



Beaver Island Coastal Sustainability Assessment

Prepared by: Lee Maynard

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Acknowledgements

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This Self-Assessment Tool references recommendations and best practices developed by LIAA, as well as from the following entities:

- Michigan State University School of Planning, Design and Construction—A Self-Assessment of Sustainability in Your Community
- Environmental Protection Agency (EPA)—Flood Resilience Checklist
- Sustainability Tools for Assessing and Rating Communities (STAR)
- Seagrant Wisconsin—Green Infrastructure Audit Tool
- Maryland’s CoastSmart Communities Tool



The statements, findings, conclusions, and recommendations in this document are those of the authors and do not necessarily reflect the views of the Department of Environment, Great Lakes, and Energy and the National Oceanic and Atmospheric Administration.



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How to use this assessment tool

Each sustainability principle features various benchmarks that are often used as an indicator of local resilience. To complete the community self-assessment, read the benchmark question and its description and choose from the following response options:

Example of how a community may score themselves

Yes (Y) - The community has included this sustainability principle in its planning efforts and/or local policies and initiatives.

Yes, but should improve (I) - The community either practices this sustainability principle but does not explicitly include it in its planning documents, or the principle can be found in planning documents but could be implemented to a greater degree.

No (N) - The community has not considered this sustainability principle in its plans or local initiatives.

Don't know (?) - It is unclear if the community is practicing this sustainability principle or if this sustainability principle is applicable given local conditions.

Not applicable (NA) - This sustainability principle is not applicable given local conditions (for example, dune protection in a community without dunes).

	Benchmark	Self-Assessment	Description
2.4	Does the master plan, zoning ordinance or other municipal plan, regulation or program call for incentivizes or regulations for developments to include affordable housing options?		For a community to effectively address housing issues, it should have adopted plans that describe the local goals, objectives and action steps to achieve greater sustainability as it pertains to housing. Support for these plans acts as support for the “sticks and carrots” that the municipality can use to implement the community’s vision for its housing.

The purpose of this self-assessment tool is to evaluate each of the benchmarks and look for gaps in your community’s overall sustainability by identifying what is working well (Y), what is present but needs improvement (I), what is missing (N) and what is unclear (?). Once each benchmark has been categorized, the community can begin to plan for a more resilient future by addressing the best practices that would benefit the local economy, social opportunities, environment and coastlines.

Data gathering and mapping

Coastal communities can work towards implementing sustainable policies and best practices once they understand the risks that certain areas and structures are under. Data and mapping that is well-organized and easily presented can help to educate community residents on the importance of planning ahead for potential risks. This is a first step in planning for flood damages to residences, businesses, natural ecosystems and critical public facilities. Planning ahead can help to prevent damages or reduce the negative effects that these damages can cause.

	Benchmark	Self-Assessment	Description
24.1	Does the community use historical mapping of lake levels and lake level projections to inform land use decisions?	N-	The Great Lakes fluctuate in a decadal pattern with an average reduction in shoreline at around 1 foot per year. This fluctuation wherein buildable beach is present for some time and then gone later contributes to development in highrisk areas. Historical data, projections and responsive zoning can help reduce risky development.
24.2	If adjacent to a Great Lake, has the community mapped shoreline erosion using data provide through the Great Lakes Research Center, NOAA and the State of Michigan?	Y- LIAA produced a northwest Michigan shoreline assessment that mapped shoreline erosion	Use the following link to view shoreline data for Michigan's coasts: https://portal1-geo.sabu.mtu.edu/mtuarcgis/apps/webappviewer/?id=d758800bb18e460ab39aa66631051156
24.3	Are flood risk maps and related data updated every five years?	N- 2016 is the last HMP	It is important that data on flood risks remain updated so that community planning mitigation efforts are based on accurate information.
24.4	Has the community benchmarked its climate risks and vulnerability to natural disasters so that it can measure improvements over time?	Y- 2016 Tri-County Hazard Mitigation Plan	Measurable benchmarks may include: property damages, the number of people and/or structures at risk and public spending on disaster recovery.
24.5	Are maps (or other spatial tools like GIS) used to spatially define the vulnerability of roads, public buildings (schools, hospitals, fire stations, etc.) and public services (wastewater treatment, water distribution, power transmissions, etc.) to coastal hazards?	N- "poor planning has led to damage to drain pipes due to storms"	Using Digital Elevation Models, shoreline erosion data, lake level data and other key sources, communities can assess the risk to their most important assets. Decision makers can use these analyses to reduce hazard risks and improve sustainability.
24.6	Has the extent of past coastal hazards been identified and mapped based on historical records, existing plans and reports or scientific and local knowledge?	Y- 2016 Tri-County Hazard Mitigation Plan	Understanding past events can help inform future plans. The community should try to gather information from as many sources as possible in order to create a clearer picture of what risks the community may be facing.

