District, USDA-NRCS, MSUE, Local Fire Chiefs, Local Officials	X			X
	33	Consider developing agreements amongst landowners (and municipal water suppliers where applicable) for secondary water sources that could be used in a drought.										Countywide	Charlevoix Conservation District, USDA-NRCS, MSUE, Local Fire Chiefs, Local Officials	X			X
	34	Consider establishing an irrigation time/scheduling program or process so that all agricultural land gets the required amount of water. Through incremental timing, each area is irrigated at different times so that all water is not consumed at the same time. This may also help with recharge of groundwater.										Countywide	Charlevoix Conservation District, USDA-NRCS, MSUE, Local Fire Chiefs, Local Officials	X		X	X
	35	Consider implementing mandatory water conservation measures during drought emergencies, such as: •Developing an ordinance to restrict the use of water resources for non-essential usage, such as landscaping, washing cars, filling pools •Adopting ordinances to prioritize or control water use, particularly for fire fighting.										Cities of Charlevoix, East Jordan, and Boyne City; Melrose Township; Village of Boyne Falls	Local governments/municipal water suppliers	X		X	X
	36	Continue the USDA - NRCS's provision of free technical assistance such as the Conservation Stewardship Program, resource assessment and monitoring, and determination of financial assistance for local farmers, ranchers and forest managers in the wake of a disaster.										Countywide	USDA-NRCS, MDNR, Charlevoix Conservation District			X	X
Shelters	37	Maintain an accurate inventory of emergency shelter sites and their capabilities; review annually and update as needed.										Countywide	County EM; American Red Cross	X			
	38	Provide and publicize designated heating and cooling centers, targeting vulnerable populations such as elderly citizens.										Countywide	County EM; Senior Centers		X		X
	39	Research funding sources for the installation of generators to enhance capabilities of emergency services and shelters.										Countywide	County EM; Local Fire Depts.; Senior Centers; Municipal Offices		X		X

THEME	CHARLEVOIX COUNTY HAZARD MITIGATION STRATEGIES		HAZARD TYPE											WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities are in Bold font)	STRATEGY TYPE						
			Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Inland Flooding and Erosion	Coastal Hazards: Flooding, Erosion, Currents, Seiche, Waterspout	Extreme Temperatures	Drought	Dense Fog	Invasive Species	Space Weather & EMPs	Public Health Emergency			1. Local Planning & Regulations	2. Building & Infrastructure Projects	3. Natural Systems Protection	4. Education & Awareness Efforts			
Shelters	40	Evaluate the need for the creation of storm shelters or "safe rooms" in areas where there are large groups of people and/or vulnerable populations.	X	X	X	X		X									Countywide; See hazard map for locations of campgrounds and mobile homes	County EM ; County Building Dept., local govts; campground managers; schools		X		
	40a	Evaluate the use of the Senior Citizens Center in East Jordan as a preferred shelter site instead of the East Jordan Middle/High School; would need a generator installed.	X	X	X	X	X	X					X	X			City of East Jordan	County EM , City of East Jordan, County Commission on Aging, American Red Cross		X		
	40b	The Shirley Roloff Center could be used as a shelter but needs a generator.	X	X	X	X	X	X					X	X			Charlevoix Township	Charlevoix County , County EM, City of Charlevoix, Charlevoix Township		X		
	40c	Warming/cooling centers are needed on Beaver Island. Utilize the data and action plan from work on Beaver Island's energy grant projects (ETIPP and ERCP) to help determine buildings that are the best fit for shelter sites and how to update them to utilize sustainable/reliable power sources.	X	X	X	X	X	X					X	X			Peaine and St. James Townships	Beaver Island ETIPP Team		X		
	41	Continue to establish areas of refuge and evacuation routes from campgrounds, recreation areas, and other sites of large outdoor events.	X	X	X	X		X	X								See hazard map for locations of campgrounds and mobile homes	County EM ; private and public campground managers; local fire depts.		X		X
