

LAKE CHARLEVOIX SHORELINE PROTECTION

2023 FINAL REPORT

Acknowledgements:

A steering committee comprised of planning and water protection professionals provided insight and recommendations throughout the creation of this report. The committee’s collective experience and knowledge of Lake Charlevoix shoreline issues were instrumental in the creation of the recommendations of this report.

We would also like to thank all the communities around Lake Charlevoix for their participation in the visioning sessions throughout 2022 and 2023.

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Lake Charlevoix Shoreline Protection 2023

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Introduction

The Lake Charlevoix Watershed is home to many precious water resources, from quiet inland lakes and clear, cold rivers and streams to richly diverse wetlands, and, of course, the beautiful and beloved Lake Charlevoix. Lake Charlevoix is a stunning freshwater lake located in the northern part of the Lower Peninsula of Michigan, United States. The beauty of Lake Charlevoix has attracted visitors for more than a century with its clean water, scenic shoreline, and superb fishing. The Lake Charlevoix Watershed is one of Northern Michigan's larger watersheds, covering approximately 332 square miles or 212,515 acres in Antrim, Charlevoix, Emmet, and Otsego counties. Lake Charlevoix stretches across the west side of Charlevoix County from northwest to southeast, covering portions of seven townships (Bay, Charlevoix, Evangeline, Eveline, Hayes, South Arm, and Wilson) and touching upon three cities (Boyne City, City of Charlevoix, and City of East Jordan). It covers a surface area of approximately 17,200 acres and spans about 14 miles in length.



The lake is the third-largest inland lake in Michigan in terms of surface area, but due to its shape and the elongated South Arm, its shoreline length far exceeds that of any other inland lake in Michigan. It has a maximum depth of around 122 feet located near the center of the main basin. The South Arm is shallower with a maximum depth of 52 feet. The mean depth of the lake is approximately 57 feet. The lake features several bays, peninsulas, and islands, adding to its scenic beauty. It is accessible from several towns and communities, including Charlevoix, East Jordan, and Boyne City. These towns offer various amenities, marinas, and public access points for boaters, fishermen, and recreational activities.

Project Background

In 2016, the Land Information Access Association (LIAA), a nonprofit community services organization based in Traverse City, Michigan, and the Tip of the Mitt Watershed Council (Watershed Council), a nonprofit committed to watershed protection in the northern portion of the Lower Peninsula of Michigan, worked with communities around Lake Charlevoix to develop recommended best zoning standards to protect the water quality of Lake Charlevoix. It was clear at that time that water quality was considered extremely important to the economic development and quality of life in the region. General shoreline protection recommendations were made for specific categories including:

- High water elevation
- Shoreline setbacks
- Greenbelts or vegetated buffer strips
- Engineered stormwater control systems
- Maximum impervious surface lot coverage
- Conditions for issuance of zoning permits
- Formal planning commission site plan review
- Shoreline protection structures
- Keyhole and funneling practices
- Number and use of docks

It was noted that due to existing development patterns (e.g., smaller lot sizes, shallow setbacks, etc.) and the presence of highly disturbed sites within the three cities, the application of some of the recommended shoreline zoning standards is impractical and adjustments could be made to meet each community's specific needs.

In 2022 and 2023, the Lake Charlevoix Association (LCA), a nonprofit that was established to protect the lake for present and future generations, worked with LIAA and the Watershed Council to build upon this work and create a unified vision for the lake.

The following project report details the project background and process, input received from the community visioning sessions held in nine out of the 10 jurisdictions surrounding Lake Charlevoix, a summary of recommendations, and how to continue to build on the positive momentum generated by this effort.

Purpose

The communities surrounding the lake have a long history of working together to actively protect water quality, but ever-changing conditions such as recent record-high water levels, the rise of remote work due to the COVID-19 pandemic, accelerating development pressures, and even turnover of elected and appointed officials in local governments and commissions can put communities in a reactionary state instead of on a proactive path toward desired goals. The purpose of this project was obtain feedback on how communities around the lake envision protecting and preserving Lake Charlevoix for the future. Input and insights were used to identify core values, desired outcomes, and priority actions essential to maintaining water quality. Through the project, the partners sought a recommitment from the local governments acknowledging their special role to play in ensuring that inland lakes and streams are protected. In doing so, water quality protection can be achieved that provides a wide range of community benefits, including preservation of quality of life, wildlife habitat, recreational opportunities, human health, aesthetics, economic vitality and increased property values.

This report is to document the process undertaken and input received from the communities in order to establish and explain a unified vision for Lake Charlevoix.

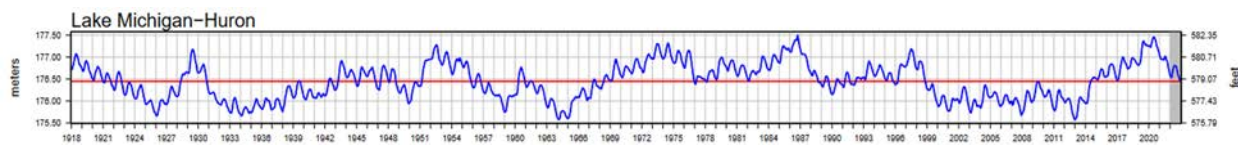
LCA, in collaboration with the Watershed Council and LIAA, met with the local planning commissions around the lake to discuss challenges and opportunities related to water quality and shoreline protection. The sessions were intended to build toward a common future vision for the lake, listen to the challenges that each jurisdiction faces in managing its shoreline, and highlight available tools and strategies that can support each jurisdiction in realizing its vision for a protected and preserved Lake Charlevoix.

The project kicked off with Lake Charlevoix Day in June of 2022 and was followed by two rounds of on-on-one visioning sessions with the local jurisdictions. The first round was held throughout the fall of 2022 and the second round was held in the late winter/early spring of 2023.

A Brief Understanding of Coastal Dynamics

Because the water levels of Lake Charlevoix fluctuate in tandem with those of Lake Michigan due to the direct hydrologic connection via Round Lake and the Pine River, it is important to have some understanding of the dynamics at play.

Great Lakes water level changes result from cyclical changes in rainfall, evaporation, and river and groundwater inflows. These factors work together to raise and lower the water levels of the Great Lakes in small increments daily, and larger increments seasonally and over the course of years and decades. Long-term water levels fluctuate by multiple feet. The figure below illustrates the water level of Lake Michigan from 1918 to 2022 (Lake Michigan and Lake Huron are technically considered one lake).



Lake Michigan-Huron Water Level Changes, 1918 – 2022

The Great Lakes had been experiencing a period of rising lake levels. Since the early 2000s, water levels had remained low, but historical patterns over the last century indicated that higher water levels were sure to return. After a period of lows in 2013, Lake Michigan's water level in July of 2020 averaged 582.2 feet, which was 34 inches above its long-term average level for the month. According to a recent U.S. Army Corps of Engineers summary, based on current conditions, Lake Michigan is beginning to see lake levels decline after seeing record highs throughout 2019 and 2020.

There are many other factors at play when it comes to the fluctuating water levels in the great lakes such as the earth's crust rebounding from glacial activity, the increase in stormy weather, and the impact of increasing temperatures due to climate change. The most important thing to remember is that the great lakes are a dynamic system with water levels that rise and fall based on a number of factors and that this directly impacts Lake Charlevoix.

Terminology

Before discussing the input and the vision for each community as well as the lake as a whole, it is important to lay some groundwork for some of the technical information involved in drafting the vision. The concepts of "shoreline protection" and "hardening" of the shoreline came up in many forms throughout this process and can be interpreted in many ways. The following defines some of the concepts that were discussed with regard to this project and report.

Ordinary High-Water Mark

In general terms, the Ordinary High-Water Mark (OHWM) is an elevation which marks the boundary of the lake, marsh, or stream bed. It is the highest level at which the water has remained long enough to leave its mark upon the landscape.

The OHWM is a legal and technical term used to designate where regulatory jurisdiction lies or define the regulatory boundary of a body of water, such as Lake Charlevoix. It can usually be identified as a line on the shore where the presence and action of water are continuous enough to leave a distinct mark, such as erosion, scouring, or vegetation growth. It often can be visually identified as a distinct line or physical evidence on the shoreline, indicating the regular and ordinary presence of water. It may appear as a change in vegetation type or density, a change in soil characteristics, or erosion features like a bluff or beach ridge.

In the case of Lake Michigan and Lake Charlevoix, the OHWM is generally determined by considering factors such as historical records, surveys, aerial photographs, and field observations. It represents the average level of the lake over a period of time, taking into account seasonal fluctuations, wave action, and other natural variations.

The OHWM is also defined by government agencies using an elevation system. The State of Michigan defines the OHWM on Lake Michigan as 580.5 feet International Great Lakes Datum (IGLD) (Great Lakes Submerged Lands Act, Part 325, Administrative Rules of the Natural Resources and Environmental Protection Act). The U.S. Army Corps of Engineers (USACE) defines the OHWM as 581.5 feet IGLD. Since Lake Charlevoix connects directly to Lake Michigan, the water levels within Lake Charlevoix change in correlation with Lake Michigan. Therefore, Lake Charlevoix has the same OHWM as Lake Michigan. However, the defined elevation OHWM for Lake Charlevoix is 581.5 feet IGLD.

In the 2016 report “Enacting Shoreline Protection Around Lake Charlevoix,” it was recommended that local zoning ordinance define the OHWM for Lake Charlevoix as 582.35 feet IGLD. 582.35 feet IGLD is the highest water level recorded on Lake Charlevoix. Historical water levels have frequently been higher than the statutory OHWM of 581.5 feet IGLD and standardizing a OHWM of 582.35 IGLD feet helps ensure the effectiveness of shoreline buffers around the lake.

International Great Lakes Datum

The IGLD is used to determine the OHWM by both the State of Michigan and USACE. It is a reference system used to measure and define elevations and water levels in the Great Lakes region of North America. It provides a standardized vertical reference point for various purposes, including navigation, engineering, surveying, and mapping.

The IGLD was established to address the need for a consistent and uniform measurement system across the Great Lakes. Prior to its implementation, each lake had its own local datum, which caused inconsistencies and challenges when comparing elevations and water levels between different lakes.

The IGLD was first adopted in 1955 and has undergone subsequent updates to account for changes in technology and to improve accuracy. The current version is IGLD 1985, which is based on measurements taken at various reference stations throughout the Great Lakes region.

To account for movements of the Earth’s crust and accurately measure water levels, the IGLD needs to be updated approximately every 25-30 years. The International Great Lakes Datum (IGLD) is maintained and updated periodically by a binational group of federal scientists known as the Coordinating Committee on Great Lakes Basic Hydraulic and Hydrologic Data. The existing IGLD will be revised over the next several years and replaced by IGLD 2020 around 2027. It is important to note that the change in the IGLD is anticipated to impact the OHWM and permits issued by federal and state agencies.

Shoreline Protection

During the most recent high-water event in 2019-2020 on Lake Michigan, the Michigan Department of Environment, Great Lakes and Energy (EGLE) experienced a significant increase in the number of permit applications requesting shoreline hardening, which is the installation of physical, artificial, engineered shore structures to stabilize sediment and prevent erosion or provide flood protection. Shoreline hardening features include seawalls, revetments, and riprap (all defined below). This was a result of riparian property owners attempting to protect their shoreline from the rising waters. Shoreline protection can come in many forms, and results can vary depending on the type of protection methods used. While results may vary, there are some well-studied and known impacts that different types of shoreline protection can have on the environment and water quality of the lake (see map on page 17).

In 2018, LCA and the Watershed Council partnered to conduct a parcel-by-parcel assessment of the Lake Charlevoix shoreline. The survey was designed to document conditions that can impact water quality, including the three biggest threats to inland lakes: nutrient pollution, habitat loss, and shoreline erosion. Through the survey, areas with shoreline hardening were identified, as was the impact it has on the lake ecosystem. The results of the survey suggested that improving greenbelts — a strip of diverse vegetation that grow naturally or are planted along the shoreline — would help the character and quality of the lake by reducing nutrient pollution and sediment input from erosion along the shoreline (see map titled “Greenbelt Scores around Lake Charlevoix” on page 13).

The following discusses some of the types of shoreline protection:

Seawalls

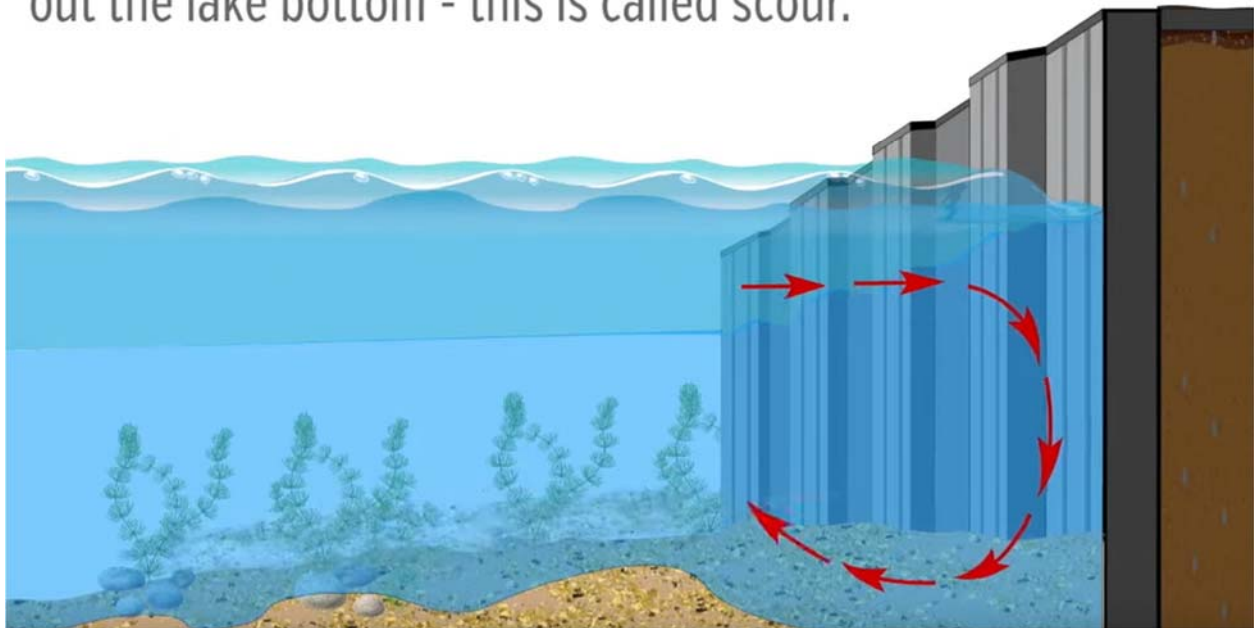
Seawalls are near-vertical structures commonly constructed of timber, concrete, or steel sheet piling. The structure is installed parallel to the shore and is intended to retain or prevent the sliding and slumping of land while protecting the adjacent upland area from wave action.