Y—Yes I — Yes, but should improve N — No ? — Don't know NA — Not applicable

Data gathering and mapping (continued)

	Benchmark	Self-Assessment	Description
24.7	Do any plans, and especially the Hazard Mitigation Plan, describe the damage and cost of previous storms, floods or erosion?	Y- 2026 Tri-County HMP	Dollar amounts for past damages can help community members decide how risk averse they want to be going forward.
24.8	Does the community track repetitive loss properties within the National Flood Insurance Program?	I- Townships have attempted in the past but still need to do more	A repetitive loss property is any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978
24.9	Are maps or spatial data used to predict the probable extent of future coastal hazards?	Y- West Michigan CZM report by LIAA	Similar to benchmark 24.7, measuring the probability of different coastal scenarios (100-year storm versus 500-year storm, for example) can help community members and decision makers decide to what extent they want to avert coastal risks.
24.10	Do community plans estimate the potential financial losses that may result from lake-level rise?	Y- 2016 Tri-County HMP and northwest Lake Michigan CZMAssessment	Along with understanding the sites most at risk of taking on damages, the community also benefits from knowing the potential costs of future damages so they can plan accordingly.
24.11	Does the municipality share the findings from risk and vulnerability assessments with planning staff, public works officials, transportation planners, emergency management, elected officials and the general public?	?- A 2022 Hazard Mitigation Plan Team exists to help engage leaders and community members in creating the Plan	It is important for each municipal department to be on the same page, especially regarding hazard mitigation efforts. This can help increase consensus and buy-in around decision-making.
24.12	Has the community conducted a buildout analysis using current zoning to better understand the potential for development in at-risk areas?	N-	While a full buildout is rare, communities should be aware of the potential for increased development to occur in risk prone areas. This may help inform zoning changes to improve resilience.

Y—Yes I — Yes, but should improve N — No ? — Don't know NA — Not applicable

Zoning regulations

Municipal governments are responsible for protecting public health, safety and natural resources now and for generations to come. Zoning regulations are a useful tool for preserving natural assets and siting developments in low-risk areas. The local government should engage the community to explain the potential risks that natural hazards pose to community assets when development is not regulated. The master planning process is an ideal time for this engagement to occur.

	Benchmark	Self-Assessment	Description
25.1	Does the municipality use zoning regulations to reduce damages to the built environment?	Y- Beaver Island Master Plan and Zoning Ordinance	Zoning regulations can work to prevent development in areas at serious risk of flooding, which can help reduce the fiscal damage that a natural disaster may cause.
25.2	Is the zoning ordinance reviewed periodically to ensure that it is effectively reducing the risk of flood damages?	I	If the same developed areas are repeatedly experiencing flooding, it may be time to seek regulatory options to reduce the financial burden that rebuilding these structures is having.
25.3	Does the master plan or zoning ordinance mention vegetation requirements for properties and developments near or within coastal areas?	I - Section 4.21 (d) Needs to be made aware to land owners and enforced	Vegetation plays an important role in reducing runoff, preventing flooding and maintaining natural landscapes.
25.4	Does the master plan or local ordinances prevent the removal of native vegetation around houses near dunes and beaches?	Y- "CD" zoning district and section 4.21	Dunes and beaches are at a greater risk of deterioration when vegetation is removed during development. Planning documents and municipal ordinances can help protect these natural features.
25.5	Does the zoning ordinance work to minimize the amount of impervious surfaces in the entire community?	N-	Impervious surfaces contribute to runoff, dune and beach loss and can be harmful to the natural and built environments. Pervious surfaces and natural landscaping should be utilized as much as possible.
25.6	Has the municipality established a buffer area around flood zones to restrict or guide development in these areas?	N	This is an alternative to benchmark 25.1. When it is unfeasible to restrict development in a flood-prone area (i.e. there is already development there) the municipality may look to guide redevelopments and new developments to improve that area's ability to withstand natural hazards.

Y—Yes I — Yes, but should improve N — No ? — Don't know NA — Not applicable

Zoning regulations (continued)

	Benchmark	Self-Assessment	Description
25.7	Does the community have local ordinances to protect dunes, bluffs, eroding cliffs, wetlands and/or beaches from development disturbance?	Y- 6.14- "CD" Critical Dune District and Article IV Sec 4.21 Shoreline Protection Strip	These natural features are lost forever if not protected. They play an important role in economic, social and environmental sustainability.
25.8	Are frequently flooded areas zoned or planned for open space protection and/or recreation use to prevent risky developments?	Y- The 2017 Master Plan's Future Land Use Map highlights sensitive features	Areas that are repeatedly flooded are best kept in their natural state. Maintained as open space or recreation areas, they still contribute to the overall quality of the community.
25.9	Does the community regulate the elevation of residential, non-residential and public buildings or infrastructure to be above the base flood elevation within the 100-year floodplain?	NA- Beaver Island is not part of NFIP	While elevating structures above the base flood elevation does not remove all risk to the property, it does reduce the chance that the structure will be damaged by a coastal hazard.
25.10	Does the community require the flood-proofing of structures within the 100-year floodplain?	NA- Beaver Island is not part of NFIP	Flood proofing refers to structural and non-structural changes, or adjustments made in the building that reduces or prevents flood damage to the structure and/or its contents. The two widely recognized types of flood-proofing are wet flood-proofing and dry flood-proofing.
25.11	Does the community prevent the rebuilding of structures destroyed by coastal hazards? (Where rebuilding is allowed, are additional design elements required to reduce the risk of future damages?)	N	By preventing or regulating the rebuilding of damaged structures from coastal hazards, the municipality is reducing the health and financial risks posed to the property owner, as well as the potential costs incurred by the public.