	42	Create signage in public parks/beaches that illustrate the nearest emergency shelter.	X	X	X	X	X	X	X								Countywide	County and local governments ; MDNR				X
	43	Maintain and improve procedures for adequate quarantine areas in group living quarters, such as shelters, hospitals and assisted living facilities.													X		Countywide	County Medical Care Facility ; County Jail; Munson Hospital ; assisted living and adult foster care facilities				X
Buildings, Transportation & Dams	44	Continue enforcement of building codes, stormwater management ordinance, soil erosion/sedimentation control, and EGLE permitting requirements relative to new construction or site modification.	X	X	X	X	X	X				X	X	X		Countywide; Critical Dunes are in Charlevoix Twp., Norwood Twp., St. James Twp., Peaine Twp., and City of Charlevoix.	County Building Dept. , Peaine Twp., St. James Twp., EGLE	X	X	X		
	45	Consider adopting a Time of Sale/Transfer (TOST) septic ordinance (also called Point of Sale, or POS), requiring local inspection of well and septic systems prior to the sale of a property. These are designed to identify well and septic systems that are no longer functioning as designed (or were installed without regard to the code) and then require corrective action if necessary.				X	X							X		Countywide	Local Governments , Health Department of NW MI , TOMWC	X		X	X	
	46	Promote the availability of low-cost residential weatherization and home improvement programs.	X	X	X	X	X							X		Countywide	Charlevoix County Commission on Aging , County EM, NMCAA		X		X	

THEME	CHARLEVOIX COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE											WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities are in Bold font)	STRATEGY TYPE						
		Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Inland Flooding and Erosion	Coastal Hazards: Flooding, Erosion, Currents, Seiche, Waterspout	Extreme Temperatures	Drought	Dense Fog	Invasive Species	Space Weather & EMPs	Public Health Emergency			1. Local Planning & Regulations	2. Building & Infrastructure Projects	3. Natural Systems Protection	4. Education & Awareness Efforts			
Buildings, Transportation & Dams	47	Consider providing a reduced-cost program to install air conditioning in the homes of low-income senior citizens.			X										X	Countywide	Charlevoix County Commission on Aging, County EM		X		
	48	Improve ventilation techniques in areas, facilities, or vehicles that are prone to crowding or that may involve exposure to contagion or noxious atmospheres.													X	Countywide	Local and county governments, schools, private venues.		X		
	49	Continue to pursue opportunities for brownfield and blight clean-up activities, including demolition and clearance of vacant, condemned structures, to remove actual and potential sources of land, water and air contamination.		X	X	X	X								X	Countywide	Charlevoix County Brownfield Redevelopment Authority; Local Governments	X	X	X	
	50	Pursue available funding opportunities from the MI EGLE Dam Risk Reduction Grant Program for the East Jordan Dam and Boyne Falls Dam				X										South Arm Township and City of East Jordan; Village of Boyne Falls and Boyne Valley Township	East Jordan Plastics Co., Village of Boyne Falls		X	X	
	51	Evaluate options for developing additional Lake Michigan access points (boat launches) for emergency use on all sides of Beaver Island. Currently there are only 2 boat access launches on the island, which are in St. James Harbor.	X	X	X		X	X	X				X	X		Peaine and St. James Townships	Peaine and St. James Twps., MI EGLE, USACE, USCG		X		
	52	Evaluate an emergency alternative route to King's Highway located north of East Side Drive. This section of road is surrounded by an electric substation, power plant, and a gas station with several LP storage tanks. A hazard incident associated with any of these sites could cause the closure of this single road that connects the north side of the island with the south side. The owner of the land that includes "Buddy Martin's Trail" has expressed interest in Peaine Township or the RC owning the trail which could be developed into an alternative N/S road.	X	X	X	X	X	X	X	X	X	X				Peaine Township	Peaine Township, County Road Commission	X	X		