Seawalls are effective where they are absolutely necessary for protecting shoreline infrastructure from flooding and erosion. However, they simultaneously have the detrimental effect of causing scouring or flanking erosion farther down the coastline.

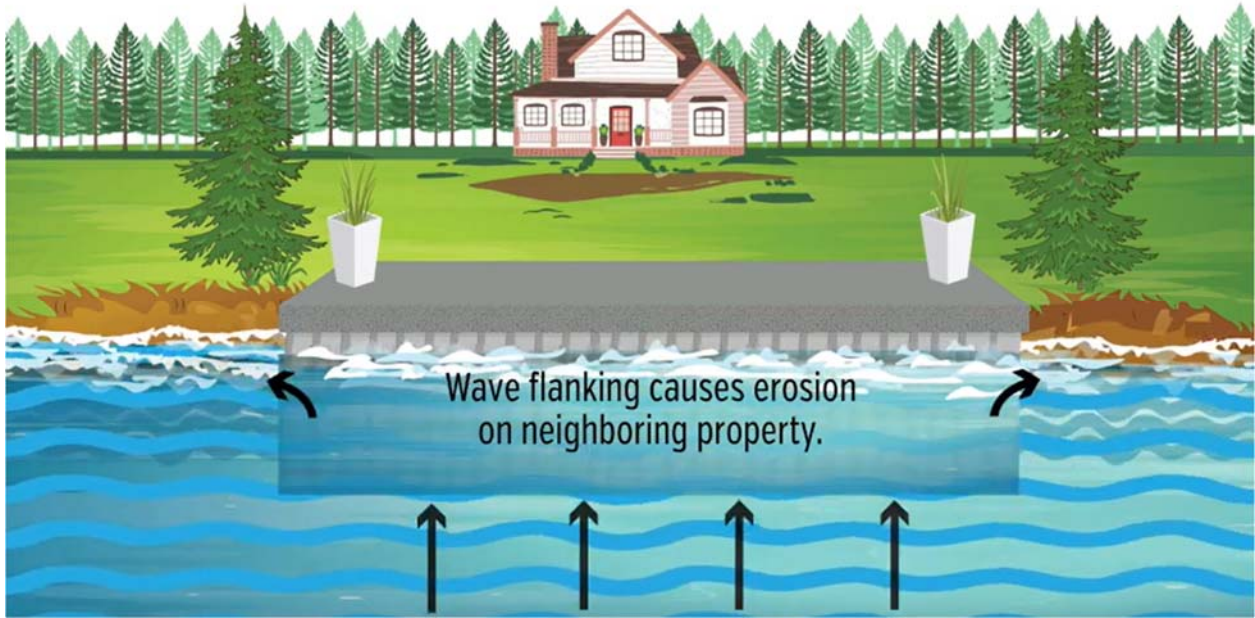
Seawall scouring refers to the erosion and removal of sediment from the area surrounding or under a seawall or other shoreline structure. The force of waves or currents can cause the sediment at the base of the seawall to be eroded and carried away, creating a depression or scour hole. This can ultimately lead to costly repairs, replacement, or removal.

Flanking refers to the reflection of waves bouncing off vertical walls, which can result in increased turbidity, bottomland scouring, damage to adjacent properties, decreased water quality, and proliferation of aquatic invasive species.

The energy that is directed down scoops out the lake bottom - this is called scour.



Seawall scouring. Photo Credit: Michigan Natural Shoreline Partnership



Seawall flanking. Photo Credit: Michigan Natural Shoreline Partnership

The individual and cumulative impacts of seawalls have deteriorated Michigan’s inland lake water quality and habitat. Vertical seawalls and hardened shorelines significantly degrade lakes by redirecting wave energy, eliminating shoreline habitat for fish and wildlife, promoting runoff of nutrients and other pollutants, and degrading water quality.

Because vertical seawalls eliminate the natural energy-dissipating capacity of a sloped, vegetated shoreline, negative impacts to water quality and shoreline habitat can be seen around inland lakes with many seawalls. Lower property values can be associated with lower water quality. Additionally, shoreline hardening fragments the land/water interface and interrupts reptile and amphibian life cycles; negatively impacts aquatic species' spawning, nursery, refuge, and feeding; and reduces habitat complexity.

This type of shoreline protection is strongly discouraged. The negative impact to the property owner, the adjacent property owners, the natural environment, and water quality make this type of shoreline protection the least desirable for the long-term health of the Lake Charlevoix Watershed and ecosystem.



Vertical seawalls. Photo Credits: Tip of the Mitt Watershed Council

Riprap

Riprap is rocky material that can be placed along the shoreline to protect from wave erosion and scour. The size of riprap rock ranges from a few inches to over five feet in diameter! The size of riprap will depend on the size of the project and the steepness of the slope, among other factors.

Riprap rock works by absorbing the flow and energy of waves that would otherwise be erosive to the shoreline. It is installed in a wall formation to protect long stretches of shoreline and riverbanks.

Riprap has the advantage of dissipating erosive wave energy and being relatively cheap to install and easy to maintain. However, it has its disadvantages because it does not work for every location and application, is not permanent, and does not protect from flooding that comes through from adjacent properties that have no protection.



RipRap. Photo Credit: The Petoskey News-Review

Revetments

Revetments are large rocks stacked on the sloped shoreline to help prevent natural erosion. This is considered a “softer” method that maintains a natural slope and absorbs wave energy despite being made of concrete or stone.



Revetment. Photo Credit: Tip of the Mitt Watershed Council

Bioengineering

The most lake-friendly solution to protect a shoreline from erosion while enhancing inland lake water quality and habitat is using techniques called bioengineering. Bioengineering, also called natural or living shorelines, is an approach that includes a variety of techniques to restore the natural processes and functions of shorelines. These techniques use a combination of native plantings, soils, and other natural materials that work to fortify shorelines. In some cases, such as on high-energy lakes, bioengineering also incorporates rounded fieldstone that is sized according to the site conditions. The size of the fieldstone used is proportional to the size of the biggest waves.



Bioengineering. Photo Credit: Tip of the Mitt Watershed Council

Natural Shoreline

Native shoreline vegetation serves as a natural barrier against forces that cause erosion. Ultimately, you want to leave existing vegetation undisturbed. Removal of vegetation can accelerate erosion and creates conditions that may cause further deterioration of the shoreline. If plants have already been removed, reestablishing and maintaining vegetation can help fix erosion and create a more resilient shoreline.

Property owners who reestablish native plants in the environment provide natural stabilization to shorelines. Erosion is best controlled with a mixture of grasses, sedges, flowers, shrubs and trees.



Natural shoreline restoration: Left (before); Right (after). Photo Credits: Tip of the Mitt Watershed Council

Living Shoreline

Living shoreline is a broad term that encompasses a range of shoreline stabilization techniques along lakes, streams, estuaries, bays, tributaries, and other sheltered shorelines. A living shoreline incorporates a variety of native material.

Beach Sanding

The creation and maintenance of a sandy beach is often an objective of shorefront residents along the shoreline of their lake property. Creating a sandy beach where one doesn't naturally exist, however, can negatively impact water quality.

Physical Impacts: Lakes act as settling basins for surrounding watersheds, collecting and accumulating materials that drain into them. Over long periods of geologic time, as a lake ages, it gradually fills in with sediment. Any activity that adds material to a lake, in addition to the natural supply, will increase the rate of lake filling. The regular addition of sand to a lake or shoreline where it can erode into the lake accelerates the filling process. If a shoreline does not have a natural beach, a constructed beach will likely require periodic additions of sand. The dumped sand will drift away with shoreline currents. Although the sand disappears from view, it does not leave the lake. The sand is added to the natural sediment load to the lake and hastens the filling and aging process.

Chemical Impacts: The mineral composition of sand is not consistent. Although clean, washed beach sand is primarily quartz, which is relatively inert, it can contain other materials. Iron-rich sand can encourage growth of bacteria that produce rust-colored slime deposits and oil-like films on the sand as they oxidize the iron. Although iron bacteria are not a health hazard, the resulting deposits are aesthetically displeasing. Sand may contain contaminants other than iron, all of which have the potential to wash out of the sand and into the water. Clay, if present in the deposited sand, can cause reduced water clarity. If phosphorus is contained in the dumped sand, it may contribute to increased plant growth in the lake. Recent studies have also found beach sand to be a breeding ground for bacteria.

Biological Impacts: The physical process of filling a lake with deposited sand has major biological impacts. Dumping sand along the shore of a lake can smother bottom-dwelling algae and invertebrates, reduces the amount of available habitat, and may cause a disruption in the food chain of higher organisms including fish. Deposited sand may also destroy spawning or nesting sites for fish. Turbidity from the deposited sand may clog gills and interfere with normal fish behavior. A shallower lake has less volume of water to dilute and assimilate incoming contaminants, including phosphorus. With a constant level of phosphorus input, a lake's productivity (algae growth) will increase as the lake's depth decreases. Also, as a lake becomes shallower, more sunlight hits the lake bottom and thus, there is greater potential for increased rooted plant growth.



Beach Sanding. Photo Credit: Tip of the Mitt Watershed Council

Greenbelt

A greenbelt or riparian buffer zone is a strip of diverse vegetation including trees, shrubs, grasses, sedges, rushes, and wildflowers (herbaceous perennials) that grow naturally or are planted along the shoreline.

Maintaining this natural buffer of native vegetation has a number of benefits. Greenbelts help reduce erosion by stabilizing the soil, slowing runoff, and filtering nutrients, sediments, and other pollutants before they reach the lake. The use of native plants, woody shrubs, and trees within the greenbelt — instead of lawns and other less-pervious surfaces — allows for greater stormwater infiltration. They also reduce the time and costs involved with maintaining a lawn, since native plants are better adapted to local shoreline conditions. Trees, shrubs, and other native plants form extensive root systems that stabilize shorelines and help prevent erosion. The vegetation also provides valuable wildlife habitat for all shoreline-dependent species including birds, insects, amphibians, fish, and reptiles, all while buffering sound and increasing privacy. Greenbelts also deter geese, who prefer well-manicured lawns with unrestricted access to the water.

The most important benefits of greenbelts are erosion control and pollution filtering. By keeping sediments and nutrients from washing into the water, greenbelts keep the water clear and cool. When excess nutrients like nitrogen and phosphorus reach the lake, they can cause nuisance algal blooms, which can deplete dissolved oxygen and create an environment inhospitable to fish, aquatic insects, native aquatic plants, and other shoreline-dependent species. It is important to note that turf grass does not provide the same benefits that a mix of native vegetation does, and therefore, is not considered an adequate greenbelt. Sod, or mowed grass, has leaves too short to aid in filtering, and roots too shallow to aid in erosion protection. In addition, chemicals and nutrients, such as fertilizers and pesticides, that are needed for lawns can disrupt natural food chains by killing organisms that act as food sources for fish and birds.



Greenbelt. Photo Credit: Tip of the Mitt Watershed Council

Lake Charlevoix Trends

Lake Charlevoix Shoreline Survey

During the fall of 2018, a shoreline survey of Lake Charlevoix was conducted by the Watershed Council in partnership with the Lake Charlevoix Association. The survey was designed to document conditions that can impact water quality, including the three biggest threats to inland lakes: nutrient pollution, habitat loss, and shoreline erosion. The shoreline assessment was conducted on a parcel-by-parcel basis around the entirety of Lake Charlevoix. Particular shoreline conditions that were noted included erosion conditions, greenbelt length, greenbelt depth, and shoreline alterations.

Greenbelts were rated based on the relative length of shoreline with a greenbelt and the average depth of the greenbelt from the shoreline into the property. Ratings ranged from zero to four and were based on the following.

Length — 0: None, 1: 1-10%, 2: 10-25%, 3: 25-75%, 4:>75%

Depth — 0: None, 1: <10 ft, 2: 10-40 ft, 3: >40 ft

Greenbelt ratings for length and depth were summed to produce an overall greenbelt score.

In addition, the following shoreline alterations (structures) were noted: steel seawall, concrete seawall, wood seawall, rock riprap, boulder riprap, mixed riprap, boathouse, discharge pipe, and artificial beach. Approximately 90% of shoreline properties (1,983 parcels) on Lake Charlevoix were considered developed.