Y—Yes I — Yes, but should improve N — No ? — Don't know NA — Not applicable

Structural design near dunes and bluffs

Traditionally, coastal homes are highly sought after (for their location and views) and for municipalities (high demand locations provide higher property tax returns). However, in recent decades some communities are finding that the social and economic costs that high-risk developments pose can often outweigh the benefits. Certain areas may need to be regulated to prevent development altogether. However, when this is impossible or undesirable, the local government can guide development to increase the sustainability of both the natural and built environments. These are best practices for all water-adjacent structures, and especially for those on dunes.

	Benchmark	Self-Assessment	Description
26.1	Are coastal homes regulated to have a smaller footprint?	N	Home designs with additional floors are able to provide the same amount of square footage to the homeowner but with less of a footprint on the natural environment. This also helps to reduce the amount of impervious surfaces.
26.2	Are homes built on dunes designed with innovation that promotes multiple uses for rooms in order to take up less space?	N	This would likely require incentives or an educational component rather than a regulatory power. Good design can work to reduce a building's footprint.
26.3	Are homes sited on dunes designed to avoid a concentrated dispersion of rainwater?	N	Homes in critical areas should be regulated to prevent water from dispersing concentratedly, which causes damage to the natural environment, especially on dunes.
26.4	Are homes on dunes encouraged to share driveways in order to avoid the amount of impervious surfaces?	N	Driveways typically use impervious materials so a reduction in their presence in critical areas can be an important step in sustaining dune and beach quality.
26.5	Are homes on dunes allowed to use pervious materials for driveways?	Y- most homes are gravel driveways	The municipality can help reduce runoff and dune destruction by allowing pervious materials to be used for driveways.

Y—Yes I — Yes, but should improve N — No ? — Don't know NA — Not applicable

House siting

While structural design benchmarks are important factors in sustaining natural ecosystems, house siting can also contribute to the well-being of the natural environment, especially for dunes. Municipalities can work prudently to protect their dunes, which are important aspects of the environmental and economic sustainability of a place, by using regulatory controls to prevent unduly harmful development patterns.

	Benchmark	Self-Assessment	Description
27.1	Are homes on dunes and beaches regulated or incentivized to be placed at the point of arrival in order to reduce the damage created by driveways and parking?	N	Previously mentioned, driveways and other impervious surfaces should be avoided to the extent possible, especially near dunes and beaches. Zoning regulations and incentives can promote house siting that reduces the need for more impervious driveway material.
27.2	Are coastal homes designed to work with natural features and conditions of the site?	Y- regulated for "Critical Dune" zoning district	Developments in critical ecosystems should not place an undue burden on said ecosystem's sustainability. Developments should alter the site as little as possible.
27.3	Are homes on dunes prevented from building close to the crest of the dune?	Y	Development on the crest of the dune can cause damage to the dune itself while also placing the structure at risk of damage or loss.
27.4	Are homes on dunes encouraged to be oriented on the long axis of the house across the slope to minimize the variation in elevation within the footprint of the structure?	N	Zoning regulations, incentives or education can be used by the municipality to encourage more sustainable site plans.

Y—Yes I — Yes, but should improve N — No ? — Don't know NA — Not applicable

Critical facilities and infrastructure

Sustainable communities can experience a natural disaster and continue to provide public services to residents before, during and immediately after the emergency. They are able to accomplish this by siting critical facilities such as police stations, fire stations, hospitals and important records in locations protected from damages in the event of a natural disaster.

	Benchmark	Self-Assessment	Description
28.1	When new critical facilities are developed, are they sited in locations that are protected from possible flooding?	N	Critical facilities should be located outside of flood zones whenever possible. This is where data gathering and mapping play an important role.
28.2	If critical facilities are located in areas at risk of flooding, are they outfitted with additional structural protective features?	N	Critical facilities must be able to function in the event of a natural disaster. This means ensuring that power, water, waste disposal, communications, and occasionally natural gas and steam are protected from potential damages.
28.3	Does the community have an emergency plan in place to continue providing services during an emergency?	Y- 2022 Emergency Operations Plan	In the event that a critical facility(ies) cannot function during or after a natural disaster, the community should have a plan in place to continue providing public services by other means.
28.4	Does the community have a plan for upgrading/repairing critical transportation infrastructure?	Y- Beaver Island Transit Authority Plan. No other on-island capital improvement plans	Transportation infrastructure is vitally important to the community's economic and social sustainability. Proper maintenance and hazard planning can help ensure that this infrastructure remains intact.
28.5	When critical transportation infrastructure is repaired are best practices considered to reduce the risk of future flood damages?	I- County maintains roads. Needs to be more formalized.	This may include elevating roads above predicted flood levels, moving roads landward as erosion occurs and/or incorporating future flooding and lake-level rise into culvert size and placement.