	53	Work towards establishing consistently cleared, labeled and maintained roads on Beaver Island to ensure they can be accessed in emergencies. Some roads may need to be widened to allow for vehicle access.	X	X	X	X	X						X	X		Peaine and St. James Townships	County Road Commission, Peaine and St. James Twps.		X		X
	54	Install snow fences along Kings Highway, including the roads near Beaver Island and Welke Airport.	X													Peaine Township	Peaine Township, County Road Commission		X		
	55	Inventory and prioritize improvements for flood/erosion prone locations in the County's infrastructure. (I.e., upgrading aging stormwater abatement structures, or replacing undersized/aging culverts and bridges.)				X	X									Countywide	County Road Commission, MDOT, local governments County Drain Commissioner, public land management organizations	X	X		

THEME	CHARLEVOIX COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE											WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities are in Bold font)	STRATEGY TYPE							
		Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Inland Flooding and Erosion	Coastal Hazards: Flooding, Erosion, Currents, Seiche, Waterspout	Extreme Temperatures	Drought	Dense Fog	Invasive Species	Space Weather & EMPs	Public Health Emergency			1. Local Planning & Regulations	2. Building & Infrastructure Projects	3. Natural Systems Protection	4. Education & Awareness Efforts				
Buildings, Transportation & Dams	55a	Work to complete an inventory of Beaver Island's culverts, documenting their conditions and establishing short/long-term replacement plans.	X	X		X	X						X			Beaver Island (Peaine and St. James Townships)	County Road Commission, Townships, Tip of the Mitt Watershed Council, Conservation Resource Alliance	X	X	X		
	55b	Undersized culvert(s) are present on East Side Drive over stream connecting Lake Geneserath to Lake MI.				X										Peaine Township	Charlevoix County Road Commission, local government		X	X		
	55c	Continue to maintain the impoundment on Font Lake which functions as an emergency drainage point when the lake floods.				X										Beaver Island (Peaine and St. James Townships)	St. James Township	X	X	X		
	55d	Gull Harbor Drive was flooded during high Lake MI water levels					X									St. James Township	Charlevoix County Road Commission		X			
	55e	During high Lake MI water levels, coastal erosion occurred along South End Road between Iron Ore Bay and Cable Bay; part of East Side Dr., east of Martins Pit Rd.; and along the northern coast of Beaver Island.					X									Beaver Island (Peaine and St. James Townships)	Charlevoix County Road Commission		X			
	55f	When a "road closure" sign is placed by the Road Commission, clearly communicate to motorists if the road is only open to local traffic (partial access) or completely closed (no access).	X	X	X	X	X									Beaver Island (Peaine and St. James Townships)	Charlevoix County Road Commission, local governments					X
	55g	Flooding at Hetrick Road over Schoolhouse Creek				X										Boyne Valley Township	Charlevoix County Road Commission, local government		X	X		
	55h	Matz Road stream crossings - beaver dam activity floods near the road; water saturates the road be. Contract with land owner to fix				X										Chandler Township	Charlevoix County Road Commission, local government		X	X		
	55i	Beaver dam activity impacting East Shadow Trail				X										Evangeline Township	Charlevoix County Road Commission, local government		X	X		
	55j	Address water runoff/erosion issues from roads on steep slopes in the Springwater Beach subdivision and near Hemingway Point Club Association and homes along Pine Lake Rd.				X										Evangeline Township			X	X		
	55j1	Consider adoption of a special assessment district to fund road drainage improvements.				X										Evangeline Township	Evangeline Township, property owners, Charlevoix County Road Commission		X	X		
	55j2	Consider installing rain gardens/bioswales along the road to reduce runoff.				X				X						Evangeline Township	Property owners, Charlevoix County Road Commission, TOMWC		X	X		
	55k	Flooding issues at Woodin Road stream crossing north of Huffman Lake Rd., on the county line				X										Hudson Township	Charlevoix County Road Commission, local government		X	X		