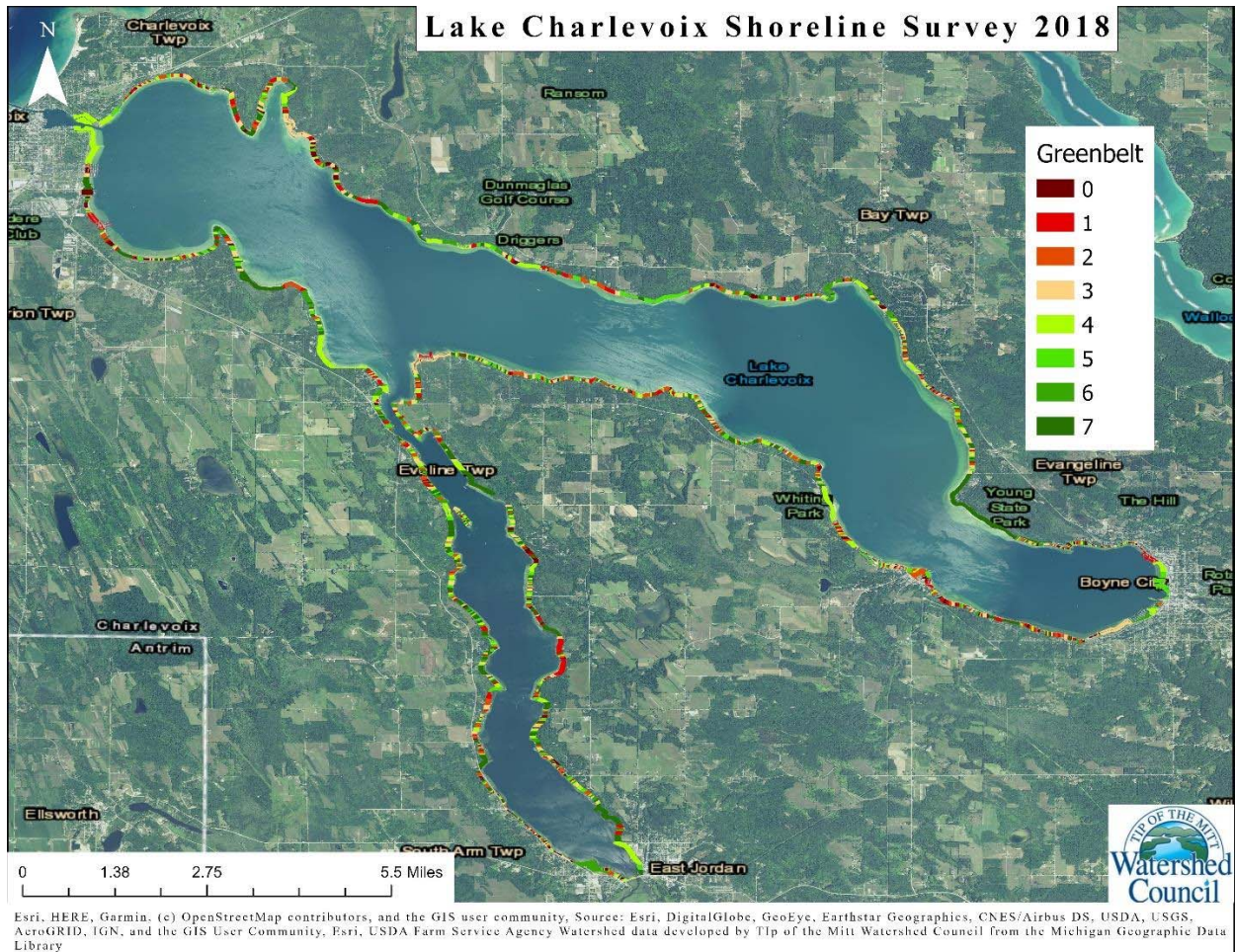
Greenbelt Scores

Greenbelt scores ranged from 0 (little to no greenbelt) to 7 (exemplary greenbelt). Lake Charlevoix greenbelts were generally observed to be in moderate to excellent condition. Of 1,692 parcels, 1,051 (62%) received a greenbelt rating in the moderate, good, or excellent categories.

Greenbelt Rating		Number of Parcels	Percent (%)
0	Very Poor (absent)	191	11
1-2	Poor	439	26
3-4	Moderate	488	29
5-6	Good	436	26
7	Excellent	127	8

Due to historical development and land limitations, clusters of properties along the South Arm and near Boyne City were ranked in the very poor (absent) to poor categories. Large parcels along the eastern shoreline showed excellent, healthy greenbelts. These areas also appeared to be largely undeveloped parcels of land.

Greenbelt Scores around Lake Charlevoix



Shoreline Alterations

Some form of shoreline alteration was noted at 62.3% of shoreline properties (1,371 parcels). Most of the alterations were observed to be rock/cobble and boulder riprap as well as artificial beach sand. There were also 191 seawalls observed along the shoreline.

Alteration Type	Number of Parcels*	Percent with Alteration (%)*
Riprap (rock)	516	34
Riprap (boulder)	200	11.8
Mixed riprap	192	11.3
Seawalls	191	11.3
Artificial Beach Sand	258	15.2
Discharge Pipes	66	4.1
Unaltered	321	18.9

**Numbers and percentages quantify alteration type; some parcels could have multiple alterations.*

Results from the 2018 shoreline survey indicate that some of the aforementioned issues may pose a threat to the water quality and overall health of Lake Charlevoix. Overall, survey results indicate that

large portions of Lake Charlevoix shoreline contain natural and native vegetation growth. However, human activity around Lake Charlevoix shoreline may be impacting the lake ecosystem and water quality. The lack of native vegetation at the water's edge and potential septic leakage from parcels might be the greatest threats to Lake Charlevoix. Removal of shoreline vegetation and erosion are highlights of the main concerns. Improving areas with poor greenbelts will help the character and quality of Lake Charlevoix by reducing nutrient pollution and sediment input from erosion along the shoreline. In addition, many properties with patches of lawn at the water's edge experience a minor undercutting caused by waves and ice shove. Properties with artificial beach sand usually experience some loss of sand into the Lake, evidenced by small erosional rills leading into the Lake. Although not catastrophic, these types of minor erosion do have the ability to degrade the water and habitat quality of Lake Charlevoix. To prevent changes to the lake ecosystem, changes should be made in shoreline property management. Mismanagement of shoreline properties can degrade the lake's water quality, diminish fisheries, and even create an environment that poses threats to human health.

		2007		2012		2018	
Greenbelt Rating		Number of Parcels	Percent of Parcels	Number of Parcels	Percent of Parcels	Number of Parcels	Percent of Parcels
0	Very Poor (absent)	388	23%	357	21%	191	11%
1-2	Poor	369	22%	429	25%	439	26%
3-4	Moderate	937	55%	330	19%	488	29%
5-6	Good	--	--	315	18%	436	26%
7	Excellent	--	--	287	17%	127	8%

		2007		2012		2018	
Alteration Type		Number*	Percent of Total	Number*	Percent of Total	Number*	Percent of Total
Riprap (small rock)		396	23%	511	30%	576	34%
Riprap (boulders and rock)		061	4%	287	17%	192	11%
Seawalls		223	13%	100	6%	191	11%
Beach Sand		295	17%	269	15%	258	15%

Michigan Department of Environment, Great Lakes, and Energy (EGLE): Results of 2020 Shoreline Inventory

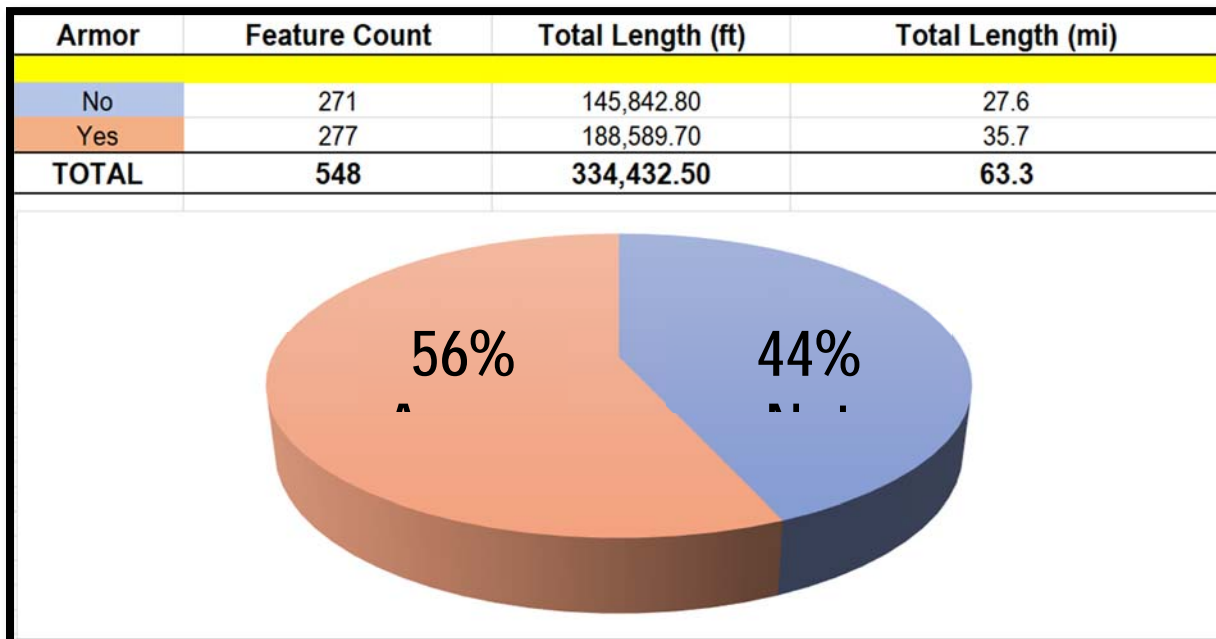
The Michigan Department of Environment, Great Lakes, and Energy (EGLE) used Lake Charlevoix as a case study to evaluate the impacts of high water and shoreline trends. EGLE has recognized that shore protection structures can have negative effects on natural resources and other shoreline properties, and shore protection structures should only be installed when they are needed to address erosion problems and the type of shore protection used should be carefully considered. EGLE also recommends the use of natural shoreline treatments, or bioengineering, for shoreline protection.

Using geographic information system (GIS) data, EGLE conducted a 2020 Shoreline Inventory to identify the type of shoreline along Lake Charlevoix. Categories of shoreline types included: beach, boat launch, developed, jetty, natural, riprap, seawall, seawall/beach sand, and wetland. The information gathered from the 2020 Lake Charlevoix Shoreline Inventory will be periodically updated to assess trends as well as cumulative impacts of shoreline hardening.

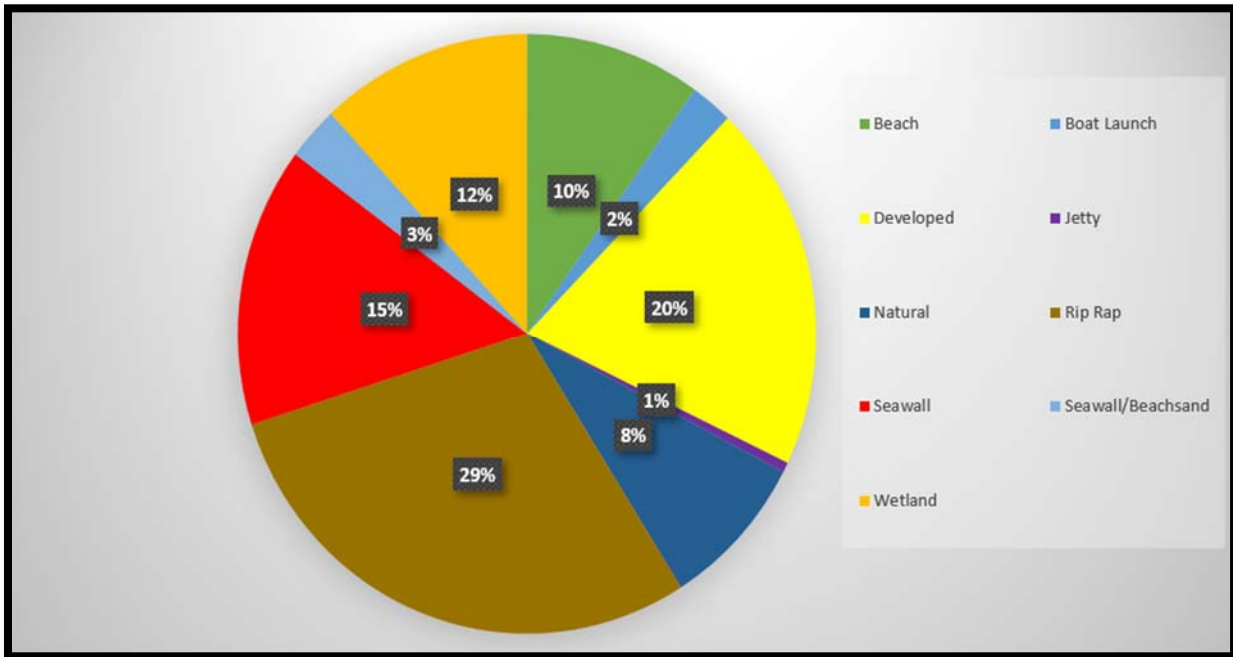
From their case study of Lake Charlevoix, here is what we have learned as of 2020:

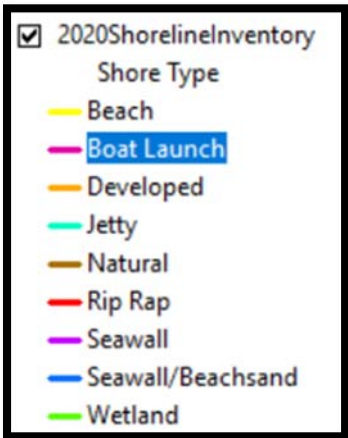
- The lake has experienced a total loss of 26.4 miles of wetland frontage since pre-settlement.
- Since pre-settlement, only 28% of the original wetland shoreline remains.