Y—Yes I — Yes, but should improve N — No ? — Don't know NA — Not applicable

Critical facilities and infrastructure (continued)

Benchmark		Self-Assessment	Description
28.6	When upgrading existing community infrastructure, does the community consider the impact of coastal hazards?	I- The townships can improve in this area	When the community updates its infrastructure it is important to consider environmental factors such as coastal erosion and/or shoreline change, lake level rise, coastal flooding and storm surge.
28.7	When planning new community infrastructure, does the community consider the impact of coastal hazards?	I- The townships can improve in this area	See Benchmark 28.6

Y—Yes I— Yes, but should improve N — No ? — Don't know NA — Not applicable

Disaster preparedness

Historical coastline data and projections can help municipalities implement scenario-based plans. For instance, flood risks can be predicted based on lucky, expected or worst-case scenarios. Each of these scenarios can be used to see how many structures or community assets may be damaged in the event of a natural disaster. This can help the community prioritize its hazard mitigation efforts.

	Benchmark	Self-Assessment	Description
29.1	Are there public facilities available for residents to receive supplies or shelter in the event of a disaster?	Y- County Emergency Operations Plan	In the event that a natural disaster affects the ability of residents to remain in their homes, access supplies or seek health assistance, the community should have designated facilities to support the affected public.
29.2	Do residents know where emergency relief facilities are located within the community?	Y- School, townships buildings	Relief facilities are only as helpful as people's ability to access them. Educating the public before the occurrence of a natural disaster can help mitigate health risks.
29.3	Are there emergency relief facilities sited close to the community's vulnerable populations?	Y- see 29.2	People who are low-income, elderly, disabled, living alone or spatially isolated are the most susceptible to the negative effects of a disaster. Their vulnerability to natural hazards can be reduced by siting resources close to these residences.
29.4	Has the community used scenario planning strategies to identify areas most at risk during a natural disaster?	I - Still needs to be developed	Scenario planning helps the community to decide the extent to which it will make plans and changes to mitigate its risk of flood damages. Scenario planning is when the lucky, expected or worst-case scenario guides mitigation efforts.
29.5	Has the community adopted a Hazard Mitigation Plan, an Emergency Preparedness Plan or a plan similar in nature?	2022 County Emergency Operations Plan and 2016 Tri-County Hazard Mitigation Plan and updated Charlevoix County Plan is underway	Plans can help to outline goals, objectives, action steps and responsibility for implementation. They can also give an idea of when and where budget expenditures should be allocated before, during and after flood damages have occurred.

Y—Yes I — Yes, but should improve N — No ? — Don't know NA — Not applicable

Disaster preparedness (continued)

	Benchmark	Self-Assessment	Description
29.6	Are first responders prepared to address a natural disaster within the community?	N- HMP is dated and out of date	The municipality should work closely with the police, fire department and ambulatory services to identify gaps and opportunities to response efforts in the event of a community emergency.
29.7	Are professional planners, engineers and/or certified floodplain managers involved in the formation of the capital improvements plan?	N- Need to have a CIP for the Island	Experts in their given field can provide plan insights that may otherwise be overlooked.
29.8	Does your community have a communication system to reach the public before, during and after a disaster event?	N- need a second tower for Island wide communication	Being able to communicate safety procedures and updates to community members is an important factor when recovering from a major storm event.
29.9	Are community members engaged through education programs about mitigation options?	I—Beaver Island Association involved in educating members and whole community	Community members should understand why certain zoning regulations, local programs and public works projects exist. This can help promote public support and may encourage community members to implement mitigation features on their property.

Y—Yes I— Yes, but should improve N — No ? — Don't know NA — Not applicable

Bluff and ravine protection

Bluffs and ravines both play important roles in the environmental, economic and social sustainability of a place. Bluffs are a tourism draw for their aesthetic qualities and provide a natural barrier for coastal homes from flooding. Ravines are important to sustain in order to reduce the risk of flooding to nearby properties. There are certain tools and best practices that municipalities can implement to make sure that these natural features are not damaged, or damaged to a lesser extent, by development.

	Benchmark	Self-Assessment	Description
30.1	Does the master plan mention bluff and ravine protection?	Y- "CD" is Critical Dune zoning district	Zoning regulations and other policy initiatives need to be backed up by an adopted community plan. The master planning process also helps to educate the public on the importance of protecting these natural features and how this can be accomplished by the private landowner.
30.2	Does the zoning ordinance require setbacks from bluffs and ravines for new structures, redeveloped structures or new impervious structures?	Y- 100' setback from OHW	Setbacks from bluffs can help to protect the bluff itself from eroding faster than its natural tendencies and can also prevent homes from being sited in a risky location. Setbacks from ravines can help reduce erosion and the potential for flood damage near bodies of water.
30.3	Has the community identified properties near bluffs and ravines at risk of damage or loss?	N-	Bluffs and ravines naturally erode, though developments and climate change can make these processes proceed at a faster rate. The community should work preemptively to reduce the likelihood of property damage or injuries to residents.
30.4	Does the community map bluffs and ravines in relation to fluctuating water levels?	N	Mapping bluffs and ravines in relation to Great Lakes changing water levels can help to identify structures at risk of damage. Not all bluffs and ravines are susceptible to changes in lake levels and some are projected to change at greater rates.