55l	Iron Bridge Road is seasonal road with weight restrictions				X										Hudson Township	Charlevoix County Road Commission, local government		X	X			

THEME	CHARLEVOIX COUNTY HAZARD MITIGATION STRATEGIES		HAZARD TYPE											WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities are in Bold font)	STRATEGY TYPE							
			Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Inland Flooding and Erosion	Coastal Hazards: Flooding, Erosion, Currents, Seiche, Waterspout	Extreme Temperatures	Drought	Dense Fog	Invasive Species	Space Weather & EMPs	Public Health Emergency			1. Local Planning & Regulations	2. Building & Infrastructure Projects	3. Natural Systems Protection	4. Education & Awareness Efforts				
Buildings, Transportation & Dams	55m	Narrow road crossings over the West Branch Sturgeon River on Bingham and Iron Bridge Roads due to beaver dam activity				X											Hudson Township	Charlevoix County Road Commission, local government		X	X		
	55n	Two culverts on Bauman Road over creeks need to be 15 feet longer. Culverts are very short and the road jogs; lots of beaver dam activity in the area.				X											Melrose Township	Charlevoix County Road Commission, local government		X	X		
	55o	Springvale Road has 3 culverts over the Bear River; two are failing. Very old. Classified as a bridge as it meets the minimum 20' span width. Springvale Road is an E-W primary road. Want to turn it into a free span bridge and open up the creek to increase creek flow and improve riparian habitat.				X											Melrose Township	Charlevoix County Road Commission, local government		X	X		
	55p	M-75 water issues at stream crossings at 4 locations, including Walloon Lake Dam over Bear River.				X											Melrose Township	MDOT, Melrose Township		X	X		
	55q	Shadow Trail (near South Arm shoreline of Walloon Lake) was repaved in 2016-2017, but water still flows over the road at times around Fineout Creek. Beaver dam activity in the area.				X											Melrose Township	Charlevoix County Road Commission, local government		X	X		
	55r	Flooding issues around Six Mile Lake				X											South Arm Township	Charlevoix County Road Commission, local government		X	X		
	55s	Flooding has occurred around the Raven Hill Discovery Center due to undersized culverts at Bergman Rd., Fuller Road and Marvon Road over Deer Creek.				X											Wilson Township	Charlevoix County Road Commission, local government		X	X		
	55t	L. MI historic flooding/erosion impacting many areas along Lake MI coastline; particularly a portion of the Charlevoix to Petoskey Trail (paved bike path) adjoining US-31					X										Hayes, Charlevoix, Norwood, St. James and Peaine Townships; City of Charlevoix	MDOT, Local Governments, Top of MI Trails Council		X	X		
Utilities & Technology	56	Continue regular trimming of vegetation (particularly diseased or dead trees) along various road and utility right-of-ways to minimize power outages and road blockages from storm damage.	X	X	X					X				X		Countywide	County Road Commission, Cities/Villages, MDOT, Consumers Energy, Great Lakes Energy	X		X			
	56a	Charlevoix County Road Commission to consider utilizing a contractor to maintain vegetative clearance in the M-66 R-O-W.	X	X	X					X						City of Charlevoix; Townships of Charlevoix, Marion, Eveline, South Arm; City of East Jordan	Charlevoix County Road Commission	X		X			
	57	Continue to maintain effective communications practices between electric utility companies regarding power restoration. (County EM to post and promote electrical outage utility maps on social media.)	X	X	X					X						Countywide	County EM, Consumers Energy, Great Lakes Energy, City of Charlevoix					X	

THEME	CHARLEVOIX COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE											WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities are in Bold font)	STRATEGY TYPE							
		Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Inland Flooding and Erosion	Coastal Hazards: Flooding, Erosion, Currents, Seiche, Waterspout	Extreme Temperatures	Drought	Dense Fog	Invasive Species	Space Weather & EMPs	Public Health Emergency			1. Local Planning & Regulations	2. Building & Infrastructure Projects	3. Natural Systems Protection	4. Education & Awareness Efforts				