TOTAL SHORELINE ARMORED vs NOT ARMORED (circa 2020)



Shore Type	Shore Type Count	Total Length (ft)	Total Length (mi)
Beach	54	22048.5	4.2
Boat Launch	13	2178	0.4
Developed	109	49685.8	9.4
Jetty	3	1272.1	0.2
Natural	46	24184.3	4.6
Rip Rap	159	118888.8	22.5
Seawall	83	55266.4	10.5
Seawall/Beachsand	16	7055.4	1.3
Wetland	65	53853.2	10.2
TOTAL	548	334,432.50	63.34





Process

LCA, LIAA, and the Watershed Council began planning for this project in the spring of 2022. The desire was to learn about the general condition of Lake Charlevoix's shoreline, conduct follow-up to the 2016 *Enacting Shoreline Zoning Protections around Lake Charlevoix* report, learn about the challenges each community currently faces regarding their shoreline, and to learn what stakeholders are most interested in prioritizing in order to develop a long-term vision for the lake.

Backgrounding

To document the recent past state of the lake as well as its current status, LIAA worked with LCA and the Watershed Council to identify and review relevant reports and information to establish and compile a comprehensive understanding of past efforts. This included reviewing several maps and documentation such as:

- 2012 Lake Charlevoix Watershed Management Plan
- 2016 *Enacting Shoreline Protection Around Lake Charlevoix* Report
- 2018 Lake Charlevoix Shoreline Survey
- 2019 EGLE shoreline permit data
- Current jurisdiction ordinances, permits and other applicable regulations

In addition to reviewing documentation, LIAA developed two rounds of presentation materials to bring before the planning commissions of each community around the lake. Presentations were designed to share information obtained through background research, to listen to what the local jurisdictions were currently experiencing, and to hear what the jurisdictions would like to see happen in the long term.

The Watershed Council compiled factsheets for distribution during the first round of visioning sessions. The first factsheet outlined the 2016 Lake Charlevoix Watershed Zoning Recommendations. The second factsheet provided a comparative analysis for each of the local units of government around the lake on the status of meeting or exceeding the shoreline protection recommendations both in 2016 and as of 2020. The latter was never intended to be a score card or grade for jurisdictions and was provided merely for informational purposes. All factsheets can be found in the Appendix. LIAA, LCA, and the Watershed Council attended, presented, and listened at each of the visioning sessions.



Visioning Sessions

Nine out of ten communities participated in the process:

Name of Jurisdiction	First Round (Fall 2022)	Second Round (Winter/Spring 2023)
Bay Township	X	X
City of Boyne City	X	X
City of Charlevoix	X	X
Charlevoix Township	X	X
City of East Jordan	X	X
Evangeline Township	X	X
Eveline Township	X	X
Hayes Township	X	X
Marion Township		
South Arm Township	X	

Lake Charlevoix Day

A kickoff meeting was held in June of 2022 with guest speakers from the Michigan Department of Environment, Great Lakes, and Energy (EGLE), the University of Michigan Program in the Environment, the Great Lakes Research Center based out of Michigan Technological University, the National Oceanic and Atmospheric Administration (NOAA) Restoration Center, GEI Consultants, and Tip of the Mitt Watershed Council. This session focused on discussing the scientific and legal aspects of shoreline dynamics and hydrological processes, as well as historical trends of shoreline hardening on Lake Charlevoix, local planning and zoning efforts for resilient and sustainable lake shorelands, and the successes of bioengineering or natural shorelines. Input on challenges to shoreline management from local municipalities, consultants and contractors, and other stakeholders was received during a breakout session and laid the groundwork for the development of the upcoming visioning sessions.

First Round of Visioning Sessions

The first round of visioning sessions was held during planning commission meetings at the local jurisdictions that took place during the fall of 2022. Initial visioning sessions were held in person with nine out of the 10 municipalities: Bay Township, Boyne City, City of Charlevoix, City of East Jordan, Charlevoix Township, Evangeline Township, Eveline Township, Hayes Township, and South Arm Township. Marion Township was not able to find a time that worked with its schedule, but the township was provided with written information and the opportunity to provide comments. During the first round of these meetings, presentations were given that outlined the purpose of this effort with opportunities for local government officials to speak and provide feedback to help craft the vision for Lake Charlevoix. The planning commissioners and public from each jurisdiction were given the opportunity to share their thoughts, experiences, and hopes for the future for the lake, as well as to discuss challenges and opportunities related to water quality and shoreline protection. The insights gained during these meetings were used to develop the content of this report.

Second Round of Visioning Sessions

Follow-up meetings were conducted at eight out of the 10 jurisdictions from February to May of 2023. South Arm Township and Marion Township were unable to coordinate schedules with LIAA, LCA, and the Watershed Council. During the follow-up visioning sessions, a presentation was provided to ensure that local challenges and opportunities were accurately captured during the first meeting, and draft recommendations were proposed. Planning commissioners and local government staff offered feedback and suggestions that have been incorporated into this report and the final recommendations to fully achieve the vision for the Lake Charlevoix Watershed to protect water quality and habitat.



Lake-Wide Vision and Recommendations

Every community that participated agreed that the long-term protection of Lake Charlevoix for future generations was of the utmost importance. It was generally understood that to achieve this, each community would have to work together to coordinate efforts regarding local ordinances, communication, and education. Flexibility is desired, understanding that there is not a one-size-fits-all approach that will work for every community.

Recommendations have been divided into three categories. The first is lake-wide recommendations — those actions that all local governments around Lake Charlevoix should pursue. The second is additional options for consideration, which are recommendations that will require additional discussion, communication and collaboration among all the municipalities.

In addition, it is recognized that each municipality faces its own challenges and needs. As a result, we included a third category of individual recommendations tailored to each individual jurisdiction in the next section of this report.



Recommendations for All Jurisdictions Around Lake Charlevoix

The purpose of the recommendations provided are to:

- Prevent and control water pollution.
- Protect spawning grounds, fish, and aquatic life.
- Protect private property, building sites, and control the placement of structures.
- Preserve shore cover and natural beauty.
- Maintain safe and healthy conditions.
- Protect the rights of all residents to access the water of Lake Charlevoix to fish, swim, boat, and enjoy its scenic beauty.

1. Education

Significant education is needed in the area of shoreline protection. Education should be targeted to the public, including property owners and especially new homeowners, as well as contractors that may be hired to conduct shoreline projects on their property. Information should focus on both the benefits and responsibilities of owning property on Lake Charlevoix, such as how to be a good steward, how water level fluctuations can impact a shoreline, and best management practices for shoreline protection, including bioengineering (a form of erosion control that incorporates biological, ecological, and engineering concepts to produce a living, functioning shoreline system through the use of live and dead plant material, native soils, and structural materials). In addition, it would be worthwhile to provide a permit guide outlining what shoreline activities require a permit and from whom.

Additional education should also occur with planning commissioners, zoning administrators, and other local government officials on best practices for shoreline protection, particularly bioengineering. This would give local government officials the knowledge to make sound scientific recommendations when reviewing shoreline development proposals to ensure protection of private property and Lake Charlevoix.

2. Lastly, realtors should be educated to provide a realistic description of what can and cannot occur on a property and realtors should be asked to assist in the education of new homeowners on Lake Charlevoix. **Coordination on Permitting**

When it comes to environmental protection and natural resource management, local governments share power with the state and federal governments. Power is shared because our environment stretches beyond jurisdictional borders and its elements are completely interconnected. That is why it is important that decisions which affect the shoreline be coordinated and be based on a common approach. The better local, state, and federal governments understand the shared responsibility for coordinated decisions affecting our common resources, the greater the likelihood each will do their part in protecting our environment.

To coordinate on permitting, the following actions are recommended:

- **Comment on Permit Applications**

Local governments are provided notice and given the opportunity to review and comment on proposed public notice prior to action. In addition, local governments are copied on permits and violation letters. Local units of government need to take the opportunity to participate in the permitting process with the State of Michigan by providing comments, particularly when a proposed project will violate a local ordinance.

- **Invite State Permitting Staff to Attend a Planning Commission/Board of Trustee Meeting**

District permitting staff from the Michigan Department of the Environment, Great Lakes, and Energy (EGLE) has agreed to attend a Planning Commission/Board meeting for each jurisdiction to further understanding and coordination between the state and local units of government. Inviting the state permitting staff to a meeting can encourage the development of relationships, enhance collaboration, and improve the shared permitting responsibility between governments.

- **Require all other Relevant Permits to be Obtained Prior**

Local communities may include provisions in their zoning ordinance that all other relevant permits are received prior to permit approval. Local units of government could also conditionally approve a permit, requiring submission of all other required permits prior to final approval. Once a sequence for permits has been established communities can create and use checklists to guide and document their workflow

3. Ban Construction of Vertical Seawalls

From an ecological perspective, construction of vertical seawalls should be avoided in favor of other erosion control measures because hard surfaces reflect wave energy and increase erosion in the vicinity of the structure. It may be best for zoning ordinance standards to discourage construction of seawalls by banning their construction except where warranted by a hydrological analysis and/or engineer's finding. This would not only protect private property from erosion but would protect Lake Charlevoix from the impacts of hardening the shoreline.

4. Ban Inland Dredging for the Creation of Boat Basins

Boat basins are created by altering and destroying the natural shoreline and dredging habitat. Dredging can have a wide range of impacts and unintended consequences on lakes, including releasing toxic materials, damaging or destabilizing neighboring properties, allowing invasive species to become established, and reducing water quality. Dredging can also change the properties of the water in ways that directly impact fisheries, such as decreasing clarity and increasing sedimentation in the near term, and altering the landscapes where fish live or spawn in the long term. In addition, dredging disturbs ecosystems by removing and killing critical organisms on lake bottoms that play an important role at the base of aquatic food chains. Changes in those populations can have cascading impacts throughout the aquatic ecosystem. Furthermore, boat basins require maintenance dredging, which results in future adverse impacts.

Boat basins could also have significant cumulative effects. If authorized, other property owners along Lake Charlevoix could follow suit. This will compound and result in cumulative negative impacts across the watershed. While all shoreline projects can and do have cumulative impacts, new private boat basins/boat wells are rare and, subsequently, more likely to have greater cumulative impacts by setting a precedent that this is an acceptable and expected riparian right.

Zoning ordinances should be amended to prohibit the creation of personal boat basins.

5. Use Bonding or Specific Predetermined Fines

To ensure conditions of shoreline protection ordinances are met, specifically with respect to greenbelts, require self-reporting or independent inspections and use bonding or specific predetermined fines. For example, a shoreland ordinance could include a fine for trees that are damaged on shoreline property.

6. Reinvigorate Planner's Forum

For six years, an annual Charlevoix County Planners Forum was held. This was an educational opportunity for elected and appointed planning officials within Charlevoix County to learn about the

latest issues affecting the county, as well as to share information and coordinate among the various jurisdictions. The Planner's Forums were well attended and found to be very useful in keeping all local units of government abreast of key topics and ensuring collaboration and communication among the communities. The Planner's Forum was paused due to COVID-19. By restarting the Planner's Forum, the local units of government within Charlevoix County could hopefully rebuild relationships and learn to coordinate more effectively and efficiently, not only on shoreline protection, but also on other matters pertinent to Charlevoix County.

Tip of the Mitt Watershed Council will be hosting a Charlevoix County Planner's Forum scheduled for November 2023.

7. Attend the Lake Charlevoix Watershed Advisory Council Meetings

The Lake Charlevoix Watershed Plan Advisory Committee was created to implement steps in the Lake Charlevoix Watershed Management Plan, and in the past decade it has been one of the most active watershed advisory councils in the region. The Advisory Committee is a partnership between the Lake Charlevoix Association, Charlevoix Conservation District, Charlevoix County, Little Traverse Conservancy, Grand Traverse Regional Land Conservancy, Little Traverse Bay Bands of Odawa Indians, local township governments, friends' groups, interested citizens, and Tip of the Mitt Watershed Council. The goal of the Advisory Committee is "to protect the water quality and high-quality uses of the water resources of Lake Charlevoix and its tributaries by reducing the amount of non-point source pollution and preventing future contributions." The Lake Charlevoix Watershed Advisory Committee seeks to educate and involve the community in watershed management issues and has had many successes. Involvement of local governments is critical to the continued success and implementation of the Lake Charlevoix Watershed Management Plan.

Contact Tip of the Mitt Watershed Council for more information on the Lake Charlevoix Watershed Advisory Council or to attend upcoming meetings.

8. Improve the Permit Application Process

Every regulatory agency, whether federal, state, or local, can improve compliance by improving the permit application process. Many zoning ordinances are written in a manner that has shoreline protection provisions in different sections of the zoning ordinance. This makes it difficult for property owners to fully understand exactly what requirements need to be met. To simplify the process for homeowners and ensure compliance, a checklist of all shoreline protection requirements, along with drawings, could be implemented as part of the permitting process. Both the checklist and drawings should identify all of the development and shoreline protection standards. A signature can be required by the applicant to confirm acknowledgement of all zoning standards to ensure there can be no claim that the property owner was not aware of any standard. A checklist can also provide an easier method for a zoning administrator or enforcement agent to ensure the property owner is in compliance with all provisions of shoreline protection in a zoning ordinance.

9. Attend Training(s)

Training opportunities exist or can be made available for members of planning commissions, zoning administrators, and other local government officials to assist with assessing permit applications for shoreline projects. Examples of available trainings include:

- Michigan Lake and Stream Leaders Institute

Level: Intermediate. Fee: Yes; scholarships available. The Lake and Stream Leaders Institute is a multisession program offered by Michigan State University Extension, with support from Michigan Lake and Stream Associations and the Michigan State University Department of Fisheries and Wildlife. Open to all interested applicants, the Institute provides outdoor and classroom experiences that improve participants' understanding of lake ecology and management, while developing their communication, leadership, and conflict resolution skills.

Website: https://www.canr.msu.edu/michigan_lake_and_stream_leaders_institute/

- Michigan Citizen Planner

Level: Intermediate. Fee: Yes. The Michigan Citizen Planner program from MSU Extension offers land-use education and training to locally appointed and elected planning officials throughout Michigan. Michigan Citizen Planner is a non-credit course series leading to a certificate of completion awarded by Michigan State University Extension. There is also a Citizen Planner Online, a self-paced version of the Citizen Planner Program designed for individuals who can't fit a six-week course into their schedule or who prefer this style of learning.