Y—Yes I — Yes, but should improve N — No ? — Don't know NA — Not applicable

Bluff and ravine protection (continued)

	Benchmark	Self-Assessment	Description
30.5	Does the community prevent the use of all-terrain vehicles (ATVs) on beaches, sand ridges or dunes in order to protect native vegetation from destruction?	N – regulating and restricting ATVs access and impacts was a popular issue / comment made during the Public Input process	ATV's can damage the native vegetation that is vital to the sustainability of coastal ecosystems.
30.6	Does the municipality have a program that works to help stabilize dunes? This can include replanting native beach grass and utilizing slot-type snow fences.	Y- Charlevoix county conservation district provides dune grass for residents to plant	The municipality on its own, or in collaboration with local organizations and volunteers, can actively place natural and built features that act to reduce dune erosion.
30.7	Are steps, bridges and ramps mounted on posts to traverse steep or unstable slopes?	N- floated away during high water in 2019/2020	These infrastructure components can help to prevent erosive damages to dunes.

Y—Yes I — Yes, but should improve N — No ? — Don't know NA — Not applicable

Professional training

Communities hoping to implement the best practices described in this assessment tool are better positioned to do so when they have a staff that is highly trained in their respective profession. While this may include a formal education in planning, civil engineering or GIS, it is also important that current staff engage in ongoing education as new problems and best practices emerge. Municipal employees may take part in professional organizations, trainings offered by universities and should have certifications that demonstrate a thorough knowledge of topic matter.

	Benchmark	Self-Assessment	Description
31.1	Does the community have staff trained in mapping or monitoring potential hazards such as coastal erosion and/or shoreline change, lake-level rise, coastal flooding and/or storm surge?	N- BI has volunteers / residents with a personal interest	See the Benchmarks for sustainability topic 24 on the importance of accumulating data related to coastal hazards and monitoring these trends over time.
31.2	Does the community have a certified floodplain manager (CFM) on staff?	N- the County has not mapped flood plains (2022 EOP)	The Association of State Floodplain Managers has established a national program for professional certification of floodplain managers. By taking part in the program, local, state, federal and private-sector floodplain managers are encouraged to take part in continuing education and professional development.
31.3	Does the community have a floodplain manager or planner who participate in professional organizations or ongoing education?	N	In addition to the Association of State Floodplain Managers (ASFPM), other relevant professional organizations include the American Planning Association (APA), American Society of Civil Engineers (ASCE) and the American Public Works Association.
31.4	Does the community have technical or computer mapping capabilities?	Y—Twp can access county GIS data; County provides information	There are various GIS software programs. Communities should invest in mapping capabilities to measure coastal data, in addition to other important information such as demographics and land use.
31.5	Are municipal staff encouraged to attend professional conferences and/or trainings from universities and associations?	Y	Conferences and trainings can help introduce staff to emerging concepts related to coastal sustainability. These events also foster information exchanges between professionals.

Y—Yes I — Yes, but should improve N — No ? — Don't know NA — Not applicable

Professional training (continued)

Benchmark		Self-Assessment	Description
31.6	Does the municipality hire certified building inspectors?	Y- County completes building inspections	For developments that require flood-proofing measures or are subject to other zoning regulations related to coastal resilience, the municipality must have staff to enforce the code if it is to be successfully implemented.
31.7	Does the municipality staff an adequate number of people to enforce building codes?	Y- administered at County level	See Benchmark 31.6
31.8	Does the community have planning commissioners with formal training in planning?	Y— Encouraged to take American Citizen Planner course, unclear how many have	Many planning commissioners across the U.S. are civically engaged members of the community, but often lack formal training in planning. New planning commissioners without a planning background should be encouraged to take part in trainings or certification courses. The American Citizen Planner program is one example of these.

Y—Yes I — Yes, but should improve N — No ? — Don't know NA — Not applicable

Hazard planning

One of the most important factors in implementing sustainable practices is to ensure that the community identifies goals, objectives and action steps in its plans. This is important for multiple reasons. First, planning processes are intended to engage the public to gather input and build consensus. Both of these planning ingredients help make implementation more likely to occur. Second, the community needs to have a clear direction for how risk averse it wants to be. Plans help to clearly delineate what the community is willing to implement and less willing to implement as it becomes more sustainable. Plans should consider short and long-term risks and, in doing so, should identify short and long-term projects towards increased sustainability.

	Benchmark	Self-Assessment	Description
32.1	Does the community participate in the FEMA Community Rating System?	N- FEMA approved HMP plan has expired	According to FEMA, "The National Flood Insurance Program (NFIP) Community Rating System (CRS) was implemented in 1990 as a voluntary program for recognizing and encouraging community floodplain management activities exceeding the minimum NFIP standards. Any community in full compliance with the minimum NFIP floodplain management requirements may apply to join the CRS."
32.2	Does the community have a current FEMA-approved All-Hazard Mitigation Plan?	N- 2016 HMP plan expired	According to FEMA, "FEMA requires state, tribal, territorial and local governments to develop and adopt hazard mitigation plans as a condition for receiving certain types of non-emergency disaster assistance, including funding for mitigation projects. Jurisdictions must update their hazard mitigation plans and re-submit them for FEMA approval every five years to maintain eligibility."
32.3	Does the community's master plan have a coastal planning element or does the land use plan make recommendations to reduce coastal hazard vulnerability through planning?	N- the 2017 Master Plan does not include a coastal planning element	A comprehensive snapshot of the community's past, present and future, the master plan guides the overall direction of areas such as transportation, infrastructure, housing and the environment. It is critical that coastal resilience appear in the plan.
32.4	Does the community have an adopted floodplain management plan?	N	Building off of the master plan, the floodplain management plan allows for greater detail and action step planning for managing hazardous areas.