Utilities & Technology	58	Place electric and communication utility lines underground, such as during new construction, new utility connection work, or in areas regularly prone to power outages.	X	X	X						X		X				Countywide	Local governments with zoning; property owners; Consumers Energy, Great Lakes Energy, City of Charlevoix	X	X		
	58a	Priority area to evaluate for Beaver Island: Bury electric lines between the GLE electric distribution station and the landward point of entry from Lake Michigan.	X	X	X						X		X				Peaine Township	Peaine Township, Great Lakes Energy		X		
	58b	Priority area to evaluate for Beaver Island: Bury electric lines on the east side of the island where there is a high density of development	X	X	X						X		X				St. James Township, Peaine Township	Property Owners, Great Lakes Energy	X	X		
	59	Document occurrences of electrical interruptions during storms and work with electric companies to improve the resiliency of the infrastructure in these areas. Prioritize minimizing power outages for facilities caring for vulnerable and/or marginalized populations, such as hospitals, nursing homes, publicly accessible buildings, etc.	X	X	X	X					X						Countywide	County EM, Citizen volunteers, Consumers Energy, Great Lakes Energy, City of Charlevoix		X		X
	60	Install lightning protection devices as needed on the community's communications infrastructure and critical structures.		X													Countywide	County/Local Governments		X		
	61	Promote the use of small-scale renewable energy sources for homes, businesses and governmental facilities	X	X							X						Countywide	County/Local Governments		X	X	X
	61a	Utilize the results of the Energy Transitions Initiative Partnership Project (ETIPP) assessment of Beaver Island's energy grid to investigate several potential projects to present to entities involved in the overall operation of the Island's energy. This may be accomplished over time through the implementation of local policy changes, collaboration with existing energy suppliers, applications for grant funding, and support in the exploration of developing alternative energy generation (such as solar and geothermal) and distribution methods (such as a microgrid).	X	X	X						X						Beaver Island (Peaine and St. James Townships)	Beaver Island ETIPP Team	X	X		
62	Continue to maintain community sewer systems at acceptable regulated operating standards.				X	X									X	Cities of Charlevoix, Boyne City, East Jordan; Melrose Township; St. James Twp.;	Cities of Charlevoix, Boyne City, East Jordan; Melrose Township; St. James Twp.;	X	X	X		

THEME	CHARLEVOIX COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE											WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities are in Bold font)	STRATEGY TYPE					
		Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Inland Flooding and Erosion	Coastal Hazards: Flooding, Erosion, Currents, Seiche, Waterspout	Extreme Temperatures	Drought	Dense Fog	Invasive Species	Space Weather & EMPs	Public Health Emergency			1. Local Planning & Regulations	2. Building & Infrastructure Projects	3. Natural Systems Protection	4. Education & Awareness Efforts		
Utilities & Technology	63	Continue to maintain community water systems at acceptable regulated operating standards.			X									X	Municipal water service is provided by the cities of Boyne, Charlevoix and East Jordan, the Village of Boyne Falls, and Charlevoix Township. The unincorporated village of Walloon in Melrose Twp. is serviced by a privately owned water supply system.	Cities of Boyne, Charlevoix and East Jordan; Village of Boyne Falls; Charlevoix Township; Walloon Lake Water System Inc.	X	X		
	64	Separate storm and sanitary sewer systems where applicable.	X	X		X	X							X			X	X	X	
	64a	Most of East Jordan's stormwater infrastructure is separate from the sewer system, although a small amount flows into the sanitary sewer. Stormwater from the community's southwest side still flows too rapidly into the sewer at times, and so the City may need to identify problem areas in that part of the community.	X	X		X	X							X	City of East Jordan	City of East Jordan	X	X	X	