Website: https://www.canr.msu.edu/michigan_citizen_planner/

- Introduction to Lakes

Level: Introductory. Fee: Yes. Introduction to Lakes is an online course through MSU Extension that focuses on lake ecology and lake management for those getting started in their lake management endeavors.

Website: <https://www.canr.msu.edu/courses/introduction-to-lakes>

- The Watershed Council would also be willing to develop a specific training program for Charlevoix County local government officials on bioengineering, if funding can be obtained.

Zoning and Additional Lake-Wide Considerations

In addition to the lake-wide vision and recommendations, there are some additional factors concerning zoning standards that each community may want to consider. Please note, not all of the additional options will be applicable to all local units of government.

Local governments have a very important role to play in the protection of surface water, groundwater, drinking water and wetlands. Local governments receive their authority to protect the environment and manage natural resources from Michigan's Constitution and two primary sources in state law. The first source is the Natural Resources Environmental Protection Act. The second source is collectively known as the Planning and Zoning Enabling Acts. These give townships, cities, villages, and to a lesser extent counties, the authority to oversee land-use decisions, protect the natural environment, and conserve natural resources and energy.

Zoning refers to the division of land into different zones or districts based on specific regulations and guidelines that dictate the permitted uses, development standards, and restrictions within each zone.

Zoning is a fundamental tool used by local governments to regulate land use and ensure orderly and planned development within their jurisdictions. The primary goals of zoning are to promote public health, safety, and welfare, as well as to guide and control the use of land in a way that is compatible with the surrounding environment and neighboring properties. Zoning regulations help communities manage growth, protect property values, maintain quality of life, and address various social, economic, and environmental concerns. If the zoning ordinance has appropriate standards to protect natural resources and minimize harm to the environment as new development, or redevelopment occurs, then not only the present generation, but also future generations will benefit.

1. Waterfront Zoning Protections

When it comes to waterfront zoning, one of the fundamental concerns is the protection of the water resource itself. Many of the local jurisdictions around Lake Charlevoix have zoning standards that require protection of the lake in some form. Proactive protection of surface water such as lakes and rivers is often an issue of how the shoreline is regulated with setbacks, vegetation belts or buffers, and density of development (parcel size and impervious surfaces). One of the most effective ways to protect inland lakes is to require minimum setbacks, with the maintenance or development of an undisturbed buffer of native vegetation within a certain distance from specified natural features. For example, a zoning requirement might be for a property owner to maintain a 50-foot greenbelt in which only native and natural species are allowed to grow. This would prohibit any lawn from going to the water's edge, or any beach sanding activity within the greenbelt or at the shoreline. It may also prohibit the installation of any structures or permanent fixtures (such as a deck or fire pit) within the greenbelt. It could also prohibit the use of pesticides, herbicides, and fertilizers, and place limitations on the cutting or pruning of vegetation and trees. Most jurisdictions would use the OHWM as the spot to begin measuring the greenbelt. In that case, a 50-foot greenbelt would mean the greenbelt would be measured starting at the OHWM and extend inland for 50 feet.

2. Overlay District

Another mechanism that would accomplish a feat similar to greenbelts may be the implementation and enforcement of a Zoning Overlay District. A zoning overlay district is a special designation or additional set of regulations applied to a specific area within an existing zoning district. It is designed to address unique characteristics, development needs, or specific goals of that particular area. Unlike the base zoning district, which establishes general land-use regulations for a larger geographic area, a zoning overlay district provides additional guidelines and restrictions that apply only to the designated overlay area. It can be used to address specific issues or opportunities such as environmental protection. Common standards or regulations in an overlay zone may include building setbacks, density standards, lot sizes, impervious surface reduction, vegetation requirements, building floor height minimums, and flood-proofing against high water levels. For example, it may be an overlay district along a lake or river that crosses several different zoning districts. Shoreline protection intentions could include a vegetation buffer and larger setback from the lake shoreline or riverbank for the entire length of the waterbody. The overlay district text in the zoning ordinance is where the larger setback and requirement for the vegetation buffer is written. Overlay districts can be useful for many of the jurisdictions around Charlevoix County.

Overlay districts can be written into ordinances for areas like shorelines that are sensitive to climate change impacts, including extreme storms, high waters, erosion, and flooding. An overlay district could

allow for a larger setback and requirement for greenbelt or vegetative buffer in order to adapt/mitigate the projected climatic impacts to the shoreline. In addition, overlay districts can be written for nonconforming areas to provide additional and/or different regulations that apply within the district. Given the unique and existing characteristics of an area, an overlay district could provide additional protection for a specific area within the confines of the existing development.



3. Nonconforming Uses

A nonconforming use, also known as a grandfathered use, refers to a land use or structure that was lawfully established and in operation before new zoning regulations or amendments were put into effect. When zoning laws change, these uses or structures no longer comply with the updated zoning ordinance, but they are allowed to continue operating or existing under certain conditions as nonconforming uses.

Nonconforming uses are generally allowed to continue operating despite not conforming to the current zoning regulations. Preexisting land uses that do not conform to current zoning are generally not favored. The goal of zoning is to achieve uniformity of property uses within each zoning district. At the same time, the intention is to recognize and protect the rights of property owners who made investments or established uses in good faith when the previous regulations were in place.

While nonconforming uses are widely used to balance a property owner's rights to comply with a zoning ordinance at a specific point in time, they are also used to discourage the continuance of such uses should a structure fall into disrepair. In addition, nonconforming properties may not expand a nonconforming use in any way or change the property use at all unless it conforms with new zoning regulations. In some circumstances, the nonconforming use may only be granted for a limited amount of time, setting a deadline for the property to meet the new requirements.

Should a community enact shoreline protection zoning ordinances, the impact may not be felt immediately. Some nonconforming uses may be allowed to exist for several years or even decades, so long as they remain in good repair and obtained a permit that was in compliance with zoning standards in existence at the time of their construction. If a structure falls into disrepair or changes a use, a municipality may be able to require that it be removed or altered to comply with current standards. Whether or not this type of enforcement would be effective would depend on whether the local jurisdiction chooses to establish a standard in its zoning ordinance that defines both a timeframe for compliance and what would trigger compliance with new standards.

Having an effective non-conforming use ordinance may not be an immediate solution, but it would help to improve shoreline conditions over a longer period of time.

4. County Zoning

It may make sense for Charlevoix County to adopt an ordinance because it has the police department (sheriff), legal team (prosecutor), and other resources (staff) to uniformly enforce ordinances for the entire county. The course of action for this to occur is to have the municipalities adopt the ordinance and contract with the county for enforcement services. With such contracts, the county is acting as an agent of that municipality. Having county-wide zoning would ensure consistency and uniformity around Lake Charlevoix, similar to the Charlevoix Stormwater and Soil Erosion and Sedimentation Programs.

5. Contract with a Third-Party for Review and Enforcement of Shoreline Ordinances

Similarly to County Zoning, another option would be for all municipalities to agree upon a third party to contract with for review and enforcement of shoreline ordinances. Each municipality would be responsible for a cost share. This would ensure that all ordinances are administered, reviewed, and enforced consistently across Lake Charlevoix. This type of arrangement has occurred previously among municipalities on Lake Charlevoix historically. It no longer exists due to changes in leadership among jurisdictions over the years.

6. Ordinary High Water Mark Interpretation

Under Part 301, the Michigan Inland Lake and Stream Act, the Ordinary High-Water Mark (OHWM) for inland lakes is the line between upland and bottomland identified by the presence of a distinct change in character of the land caused by successive changes in water levels. This line is identified in the field based on observed physical characteristics and may be reported by referencing either land survey elevation information or a relative benchmark such as observed water level or the base of a tree. Lake Charlevoix has a defined OHWM of 581.5 feet International Great Lakes Datum (IGLD). However, 582.35 feet IGLD was the highest water level recorded on Lake Charlevoix. We do not yet know if the high water levels in 2020 went above that highest level recorded. Regardless, the OHWM may need to be adjusted, given anticipated higher water levels and threats posed by storms due to climate change. It should also

be noted that the International Great Lakes Datum (IGLD), a common vertical reference used through the Great Lakes and connecting waters to measure water levels, is being updated. The current IGLD (1985) is scheduled to be replaced by IGLD (2020) around 2027. This is likely to impact the defined OHWM on Lake Charlevoix in the future.

7. Short-Term Rentals

In recent years, short-term rentals have increased in cities, towns and villages across Northern Michigan. As a result of this growth, local leaders have had to grapple with competing benefits and challenges — in particular, how to ensure a healthy stock of affordable housing while also supporting local tourism and economic development opportunities. While there are many considerations for short-term rentals, with respect to shoreline protection and the health of Lake Charlevoix, greenbelts and septic system maintenance are two key areas in which local units of government could regulate short-term rentals to ensure they are not harming the water quality of the lake.

In particular, short-term rentals can place enormous pressure upon septic systems. In the absence of a statewide code, Michigan has local septic codes created by local district health departments, in conjunction with township and county governments. These codes typically only regulate installation or failures of septic systems. As a result, most on-site septic systems are never inspected again, once installed. However, local governments can provide additional protections through local ordinances. Short-term rentals are known for high occupancy rates. Short-term rental operators often seek to maximize profit by increasing the sleeping capacity of a dwelling to accommodate more renters. As a result, the septic systems at short-term rentals are often not up to code and are strained by heavy usage above what the system was designed for. Given that short-term rentals are often on waterfront properties, targeting these properties is a strategic first step in efforts to protect our water resources from septic contamination. The Health Department of Northwest Michigan has identified short-term rental properties as a priority for protecting water quality and community health. Short-term rental regulations can protect against septic system failure by: (1) limiting the number of guests based on septic tank size and number of bedrooms or (2) requiring the homeowner to have a current inspection of the septic system on file.

Community Specific Vision and Recommendations

The following section provides a more specific vision and recommendations for each community around the lake. There were two distinct types of communities around the lake: cities and townships. There are some recommendations that apply to all the cities as well as some specific recommendations that apply to each specific city.

In addition, historical aerial photos for each community are provided to illustrate shoreline development over time. Photos are from 1956, 1978, 2010, and 2021.

General City Recommendations

1. Require Greenbelts on All Public Waterfront Properties Within City Limits

Lake Charlevoix's three cities have the opportunity to lead by example by requiring that all public properties along the waterfront have a minimum greenbelt requirement. Maintaining shoreline greenbelts, or vegetated buffer strips, helps protect the water quality of the lake by cooling water, reducing shoreline erosion, slowing stormwater runoff rates, and filtering nutrients from stormwater before it reaches the lake. The use of native plants, woody shrubs, and trees, instead of lawns and other less pervious surfaces within the greenbelt, allows for greater stormwater infiltration rates. Native plants often require less maintenance and are better adapted to local shoreline conditions. Including trees, shrubs, and other native plants helps develop an extensive, healthy root system in the greenbelt. These root systems stabilize banks and help prevent erosion from reaching the lake. The elimination of lawns and the use of herbicides, pesticides, and fertilizers in the greenbelt reduces the potential for chemicals and nutrients to enter the lake. Chemicals and nutrients can disrupt natural food chains by killing organisms that act as food sources for fish and birds. Fish species can also be negatively impacted when added beach sand covers important lake bottom habitats like gravel, rock, and weed beds. Beach sanding is often futile due to natural shoreline processes and frequently results in the sand burying underwater habitat or being transported to adjacent properties.

While the typical recommended requirement is a 50-foot greenbelt, this will not work within the confines of the cities. It is therefore recommended that all public waterfront properties that extend more than 100 feet landward require, at a minimum, a 30-foot greenbelt that covers 75% of the shoreline property, using specified deep-rooted plants. For publicly owned parcels that extend less than 100 feet landward, a city should still require a greenbelt that covers 75% of the shoreline property, using specified deep-rooted plants; however, the extent landward should be scaled by percentage.

2. Require a Greenbelt on Newly Developed or Renovated Properties

While the cities cannot retroactively apply a greenbelt or buffer standard to existing properties, nor institute a standard recommended 50-foot greenbelt requirement due to lot limitations, each city can require small greenbelts for new developments or redevelopments along the shore of Lake Charlevoix. This provision can be in combination with and/or separate from shoreline protection structures. While not the ideal length landward, having vegetation along the shoreline will still provide more protection and benefits than no vegetation or the installation of lawn to the lakeshore. The recommended greenbelt for newly developed or renovated properties within a city limit is to cover 75% of the shoreline property and extending, if possible, 20 feet landward. If this is not feasible given the confines of the lot

limits, the city will have to use its best judgement to determine what is reasonable given the property conditions. A greenbelt or vegetative buffer should be no less than a depth of five feet.

3. Consider Parameters for Greenbelt Requirements

Having shoreline vegetation is a first step toward protecting the water quality, habitat, and ecosystem health of Lake Charlevoix. The cities should consider inclusion of parameters within any greenbelt ordinance to fully protect our water resources for future generations. Recommendations include:

- **Requiring native vegetation in the greenbelt.** Native plants are preferred due to their effectiveness at stabilizing shorelines and streambanks, their habitat value, suitability to local conditions, and their natural “fit” in the landscape.
- **Prohibiting pesticides, herbicides, and fertilizers in the greenbelt.** Chemicals and nutrients can disrupt natural food chains by killing organisms that act as food sources for fish and birds.
- **Specific prohibition of a lawn in greenbelt.** Lawns, or areas planted in turf grass, allow stormwater to run off at higher rates than areas planted with trees and shrubs. This higher run off rate can allow storm water to reach the Lake before being allowed to percolate and increase the potential for shoreline erosion.
- **Requirement of trees and woody plants in the greenbelt.** Including trees, shrubs, and other native plants helps develop an extensive, healthy root system in the greenbelt. These root systems stabilize banks and help prevent erosion from reaching the Lake.
- **Prohibition of beach sanding.** Creating a beach where one doesn’t naturally exist can negatively impact water quality and fish and wildlife.
- **Require that new low-growing plantings be spaced for complete ground coverage in two years.** This ensures that vegetative cover is provided for greenbelt soils in a relatively short time. Adequate vegetative cover helps reduce shoreline erosion and slow stormwater runoff rates.
- **Limit pathways and structures within greenbelts.** This will reduce the amount of impervious surface coverage in the greenbelt and help to limit shoreline erosion and slow stormwater runoff speeds. It is recommended to allow a single path with a 4' maximum width to the water through the greenbelt or prohibit the construction of paths in the greenbelt. It is also recommended to limit the size of waterfront viewing platforms in the greenbelt to 200 square feet or smaller or prohibit the construction of waterfront viewing platforms.