Y—Yes I — Yes, but should improve N — No ? — Don't know NA — Not applicable

Hazard planning (continued)

	Benchmark	Self-Assessment	Description
32.5	Do planning horizons consider potential long-term coastal hazards such as lake-level rise, coastal erosion and increased storm activity and severity?	Y- 2016 Tri-County HMP	While the master plan and other local plans often consider a 20-30 year perspective for the future, many coastal-related trends require a wider timeframe. It is important to remember that Great Lakes coastal dynamics and changes in the climate are long-term trends and should be planned for with this understanding.
32.6	Does the water and sewer plan include recommendations for relocation, abandonment or protection of infrastructure at risk to coastal flooding or other coastal hazards?	N- Beaver Island needs a CIP for improved coastal and environmental sustainability	Soil erosion, coastal flooding and lake level fluctuations can expose or cause damage to infrastructure. This poses a risk to public health and can subject the municipality to expenses to repair damaged systems.
32.7	Does the community have a timeline or strategic plan for the relocation, abandonment or protection of buildings in areas at risk of flooding?	N	The community can get ahead of costly damages when it plans for or anticipates the risks associated with flood-prone sites.
32.8	Have Memorandums of Understanding (MOUs) or Memorandums of Agreement (MOAs) been signed with neighboring communities to help one another during before, during and/or after a disaster event?	I - 2022 EOP references County-wide responding fire departments	It is important to remember that disaster events do not stop at municipal boundaries. Local units of government must recognize the importance of working with neighboring jurisdictions to support regional sustainability.

Y—Yes I — Yes, but should improve N — No ? — Don't know NA — Not applicable

Inventory of Existing Master Plan, Zoning Ordinance, and Hazard Mitigation Plan

Master Plan: Relevant Language

Found in the Beaver Island 2017 Master Plan, adopted June 8, 2017

The Relevant Language section of this report cites the wording in the Beaver Island Master Plan (2017) that supports the community's support for coastal sustainability. This includes text from the community description section of the plan, the Future Land Use plan, as well as related goals and objectives. This section also includes all zoning ordinance regulations that, in some way, play a role in the community's coastal sustainability.

Page 22: "Beaver Island and High Island have **designated Critical Dune Areas**. Earthmoving, vegetation removal, and/ or construction activities within a Critical Dune Area require a permit under state law. St. James and Peaine Townships also each have locally administered Critical Dune Ordinances."

Page 22: "Coastal wetlands, in particular, are unique as they have hydrological connection to Lake Michigan and fluctuate with water level changes. **Coastal wetlands provide a wide range of important ecosystem services**, including filtering and cleaning water naturally; providing critical habitat to fish, reptiles, and amphibians; and reducing the impact of extreme rain events by absorbing flood waters."

Page 22: "The beach areas of the Island also provide important "breathing room" for nearby development, as **beaches can drastically inflate and deflate according to water level changes and severe storms on the Great Lakes.**"

Page 24: "Currently, **water quality data about the Island's inland lakes is not collected** and distributed at a large scale."

Page 29: "While flooding is a natural process, aging infrastructure and infrastructure that is not properly sited can be severely damaged in the event of a heavy precipitation event, coastal storm, or heavy ice melt. Certain areas of Beaver Island experience recurrent flooding, particularly dirt roads. Culverts that restrict the flow of water, and pavement in areas that promote the speed of runoff, can exacerbate the negative impacts of flooding. Beaver Island can use a number of mapping resources to identify potential areas for flooding including the elevation map, or Digital Elevation Model (DEM), shown in Map 2.7."

Page 29: "Evidence collected over the last several decades shows that severe storms in the Great Lakes region are increasing in both frequency and in intensity due to changing weather patterns (see the next section on climate change). In the long term, decadal lake level changes can create a false sense of security and encourage unwise building practices."

Page 29: "**Setbacks are one easy way to regulate this development**, and this Master Plan recommends that the **Planning Commissions in each township evaluate the current regulations** regarding lakefront development to determine areas where setbacks should be increased in the future or where additional studies on erosion might be needed."

Page 33: "The following section identifies several ways that climate change on Beaver Island is resulting or will result in economic, recreational, or other challenges."

Page 62: "The Preservation Association of Beaver Island (PABI) was formed to preserve the history, culture and environment of Beaver Island."

Master Plan: Relevant Language

Found in the Beaver Island 2017 Master Plan, adopted June 8, 2017

Page 83: “Planning for emergencies on Beaver Island is handled primarily through the Charlevoix-Cheboygan-Emmet Tri-County Office of Emergency Management. The Tri-County Office of Emergency Management has produced a **long-term hazard mitigation plan to reduce potential damages** by building partnerships, identifying hazard priorities, and recommending actions that might lessen the impact of a disaster.”

Page 86: “With the increase of rain events expected in Northwest Lower Michigan, many experts, including the Michigan Department of Health and Human Services, are concerned about the impacts of septic leakage on water quality.”

Page 142: Lists 5 community features to protect as part of the Future Land Use Plan. These include Shoreline, Public Open Space, Critical Dunes, Sensitive Features and Road Corridors.