	65	Identify the locations of where backup generators may be needed for wastewater pump chambers or water storage towers to service issues in the event of a power outage, and apply for funding.	X	X		X								X	Cities of Charlevoix, Boyne City, East Jordan; Melrose Township; Charlevoix Township; St. James Twp.; Village of Boyne Falls	Cities of Charlevoix, Boyne City, East Jordan; Melrose Township; Charlevoix Township; St. James Twp.; Village of Boyne Falls; Walloon Lake Water System Inc.		X	X	
	65a	Install a permanent generator to keep St. James Twp. sewer system pumps operative in a power outage or other hazard situation.	X	X		X	X							X	St. James Township	St. James Township		X	X	
	66	Continue the responsible "smart growth" land use practice of connecting existing water/sewer infrastructure to support infill development within the boundaries of the City of Boyne City. Some properties within the city are utilize private septic systems and could tie into the city's existing sewer infrastructure. It is also very cost prohibitive for the City to extend water/sewer lines to development further outside of the existing system.				X	X							X	City of Boyne City	City of Boyne City	X	X	X	
	67	Update and maintain Continuity of Operations plans and alternative remote work schedules.	X											X	County Government and Local Government Agencies; Public Schools	County and Local Government Agencies; Public Schools	X			
	68	Continue collaboration amongst local governments and utility providers to increase the availability of high-speed internet service.	X	X	X	X	X	X	X	X				X	Rural areas of the county outside of cities and villages	Charlevoix County BOC; local governments; service providers; Connected Nation MI	X	X		

THEME	CHARLEVOIX COUNTY HAZARD MITIGATION STRATEGIES										WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities are in Bold font)	STRATEGY TYPE			
	Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Inland Flooding and Erosion	Coastal Hazards: Flooding, Erosion, Currents, Seiche, Waterspout	Extreme Temperatures	Drought	Dense Fog	Invasive Species	Space Weather & EMPs			Public Health Emergency	1. Local Planning & Regulations	2. Building & Infrastructure Projects	3. Natural Systems Protection
Utilities & Technology	69	Contact industries and systems in the county that could be disrupted by space weather events and EMPs to provide information on best practices.								X		Countywide			X	
	69a	Refer critical infrastructure owners and operators to the U.S. Department of Homeland Security, Science and Technology Directorate's 2022 report <i>Electromagnetic Pulse Shielding Mitigations: Best Practices for Protection of Mission Critical Equipment</i> to assess their system's vulnerability and determine the best EMP protection approach.								X		Countywide			X	
	69b	Utilize operating procedures that include back-up systems allowing complex systems (e.g. air traffic control) to continue to function when key technological systems (e.g. GPS, radio communications, satellites) malfunction. For example, some "legacy" systems might be retained as a back-up, new GPS signals and codes could be used to remove ranging errors, and protective and back-up components could be installed in vulnerable systems.								X		Countywide			X	
	69c	Utilize special procedures, equipment, and redundancies by utility systems (e.g. electrical power and pipeline systems) to minimize the potential for geomagnetic effects to cause inappropriate shutdowns, impaired or lost functionality, and system damage. For example: the provision of reserve system capacity may offset the effects of geomagnetic storms; or the temporary disconnection of vulnerable components for their own protection.								X		Countywide			X	
	69d	Consistent use of computer data back-up systems with secure offsite storage as appropriate.								X		Countywide			X	
	69e	Use of uninterruptible battery supplies (UPS) and/or generators.								X		Countywide			X	

Charlevoix County LEPC; county emergency management, energy providers, airports, MDOT (US-31 bridge operations), USCG, Big Rock Point former nuclear power plant site, communications service providers, crop farmers that utilize GPS, Beaver Island Ferry Co.