4. Stormwater Management

Integrate Green Stormwater Infrastructure (GSI) with existing gray stormwater infrastructure. Green Stormwater Infrastructure (GSI) is an approach to land management that works with nature to manage stormwater. GSI uses native vegetation and natural processes to capture pollutants, minimize nutrient runoff, and reduce stormwater. GSI offers a number of advantages over traditional, engineered stormwater drainage approaches, including: addressing stormwater at its source - GSI practices seek to manage rainfall where it falls, reducing or eliminating the need for detention ponds and flood controls; promoting groundwater recharge - many GSI techniques allow stormwater to infiltrate the earth, recharging groundwater aquifers; allowing for more flexible site layouts - designs can incorporate stormwater management in a variety of open spaces and smaller landscaped areas; preserving streams and watersheds - GSI practices reduce both pollutant loads and streambank erosion associated with peak flows because of greater infiltration; enhancing aesthetics and public access/use - well-designed

vegetated practices, such as rain gardens, should be visually appealing as well as functional; and reducing costs - GSI reduces the need for pipes, asphalt, detention basins, or other infrastructure traditionally needed to handle runoff. It can also reduce energy costs and increase potential developable land area.

Some examples include:

- **Rain Gardens and Bioretention:** Rain gardens, also known as bioretention (“bio” meaning the use of plants and “retention” referring to the stormwater that is stored before it soaks into the ground) basins, are native, perennial gardens strategically located to capture runoff from impervious surfaces. Rain gardens increase aesthetic value, absorb water, promote infiltration, reduce runoff, protect water quality, and prevent flooding.
- **Porous Pavements:** Porous or permeable pavement surfaces allow stormwater to infiltrate into underlying soils, thereby promoting pollutant treatment and groundwater recharge. Permeable paving surfaces may include vegetated grid systems, permeable paver blocks, porous concrete, or porous asphalt. They are suited for parking lots, low traffic residential streets, driveways, and sidewalks.
- **Bioswales:** Bioswales slowly convey water to storm sewer inlets or surface waters and filter runoff. Bioswales are linear, shallow, vegetated channels that convey stormwater from one point to another. Oftentimes, they are used to guide runoff from its entry point on the property towards a nearby rain garden, dry well, or other structure.
- **Green Alley:** Alleys and low traffic roads can incorporate permeable pavers and underground stormwater storage to help intercept, filter, and infiltrate stormwater before it drains into stormwater catch basins. Pedestrian alleys can also feature stormwater planter boxes, which are similar to raised bioretention beds.
- **Tree Box Filters:** Tree box filters help to effectively manage stormwater by providing areas where water can collect, undergo filtration, and either naturally seep into the ground, be absorbed by the tree, or be transferred to storm drains.
- **Street Trees:** Unlike tree box filters, street trees do not receive stormwater runoff from the roadway. They help reduce the heat island effect of urban areas and intercept and absorb small amounts of rainfall.

Consider installation of trash capture technologies to address release of debris and plastics from stormwater systems. Such technologies can be deployed at different locations, including storm drain inlets, in-line or within the stormwater pipes, and/or at the outlet of a stormwater system. Aside from the upfront capital costs of trash capture technologies, systems may also require ongoing maintenance to routinely remove accumulated trash and debris. However, in areas with heavy stormwater and trash loads, these technologies can prove to be effective and efficient in protecting waterways.

Some examples include:

- **Curb Inlet Covers:** Curb inlet covers are trash screens that are designed to keep trash on the street and stop trash from entering the storm drain system. This way trash is kept on the street, so it can be swept up by street sweepers before it reaches the catch basin.
- **Catch Basin Outlet Screens:** Catch basin outlet screens are installed inside storm drains. These are screens or filters that block trash from entering stormwater intake pipes. Often screen systems will release trash if overflows occur. Curb inlet covers may be used in combination with catch basin devices in areas with lots of trash to act as a first line of defense and to prevent the need for more frequent clean-outs of internal catch basin devices.
- **Catch Basin Inserts:** Catch basin inserts are widely used as stormwater best management practices for trash capture. They are a relatively easy and inexpensive retrofit, particularly for older, existing drainage systems where end-of-pipe treatment technologies may be impractical or prohibitively expensive. Permanent inserts usually require steel frames, high-flow bypass, and durable fabric filter material that can withstand storms, debris loading, and cleanings. These drop-in inserts can allow inspection and cleaning without catch basin grate removal and may achieve full capture.
- **A Linear Radial Device:** This is a rigid, louvered, linear screen cage constructed in a cement vault. Stormwater and trash enter the cage and the water flows through the cement box while trash is retained within the screen cage. Vacuum trucks and other trash removal equipment are required to clean the units. Installations require adequate space for maintenance.
- **Hydrodynamic Separators:** Hydrodynamic separators are widely used in stormwater treatment. They are flow-through structures with a settling or separation unit to remove sediments, floatables, and other pollutants. These inline systems are cleaned using vacuum trucks to pump out trash, sediment, and water that has collected at the bottom. Engineering and installation costs can be quite high, but the devices are long lasting and can capture trash from a considerable area.
- **Netting Systems:** These systems may be designed with different size netting for various uses and may be in-line or end-of-pipe systems. In-line netting is installed underground in concrete vaults and functions similarly to linear removal devices. Netting systems have one or more mesh bags and a metal frame guide system to support the nets. When full, nets are removed and replaced with new nets. End-of-pipe systems are at an actual discharge point to a receiving water, or a collection point such a flood channel. Because end-of-pipe nets are above ground, they must be inspected at regular intervals to find and repair any damage from vandalism or other factors.

Specific City Recommendations

Boyne City

City of Boyne City Recommendations:

1. Require Formal Planning Commission Site Plan Review for All Waterfront Uses

Requiring formal site plan review for any waterfront use gives local units of government detailed information and more precise documentation on proposed projects adjacent to the Lake. The site plan review process ensures that each of these projects is meeting the required standards of the ordinance and allows zoning staff to simply verify that development is occurring according to the approved plans.

Require approval from state and federal agencies prior for projects in the Water Overlay District

Having other permits done before site plan review will make Boyne City's job easier. There is no longer a debate about where the driveway has to be located, what area works for on-site septic, if or where there are wetlands, groundwater issues, and so on. The City will know the site plan – drawn in compliance with the requirements of other permits – will comply with those other laws.

Should a property owner request zoning approval first, which can make sense for the applicant because state and federal permits are often more onerous or costly to obtain, the solution could be to have concurrent permit approval or issue conditional approval. Conditional approval is when the permit approval is a provisional approval that is contingent upon obtaining all other required permits.

2. Shoreline Protection Structures

Boyne City is heavily hardened by vertical seawalls which can cause degradation of shoreline areas on the waterside of the wall and additional erosion of adjacent shorelines on either side of the wall. It is recommended that the construction of vertical seawalls be prohibited within the Zoning Ordinance in favor of revetments and engineered natural shorelines, except when it is proven there is no other practical alternative.

3. Require greenbelts on All Public Waterfront Properties Within City Limits

The City of Boyne City has the opportunity to lead by example by requiring that all public properties along the waterfront have a minimum greenbelt requirement.

4. Require a Greenbelt on Newly Developed or Renovated Properties

Require small greenbelts for new developments or redevelopment of lots along the shore of Lake Charlevoix. The recommended greenbelt for newly developed or renovated properties within City limits is covering 75% of the shoreline property and extending, if possible 20' landward. If this is not feasible given the confines of the lot limits, the City will have to use best judgement to determine what is reasonable given the property conditions. A greenbelt/buffer should be no less than a depth of 5'.

5. Consider Parameters for Greenbelt Requirements

- Require native vegetation in the greenbelt
- Prohibit pesticides, herbicides, and fertilizers in the greenbelt
- Specific prohibition of lawn in greenbelt
- Requirement of trees of and woody plants in greenbelt
- Prohibition of beach sanding
- Require that new low-growing plantings be spaced for complete ground coverage in two years
- Limit pathways and structures within greenbelts

6. Stormwater Management

Integrate Green Stormwater Infrastructure with existing gray stormwater infrastructure and consider installation of trash capture technologies to address release of debris and plastics from stormwater systems.

7. Conduct a Stormwater Outfall Inventory

Identify and map the stormwater outfalls and their conditions within Boyne City. This can serve as the basis for stormwater program recommendations with respect to GSI and trash capture technologies. This will also allow for an evaluation of future needs with respect to the impacts of climate change such as higher water levels and an increased frequency and intensity of storms.



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City of Boyne City, North—Lake Charlevoix Shoreline Development Air Photography



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City of Boyne City, Central—Lake Charlevoix Shoreline Development Air Photography



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City of Charlevoix

City of Charlevoix Recommendations:

1. Redefine Ordinary High Water Mark

It is recommended that the Zoning Ordinance be amended to define the Ordinary High Water Mark of Lake Charlevoix as 582.35 feet IGLD. This elevation is the highest water level recorded on the lake and historical lake levels have frequently been higher than the defined Ordinary High Water Mark (OHWM). Standardizing a High Water Elevation of 582.35 feet helps ensure the effectiveness of shoreline buffers around the lake.

2. Shoreline Protection Structures

The City of Charlevoix is heavily hardened by seawalls, which can cause degradation of shoreline areas on the waterside of the wall and additional erosion of adjacent shorelines on either side of the wall. It is recommended that the construction of vertical seawalls be prohibited in the Zoning Ordinance in favor of revetments and engineered natural shorelines, except when it is proven there is no other practical alternative.

3. Require Greenbelts on All Public Waterfront Properties within City Limits

The City has the opportunity to lead by example by requiring that all public properties along the waterfront have a minimum greenbelt requirement.

4. Require a Greenbelt on Newly Developed or Renovated Properties

Require small greenbelts for new developments or redevelopment of lots along the shore of Lake Charlevoix. The recommended greenbelt for newly developed or renovated properties within City limits is covering 75% of the shoreline property and extending, if possible 20' landward. If this is not feasible given the confines of the lot limits, the City will have to use best judgement to determine what is reasonable given the property conditions. A greenbelt/buffer should be no less than a depth of 5'.

5. Consider Parameters for Greenbelt Requirements

- Require native vegetation in the greenbelt
- Prohibit pesticides, herbicides, and fertilizers in the greenbelt
- Specific prohibition of lawn in greenbelt
- Requirement of trees of and woody plants in greenbelt
- Prohibition of beach sanding

6. Stormwater Management

Integrate Green Stormwater Infrastructure with existing gray stormwater infrastructure and consider installation of trash capture technologies to address release of debris and plastics from stormwater systems.

City of Charlevoix, North—Lake Charlevoix Shoreline Development Air Photography



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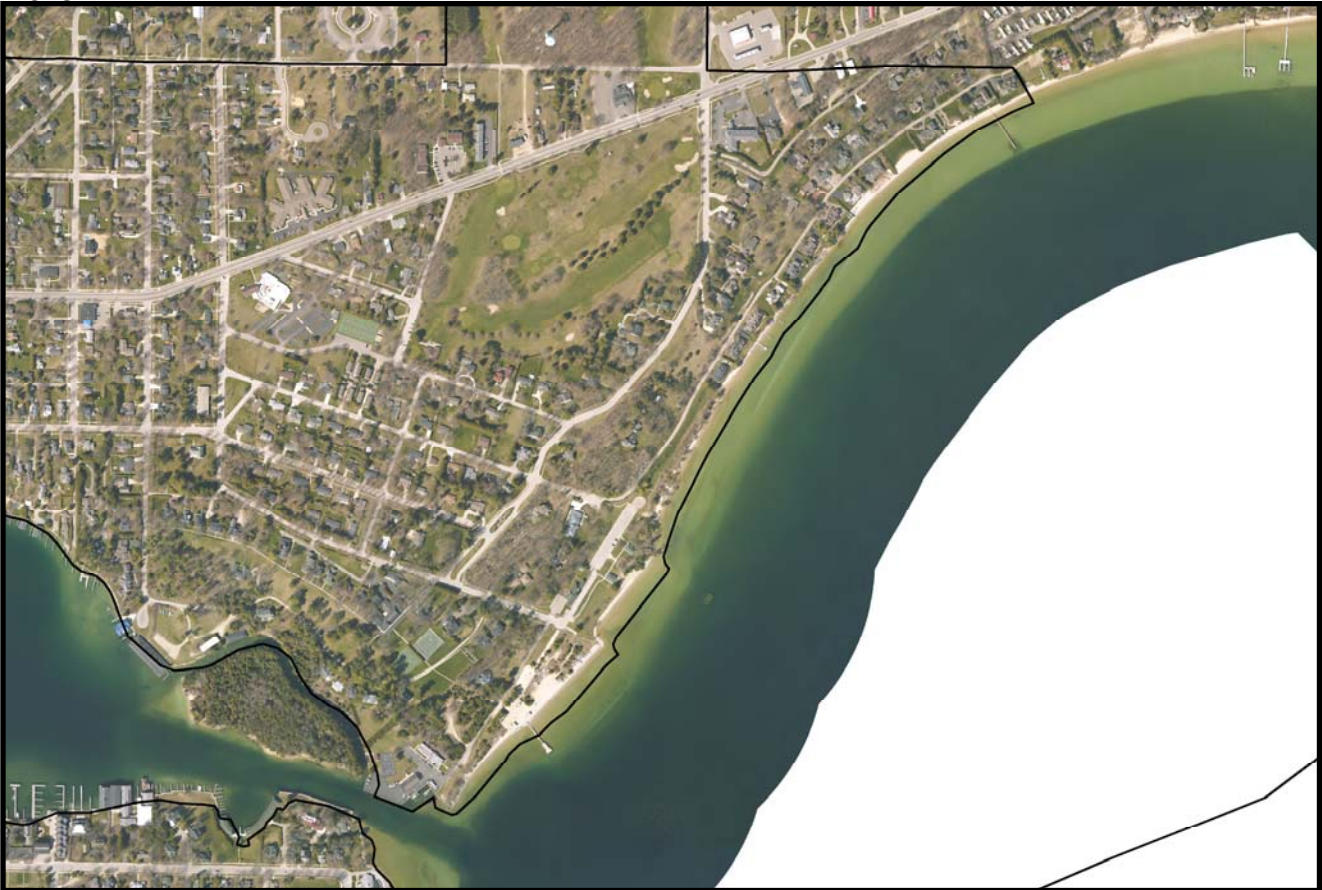