Shoreline

- Keep the existing protections listed in the Zoning Ordinance including a **vegetative buffer, a 100-foot setback from the ordinary high water mark line, and limitations on building size and number allowed** close to the shoreline.
- Evaluate areas where **erosion and coastal flooding** are concerns. Possibly increase the setback in these areas.
- **Prohibit expansions of seawalls or other shoreline hardening structures.**
- Regulate the number of properties that can share a **single access point** to the water.

Public Open Space

- Encourage **connections between existing public lands** with trails and acquisition. If public land is sold, the Township governments should prioritize the acquisition of public land. This is especially true in light of the Michigan Department of Natural Resources current land consolidation strategy that might allow non-contiguous land to be sold.
- **Encourage joint planning** for the future of public lands and the maintenance of parks and trails into recreation plans.
- Densities and uses of future development on public lands should be consistent with the area.

Critical Dunes

- Encourage **public ownership of dunes** as land becomes available.
- Work with land conservancies and other groups to **protect sensitive areas.**
- **Stay well-informed on State of Michigan regulations** for these areas and be familiar with any potential changes to regulation. As of 2012, this means the Townships cannot enact restrictions on critical dune development that are more restrictive than the State of Michigan’s regulatory requirements.

Sensitive Features

- Create an updated **inventory and map of sensitive features.**

Coastal Sustainability Self-Assessment: Community Name, version Number

Master Plan: Relevant Language

Found in the Beaver Island 2017 Master Plan, adopted June 8, 2017

- Work with land owners to place these lands in conservancies in exchange for **development rights** in other less sensitive areas.
- Maintain and/or strengthen existing zoning standards, including **buffers around sensitive areas and restrictions on building size**.
- Determine appropriate intensity and type of recreational uses on these lands.
- Reduce light pollution to encourage dark skies.

Page 146: Describes 5 places to build new developments and briefly how this development should occur.

Low-Density Residential

Low-density residential uses are located primarily along the Lake Michigan shoreline. Home-based businesses, accessory dwellings, and all types of home designs and styles are encouraged in this district. These areas should not be developed into conventional subdivisions with wide paved roads, minimal trees, and car-dependent design.

- Continue current zoning standards to encourage a mix of amenities in this district, such as parks, preserves, trails, and home-based businesses.
- Encourage **cluster development** to preserve natural features.

Medium-Density Residential

The medium-density residential areas are primarily located in St. James and Peaine Township and areas along the Lake Michigan shoreline. This district allows for a greater number of homes per acre. This district should retain a pedestrian-scale design with amenities for bikers and walkers, affordable housing options such as accessory dwelling units, and a mixture of home styles.

- Encourage connections to trails and other public amenities.
- Continue allowing and encouraging accessory dwelling units. Consider lowering the minimum living area requirement.
- Encourage unique building types and designs.

Page 151: “Currently, properties that abut Lake Michigan must follow additional regulations to **ensure properties remain safe from coastal damage** and that sensitive coastal ecosystems are **adequately buffered from development**.”

Page 151: “Evaluate the Zoning Ordinance to **determine if coastal setbacks are restrictive enough** to prevent homeowners from experiencing harm, given the climate trend of increasingly severe coastal storms and increased erosion risk.”

Page 151: “Consider the water protection recommendations identified in the **2011 Charlevoix County Local Ordinance Gaps Analysis** conducted by the Tip of the Mitt Watershed Council. Possible Zoning Ordinance changes address shoreline protection, impervious surfaces, stormwater control, soil erosion and sedimentation, septic systems, wetlands, and groundwater.”

Municipal Ordinances: Zoning Code

Found in the COMMUNITY Code of Ordinances; Zoning Code adopted DATE with amendments through DATE

Title	Location in Code	Description of Ordinance
Shoreline Protection Strip	Article IV; Section 4.21	<p>Except for the marine related district, no building or structure, except docks, launch ramps, unroofed and unenclosed decks, and walkways, shall be erected closer than one hundred (100) feet from the ordinary high water elevation of Lake Michigan or closer than fifty (50) feet from the high water elevation of an inland lake, stream, or creek within the Township. Such decks and walkways shall be subject to the following requirements:</p> <ul style="list-style-type: none"> a) No structure shall exceed the height of four (4) feet above the average ground elevation. b) Post construction shall be employed so as to minimize disturbance of the natural terrain and vegetation. c) On Lake Michigan lots, no structures of any kind, including walkways, shall be allowed within the twenty-five (25) feet landward of the ordinary high water elevation. A deck attached to the principal structure shall not be erected closer than ninety (90) feet landward from the ordinary high water elevation. d) On inland lake lots, decks and walkways shall be allowed to the high water mark in order to access docks and minimize pedestrian impacts on vegetation. <p>Not more than one-third (1/3) of the trees and shrubs shall be removed in a strip twenty-five (25) feet landward from the ordinary high water elevation of Lake Michigan or the high water mark on any lake, stream or creek. Stumps shall be cut flush with the ground but not removed, and fill material shall be of sand or gravel or other pervious material. Fill material shall not be allowed to enter the water by erosion or mechanical means.</p> <p>All residential zoning districts appear to have to comply with the Shoreline Protection Strip.</p>
Minimum Rear Yard Setbacks (R-1 Residential)	Article VI; Section 6.00	<p>On lake lots where 40% or more of the lots located within 1,000 feet on either side of and parallel to the shoreline are occupied by buildings, no building hereafter erected or structurally altered shall extend nearer the water's edge than the average rear yard line established by these buildings. In addition, the regulations contained within Section 4.21 for Shoreline Protection, shall apply.</p>
Other Development Regulations (R-4 District)	Article VI; Section 6.03	<p>6) The developer shall be required to preserve and incorporate natural features such as woods, streams and open spaces which add to the overall quality of the development of the area.</p>
Other Development Regulations (C-1 District)	Article VI: Section 6.04	<p>4) The developer or builder shall be required, where possible, to ensure that new or altered structures in this Zoning District will not be damaged by flooding or flood hazards and that excessive soil erosion, adverse changes in the natural drainage courses, or unnecessary destruction of natural features will be avoided, or remedies will be provided.</p>