THEME	CHARLEVOIX COUNTY HAZARD MITIGATION STRATEGIES		HAZARD TYPE											WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities are in Bold font)	STRATEGY TYPE								
			Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Inland Flooding and Erosion	Coastal Hazards: Flooding, Erosion, Currents, Seiche, Waterspout	Extreme Temperatures	Drought	Dense Fog	Invasive Species	Space Weather & EMPs	Public Health Emergency			1. Local Planning & Regulations	2. Building & Infrastructure Projects	3. Natural Systems Protection	4. Education & Awareness Efforts					
Environment & Natural Resources	70	Continue the monitoring, treatment and removal efforts for aquatic invasive species (AIS) and terrestrial invasive species (TIS)															Countywide	CAKE-CISMA, county and local governments, TOMWC, lake and stream management organizations, Charlevoix Conservation District, MDNR, Little Traverse Conservancy, Walloon Lake Association & Conservancy			X			
	70a	AIS in the Jordan River												X			South Arm Township and City of East Jordan				X			
	70b	AIS in Porter and Dyer Creeks (tributaries to Lake Charlevoix)												X			Eveline Township	Local governments, TOMWC, lake and stream management organizations, Charlevoix Conservation District, MDNR, Little Traverse Conservancy, Walloon Lake Association & Conservancy				X		
	70c	AIS in several tributaries on the south side of Walloon Lake; coastline along the foot of the lake (North Shore Dr., M-75 and S. Shore Drive); Bear River												X			Melrose Township					X		
	70d	AIS in Lake Charlevoix												X			Hayes, Bay, Evangeline, Wilson, Eveline, South Arm, Marion, Charlevoix and Hayes Townships; Cities of Charlevoix and Boyne City.					X		
	70e	Eurasian Water Milfoil (EWM) treatment on Thumb Lake, Lake Charlevoix and Six Mile Lake												X			Hudson Township, City of East Jordan, South Arm Township	Charlevoix County (has a park adjoining the lake); Lake Louise Christian Community; City of East Jordan; South Arm Twp.					X	
	70f	Phragmites along Lake MI Shoreline and also noted south of Clipperview Road and west of US-31												X			Norwood Township, Charlevoix Township, City of Charlevoix, Hayes Township, Peaine Township, St. James Twp.	Local governments, County Road Commission, MDOT, CAKE-CISMA					X	
	70g	Giant knotweed impacting the road structure of East Shadow Trail												X			Evangeline Township	County Road Commission, CAKE-CISMA					X	
	70h	Giant knotweed impacting Boyne City-East Jordan Road just south of Boyne City limits												X			Wilson Township	County Road Commission, CAKE-CISMA						
	70i	Area of diseased trees observed along Camp Daggett Road												X			Bay Township	Bay Township, County Road Commission, CAKE-CISMA					X	
	70j	Continue monitoring for the Emerald Ash Borer on Beaver Island												X			Beaver Island (Peaine and St. James Townships)	Peaine and St. James Twps., CAKE-CISMA						

THEME	CHARLEVOIX COUNTY HAZARD MITIGATION STRATEGIES											WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities are in Bold font)	STRATEGY TYPE				
	Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Inland Flooding and Erosion	Coastal Hazards: Flooding, Erosion, Currents, Seiche, Waterspout	Extreme Temperatures	Drought	Dense Fog	Invasive Species	Space Weather & EMPs	Public Health Emergency			1. Local Planning & Regulations	2. Building & Infrastructure Projects	3. Natural Systems Protection	4. Education & Awareness Efforts	
Environment & Natural Resources	71	Continue to provide public education/outreach regarding aquatic and terrestrial invasive species management.											Countywide	CAKE-CISMA, county and local governments, TOMWC, lake and stream management organizations, Charlevoix Conservation District, MDNR, Little Traverse Conservancy, Walloon Lake Association & Conservancy			X	X
	71a	Consider participating in EGLE's annual Great Lakes Aquatic Invasive Species "Landing Blitz" event at public boat launches, emphasizing the need to Clean, Drain, Dry boats whenever they come out of the water, and Dispose of any unwanted bait in the trash.											Countywide	CAKE-CISMA, county and local governments, TOMWC, lake and stream management organizations, Charlevoix Conservation District, MDNR, LTC			X	X