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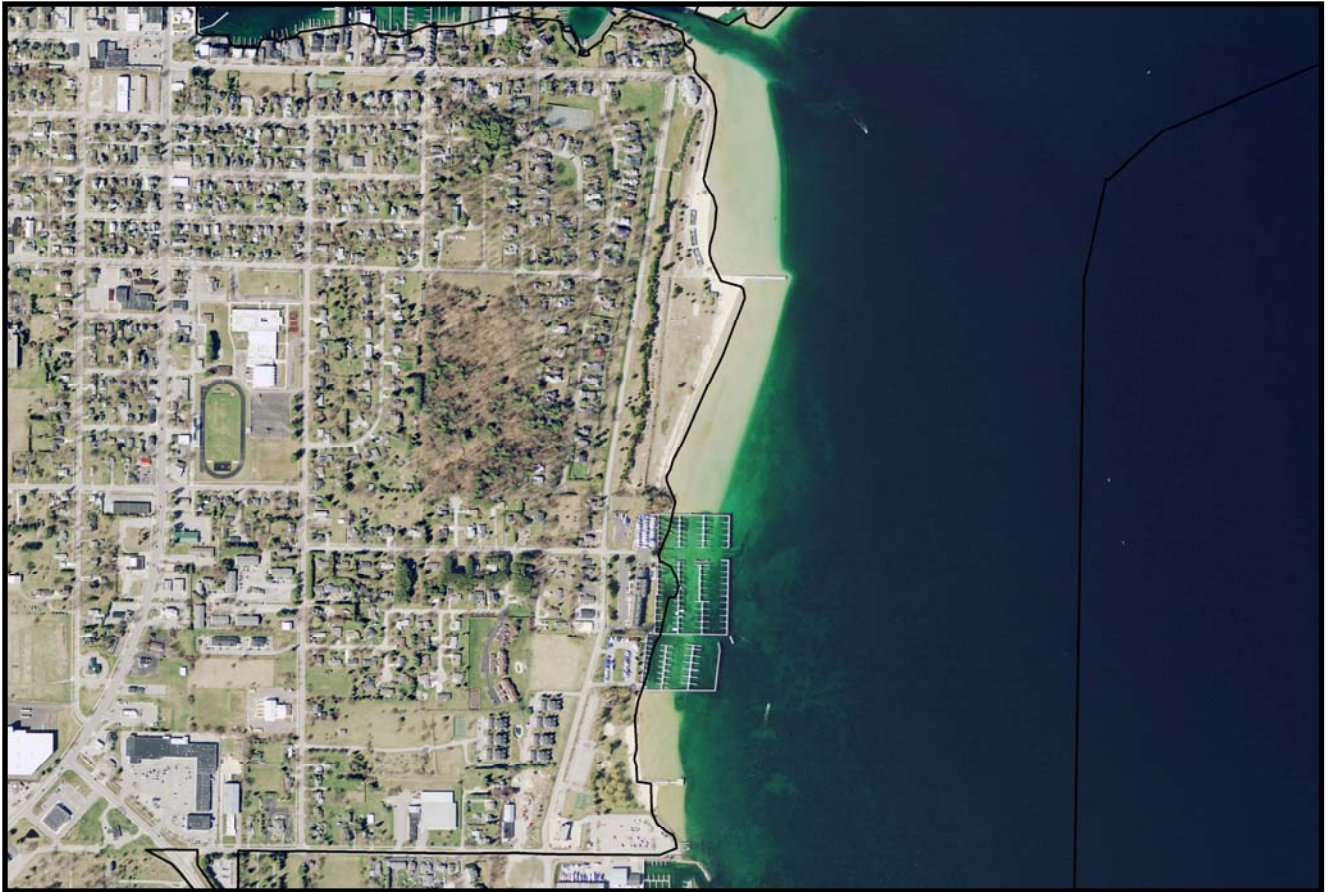


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City of Charlevoix, South—Lake Charlevoix Shoreline Development Air Photography



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City of East Jordan

City of East Jordan Recommendations:

1. Require Formal Planning Commission Site Plan Review for All Waterfront Uses

Requiring formal site plan review for any waterfront use gives local units of government detailed information and more precise documentation on proposed projects adjacent to the lake. The site plan review process ensures that each of these projects is meeting the required standards of the ordinance and allows zoning staff to simply verify that development is occurring according to the approved plans.

2. Institute a Waterfront Overlay for the Industrial District Occupied by East Jordan Iron Works to Ensure Shoreline Protections Prior to Development

The City of East Jordan has a unique opportunity for redevelopment of the current Industrial Zone, the previous location of the East Jordan Iron Works. Future zoning for the site is unknown. Regardless of future zoning, whether PUD, residential, commercial, etc., it is recommended that the City of East Jordan adopt a Waterfront Overlay District to apply additional regulations within the district to protect the shoreline and health of Lake Charlevoix. The overlay district in the zoning ordinance should, at a minimum, include text regarding setbacks, greenbelts or vegetative buffers, impervious surface maximums, dockage, and seawalls. Additional considerations in the overlay zone consist of density standards, lot sizes, building height, and conservation site design.

3. Require Greenbelts on All Public Waterfront Properties within City Limits

The City has the opportunity to lead by example by requiring that all public properties along the waterfront have a minimum greenbelt requirement.

4. Require a Greenbelt on Newly Developed or Renovated Properties

Require small greenbelts for new developments or redevelopment of lots along the shore of Lake Charlevoix. The recommended greenbelt for newly developed or renovated properties within City limits is covering 75% of the shoreline property and extending, if possible 20' landward. If this is not feasible given the confines of the lot limits, the City will have to use best judgement to determine what is reasonable given the property conditions. A greenbelt/buffer should be no less than a depth of 5'.

5. Consider Parameters for Greenbelt Requirements

- Require native vegetation in the greenbelt
- Prohibit pesticides, herbicides, and fertilizers in the greenbelt
- Specific prohibition of lawn in greenbelt
- Requirement of trees of and woody plants in greenbelt
- Prohibition of beach sanding

6. Stormwater Management

Integrate Green Stormwater Infrastructure with existing gray stormwater infrastructure and consider installation of trash capture technologies to address release of debris and plastics from stormwater systems.

City of East Jordan—Lake Charlevoix Shoreline Development Air Photography



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Townships Recommendations

Greatest Concerns Heard from All Townships:

Enforcement – Needs to be uniform and ubiquitous across all jurisdictions.

Education – Dissemination of information to contractors, realtors and homeowners.

Ordinances – Vary greatly from community to community; would like to see more universal ordinances but understand there are areas around the lake where that may not be possible; consistency among jurisdictions around the lake would make them easier to enforce.

Specific Township Recommendations

Bay Township

Community Input Received:

Bay Township Recommendations:

1. Fulfill 2016 *Enacting Shoreline Zoning Protections around Lake Charlevoix Lake Charlevoix Watershed Recommendations*

- **Redefine High Water Elevation**

It is recommended that the Zoning Ordinance be amended to define the High Water Elevation of Lake Charlevoix as 582.35' I.G.L.D. This elevation is the highest water level recorded on the lake and historical lake levels have frequently been higher than the defined Ordinary High Water Mark (OHWM) of 581.5'. Standardizing a High Water Elevation of 582.35' helps ensure the effectiveness of shoreline buffers around the lake.

- **Prohibit the sanding of beaches**

It is recommended that the Zoning Ordinance be amended to prohibit beach sanding both within the Natural Vegetative Strip and between the high water elevation and the water's edge. The sanding of beaches is often futile due to natural shoreline processes and variation in water levels. Beach sanding can also be detrimental to fish species within lakes when added beach sand covers important lake bottom habitats like gravel, rock, and weed beds.

- **Specifically regulate or prohibit keyhole/funnel development**

It is recommended that the Zoning Ordinance specifically regulate or prohibit keyhole, or funnel, development where multiple property owners or parcels are allowed lake access on a single waterfront parcel. Keyhole practices can greatly increase the number of docks and motorized watercraft on the lake, increase runoff and pollution, and increase shoreline erosion. By limiting the number of motorized boats that are able to be docked on individual waterfront parcels, water quality can be protected by reducing the potential for fuel and chemical spills. Additionally, congestion and aesthetic issues are reduced when keyholing/funneling is prevented.

- **Prohibit the alteration of the area between the water’s edge and the high water elevation**

Jurisdiction over inland lake bottomlands between the high water elevation and the water’s edge is concurrently held by both the Michigan Department of Environment Great Lakes and Energy, and local units of government. Local zoning ordinances can regulate activities that take place in these areas, including the alteration of the ground and the construction of structures. It is recommended that the Zoning Ordinance be amended to prohibit the alteration of the area between the defined high water elevation and the water’s edge. The alteration of bottomlands between the water’s edge and high water elevation can negatively impact habitat that would be underwater when lake levels are high. It can also increase the risk of shoreline erosion.

- **Finalize Article Six, Waterfront Overlay Zoning District, Ordinance Language**

**Tip of the Mitt Watershed Council has already engaged with Bay Township to finalize the language for the Waterfront Overlay Zoning District.*

2. Update Permit Application to Coincide with Article Six, Waterfront Overlay Zoning District Language

Many zoning ordinances are written in a manner that has shoreline protection provisions in different sections of the zoning ordinance. This makes it difficult for property owners to fully understand exactly what requirements need to be met. To simplify the process for homeowners and ensure compliance, a checklist of all shoreline protection requirements, along with drawings, could be implemented as part of the permitting process. Both the checklist and drawings should identify all of the development and/shoreline protection standards. A signature can be required by the applicant to confirm acknowledgement of all zoning standards to ensure there can be no claim that the property owner was not aware of any standard. A checklist can also provide an easier method for a zoning administrator or enforcement agent to ensure the property owner is in compliance with all provisions of shoreline protection in a zoning ordinance.

3. Develop an online program for permit application and examples of best management practices

An online permit application can have many advantages for both the homeowner and Bay Township. It can conveniently combine the majority of the Township’s shoreline permitting requirements into one convenient location and provide examples of what is meant by the provisions of the ordinance. Ultimately, it can help residents achieve their goals while complying with the Township’s regulations. In addition, an online permit portal can save a significant amount of time. With a traditional permit portal, citizens are required to travel to and from your office, wait for their turn to submit their permit application, and may even have to travel back to the office if they need to follow up on the status of their application or provide more information. It also helps save time for your staff. With traditional paper-based permitting, your staff will need to spend a considerable amount of time interacting with citizens one after the other.