Municipal Ordinances

Found in the COMMUNITY Code of Ordinances; Zoning Code adopted DATE with amendments through DATE

Title	Location in Code	Description of Ordinance
Other Development Regulations (MR District)	Article VI; Section 6.12	Any construction of a dock or structure in this zone shall be constructed in such a way as to insure that the building or said dock or structure does not in any way cause erosion or adverse changes to the shoreline of any adjacent lots, or in any way impair the water access or use of water by adjacent property owners.
Other Development Regulations (“H” District)	Article VI; Section 6.13	The property owner shall be required to preserve and incorporate natural features such as woods, streams and open spaces, which add to the overall development of the area.
Purpose (“CD” District)	Article VI; Section 6.14	These lands include the entire critical dune area as designated by the Michigan Department of Natural Resources pursuant to Part 353 of the Natural Resources and Environmental Protection Act, being the Sand Dunes Protection and Management portion of Act 451 of the Public Acts of 1994, as amended, and to such other lands as locally designated and depicted thereon. Locally designated sand dunes together with dunes designated under PA 451 shall be known as critical dune areas for the purpose of this Ordinance. Lands that are within two hundred and fifty (250) feet of a critical dune area, that are determined by the Planning Commission to be essential to the hydrology, ecology, topography, or integrity of a critical dune area shall also receive all the protection afforded to critical dunes in this zoning district, even if not so depicted on the zoning map.
Lot Area and Width (“CD” District)	Article VI; Section 6.14	Narrower lots than specified above may be permitted for use at the discretion of the Planning Commission provided that the following standards are met: C) One access drive serves two (2) or more lots up to where it must split to serve individual dwellings and it is demonstrated that one (1) access drive will have a less deleterious effect on the dune environment than multiple drives.

Municipal Ordinances

Found in the **COMMUNITY Code of Ordinances; Zoning Code** adopted **DATE** with amendments through **DATE**

<p>Development Plan Requirements (“CD” District) Note: See the remaining regulations for critical dunes that deal with driveways, location in relationship to dune crest and other pertinent requirements.</p>	<p>Article VI; Section 6.14)</p>	<p>g) The proposed use will be constructed behind the crest of the first landward ridge of a critical dune area that is not a foredune. However, if construction occurs within one hundred (100) feet measured landward from the crest of the first landward ridge that is not a foredune, the applicant shall demonstrate that the proposed use meets all of the following requirements:</p> <ol style="list-style-type: none"> (1) The use will not destabilize the critical dune area (2) Contour changes and vegetative removal are limited to that essential to siting the structure (3) Access to the structure is from the landward side of the dune (4) The dune is restabilized with indigenous vegetation or vegetation approved by the Soil Erosion and Sedimentation Control Officer. (5) Excavation techniques and methods shall be employed that insure no unnecessary destabilization of the landward and/or lakeward side of the dune including the possibility that mechanical equipment may not be used.
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Title	Location in Code	Ordinance No.	Ordinance Language
Code of Ordinances			
Shoreline Protection Strip	Article IV	4.21	<p>Except for the marine related district, no building or structure, except docks, launch ramps, unroofed and unenclosed decks and walkways shall be erected closer than 100’ from the ordinary high water elevation of Lake Michigan or closer than 50’ from the high water elevation of an inland lake, stream or creek within the Township. Such decks and walkways shall be subject to the following requirements:</p> <ol style="list-style-type: none"> a) No structure shall exceed the height of four (4) feet above the average ground elevation. b) Post construction shall be employed so as to minimize disturbance of the natural terrain and vegetation. c) On Lake Michigan lots, no structures of any kind, including walkways, shall be allowed within the twenty-five (25) feet landward of the ordinary high water elevation. A deck attached to the principal structure shall not be erected closer than ninety (90) feet landward from the ordinary high water elevation. d) On inland lake lots, decks and walkways shall be allowed to the high water mark in order to access docks and minimize pedestrian impacts on vegetation. <p>Not more than 1/3 of the trees shall be removed in a strip twenty-five (25) landward from the ordinary high water elevation of Lake Michigan or the highwater mark on any lake stream or creek. Stumps shall be cut flush with the ground but not removed, and fill material shall be of sand or gravel or other pervious material. Fill material shall not be allowed to enter the water by erosion or mechanical means.</p>

Hazard Mitigation Plan

Found in the COUNTY Hazard Mitigation Plan, adopted DATE