	71b	Consider applying for grant funding through MSUE's "Clean Boats, Clean Waters" comprehensive aquatic invasive species boater outreach program to communicate aquatic invasive species prevention information through outreach materials and in-person educational events to boaters.											Countywide	Local or tribal units of government; Lake associations/watershed protection groups; Non-profit 501(c)(3) organizations			X	X
	71c	Continue TOMWC's Mobile Boat Washing Station (MOBO) Program, where volunteers use high-pressure, heated water to wash invasive plants and animals off boats and trailers. Visits are made to various Northern Michigan lake landings and wash boats for free throughout the summer.												Tip of the Mitt Watershed Council			X	X
	71d	Promote EGLE's "NotMISpecies" webinars and resources on invasives control and management best practices											Countywide	CAKE-CISMA, county and local governments, TOMWC, lake and stream management organizations, Charlevoix Conservation District			X	X
	71e	Discuss amongst land managers/stakeholders the practice of conducting controlled burns on Beaver Island to reduce wildfire risk and manage invasive species.											Beaver Island (Peaine and St. James Townships)	Township staff, tribal entities (BIA, GTB), MDNR	X		X	

THEME	CHARLEVOIX COUNTY HAZARD MITIGATION STRATEGIES										WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities are in Bold font)	STRATEGY TYPE				
	Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Inland Flooding and Erosion	Coastal Hazards: Flooding, Erosion, Currents, Seiche, Waterspout	Extreme Temperatures	Drought	Dense Fog	Invasive Species	Space Weather & EMPs			Public Health Emergency	1. Local Planning & Regulations	2. Building & Infrastructure Projects	3. Natural Systems Protection	4. Education & Awareness Efforts
Environment & Natural Resources	71f	Work with transportation entities such as the Beaver Island Boat Co. and airports to promote and/ or require techniques or procedures during the transport process that minimize the potential spread of invasive species onto the Island from vehicles, boats and other motorized equipment.										Beaver Island (Peaine and St. James Townships)	Peaine and St. James Townships, CAKE-CISMA, Beaver Island Boat Co., Beaver Island Airport, Welke Airport	X		X	X
	71g	Investigate alternative, effective and less expensive invasive species control measures, such as livestock grazing.										Countywide	CAKE-CISMA, MSU Extension			X	X
	72	Consider adoption of a local ordinance that requires native vegetation in a greenbelt along a waterfront.										Townships of Boyne Valley, Hudson, Marion, Melrose, Norwood, Peaine, St. James, South Arm, and Wilson; Cities of Boyne City, Charlevoix and East Jordan	Townships of Boyne Valley, Hudson, Marion, Melrose, Norwood, Peaine, St. James, South Arm, and Wilson; Cities of Boyne City, Charlevoix and East Jordan	X		X	X
	73	Consider installing permanent boat wash stations at boat lake access points and boot cleaning stations at trail access points.										Countywide	MDNR, Local and County Government recreation providers			X	X
	74	Continue to identify and prioritize sites for open space protection/preservation and green infrastructure, especially in areas prone to flooding or erosion.										Countywide	Little Traverse Conservancy; Walloon Lake Association & Conservancy; County/Local governments; TOMWC	X		X	
	75	Incorporate green infrastructure-related goals and objectives in the county and local community master plans and park & recreation plans.										Countywide	Charlevoix County Planning Commission; All local jurisdictions	X		X	
	76	Provide information to educate and inform lakeshore residents about what they can do to help protect their property value and the health of the lake on which they live by protecting, stabilizing and beautifying their shorelines with nature-based solutions.										All communities except Chandler Township and the Village of Boyne Falls.	TOMWC, Local Governments, Charlevoix Conservation District			X	X