4. Improve stormwater management ordinance requirements in Waterfront Overlay Zoning District

**Tip of the Mitt Watershed Council has already engaged with Bay Township to work on this effort.*

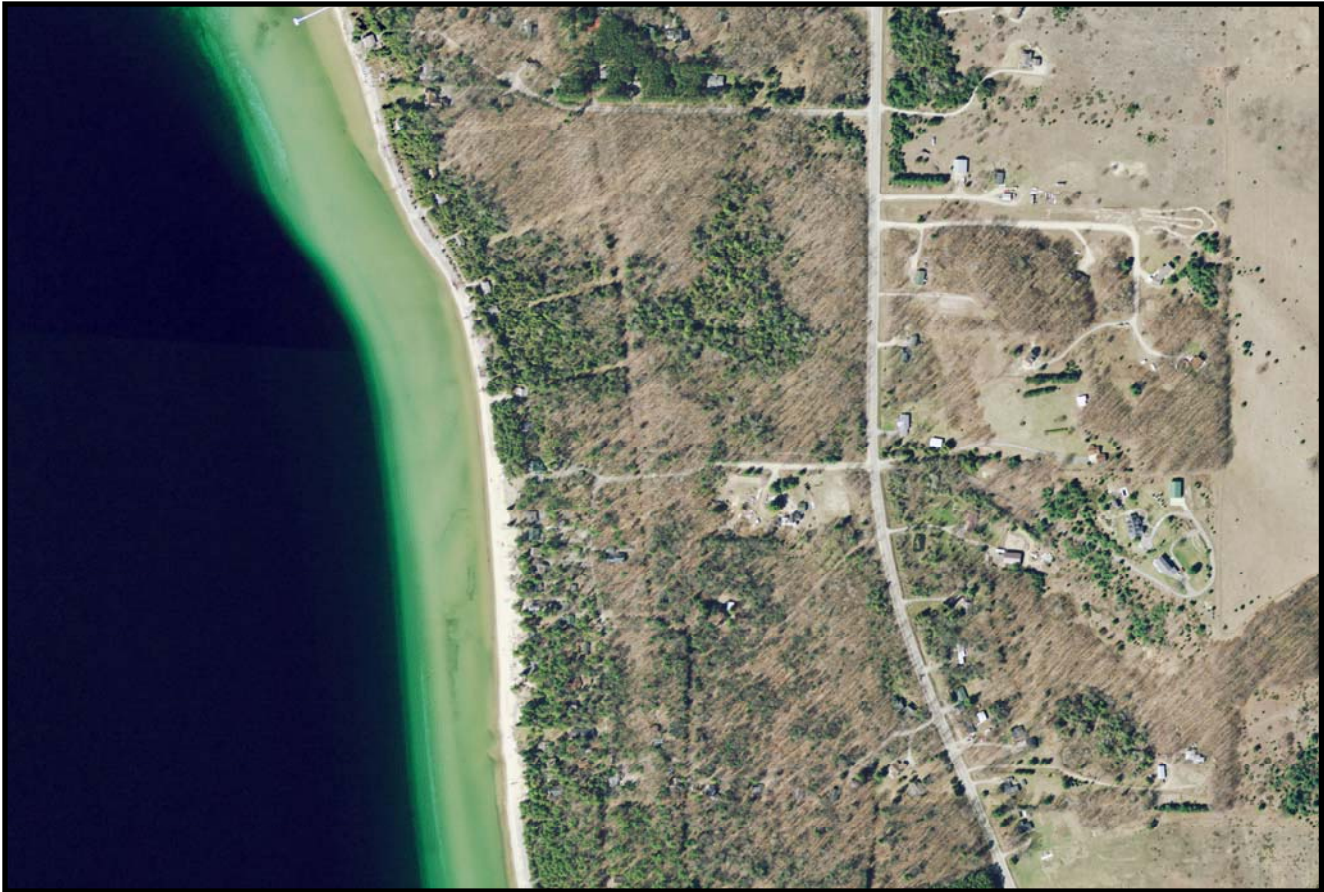


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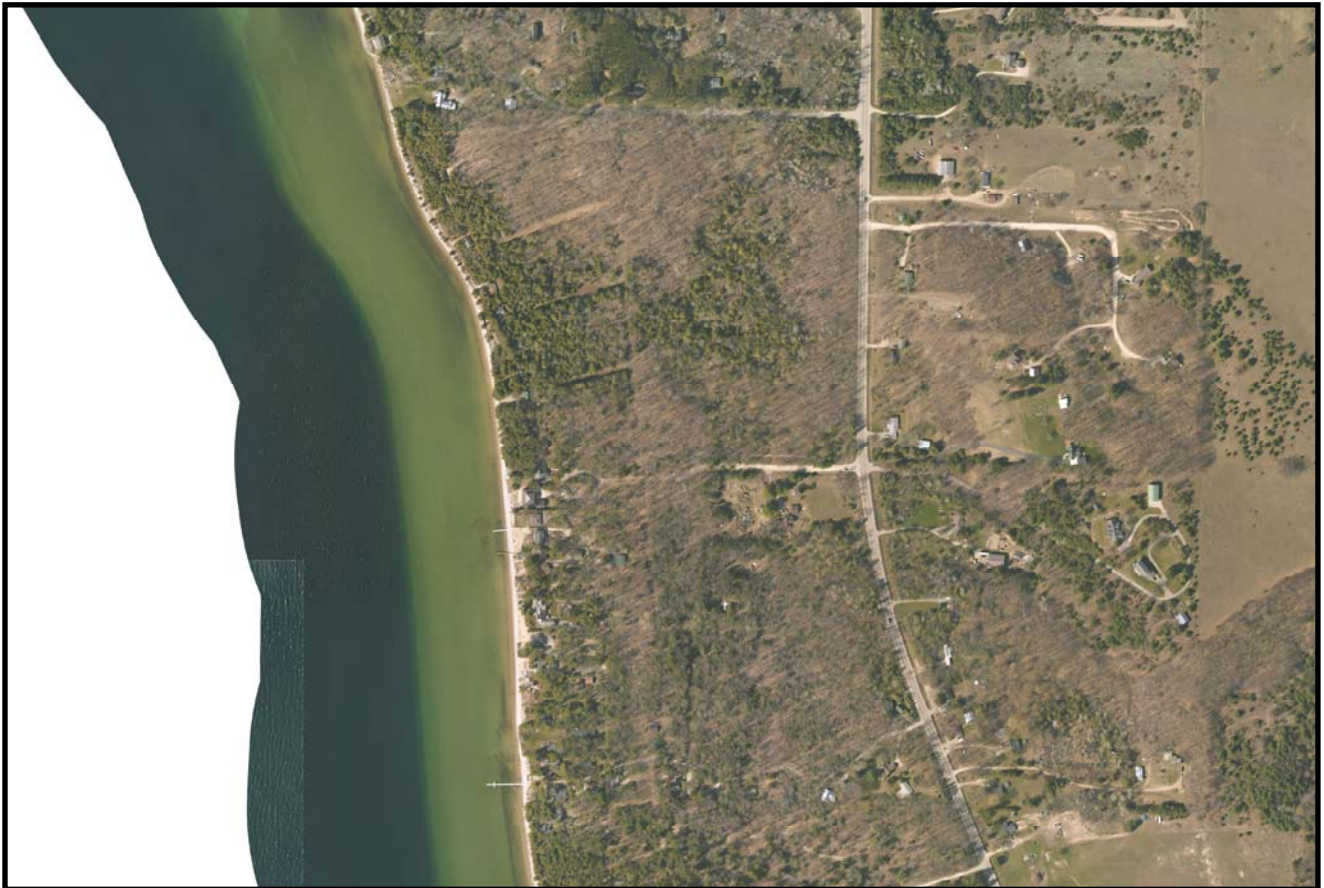


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Charlevoix Township

Charlevoix Township Recommendations:

1. Fulfill 2016 *Enacting Shoreline Zoning Protections around Lake Charlevoix Recommendations*

- **Require Formal Planning Commission Site Plan Review for All Waterfront Uses**

Requiring formal site plan review for any waterfront use gives local units of government detailed information and more precise documentation on proposed projects adjacent to the lake. The site plan review process ensures that each of these projects is meeting the required standards of the ordinance and allows zoning staff to simply verify that development is occurring according to the approved plans.

- **Redefine High Water Elevation**

It is recommended that the Zoning Ordinance be amended to define the High-Water Elevation of Lake Charlevoix as 582.35 feet IGLD. This elevation is the highest water level recorded on the lake and historical lake levels have frequently been higher than the defined Ordinary High-Water Mark (OHWM). Standardizing a High-Water Elevation of 582.35 feet helps ensure the effectiveness of shoreline buffers around the lake.

- **Specifically Regulate Number of Docks Allowed**

It is recommended that the Zoning Ordinance specifically regulate the number of docks allowed for each waterfront parcel to help protect water quality by limiting the opportunity for erosion and fuel and chemical pollution from increased boat dockage on the lake.

- **Modify Impervious Surface Coverage Standards for Waterfront Lots**

It is recommended that the Zoning Ordinance be amended to limit the maximum allowable impervious surface coverage on waterfront lots to 15%. Reducing the amount of impervious surface coverage on waterfront lots helps reduce the risk of shoreline erosion and the potential for pollutants to enter the lake through stormwater runoff.

- **Prohibit the Sanding of Beaches**

It is recommended that the Zoning Ordinance be amended to prohibit beach sanding both within the Natural Vegetative Strip and between the high water elevation and the water's edge. The sanding of beaches is often futile due to natural shoreline processes and variation in water levels. Beach sanding can also be detrimental to fish species within lakes when added beach sand covers important lake bottom habitats like gravel, rock, and weed beds.

2. Regulate Septic Systems in the Short-Term Rental Ordinance

In the absence of a statewide code, Michigan has local septic codes created by local district health departments, in conjunction with township and county governments. These codes typically only regulate installation or failures of septic systems. As a result, once they are installed, most on-site septic systems are never inspected again. However, local governments can provide additional protections through local ordinances. Charlevoix Township should incorporate a septic requirement

into its Short-Term Rental Ordinance. Short-term rentals are known for high occupancy rates. Short-term rental operators often seek to maximize profit by increasing the sleeping capacity of a dwelling to accommodate more renters. As a result, the septic systems at short-term rentals are often not up to code and are strained by heavy usage above what the system was designed to handle. Given that short-term rentals are often on waterfront properties, targeting these properties is a strategic first step in efforts to protect our water resources from septic contamination. The Health Department of Northwest Michigan has identified short-term rental properties as a priority for protecting water quality and community health. Short-term rental regulations can protect against septic system failure by: (1) limiting the number of guests based on septic tank size and number of bedrooms or (2) requiring the homeowner to have a current inspection of the septic system on file.

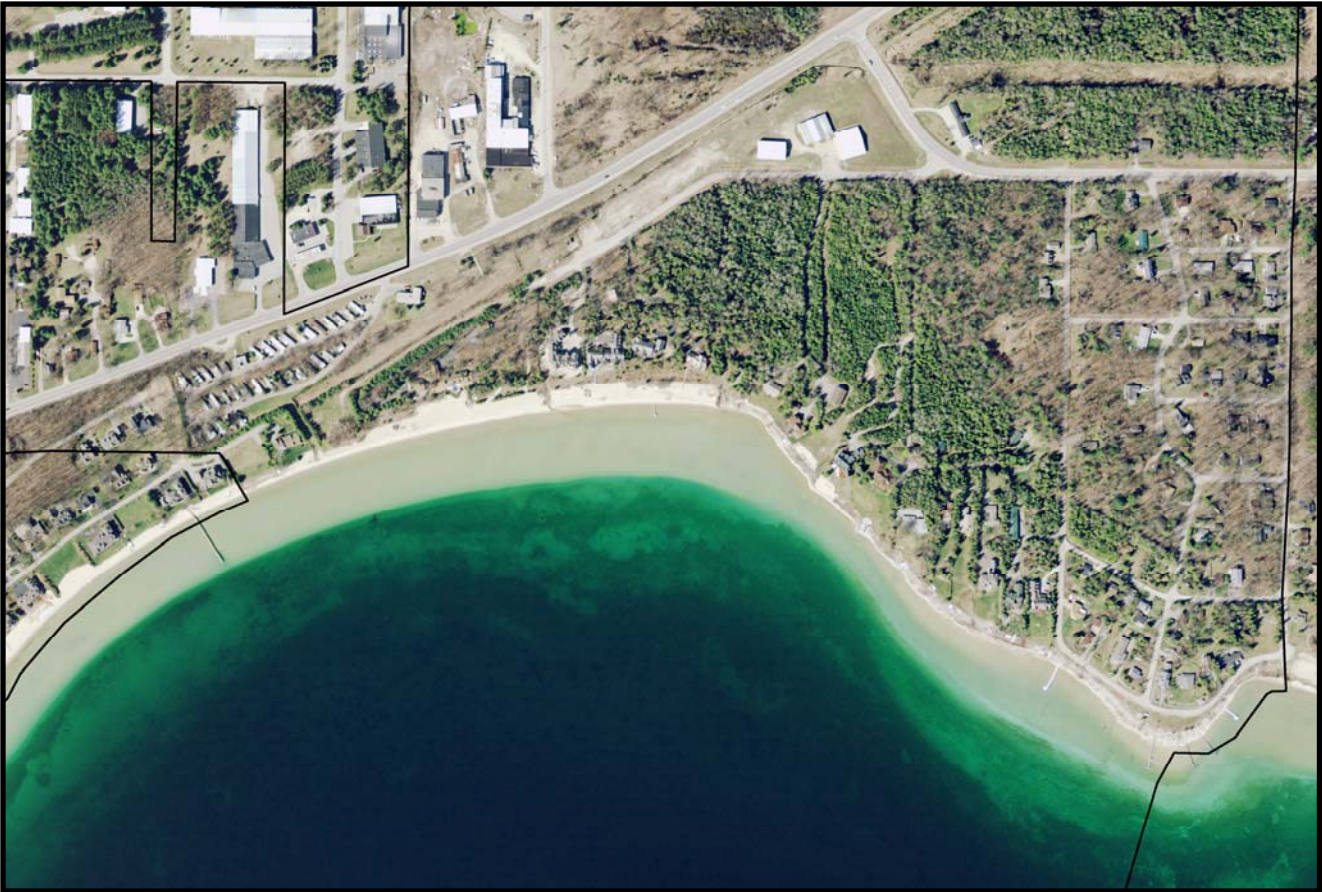


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Charlevoix Township, South—Lake Charlevoix Shoreline Development Air Photography



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Evangeline Township

Evangeline Township Recommendations:

1. Fulfill *Enacting Shoreline Zoning Protections around Lake Charlevoix Recommendations from 2016*

- Prohibit the alteration of the area between the water's edge and the high water elevation.

2. Pursue a Pilot Project to Promote the Use of Bioengineering

Evangeline Township should consider a demonstration project, jointly with Tip of the Mitt Watershed Council, to restore a high-energy shoreline area with native trees, shrubs, and other herbaceous shoreline species to facilitate restoration of critical shoreline functions. A demonstration site can be used to educate riparian owners and others about proper shoreline stabilization methods, best management practices, and how everyone can help promote a healthy Lake Charlevoix. It could even potentially be an opportunity to offer a training session for local landscape contractors to learn about or get certified in bioengineering techniques.

3. Add Greenbelt Requirements to the Short-Term Rental Ordinance

Short-term rentals can be great for tourism in Northern Michigan, but they can also put excess strain upon our water resources. Short-term rentals are known for high occupancy rates. This generally equates to a large number of vehicles which could result in an increase of contamination that might reach the lake through stormwater runoff. In addition, increased human activity can lead to increased erosion on site. Including greenbelt requirements in the Short-Term Rental License would help ensure that any additional pollution or contamination is filtered out before it reaches the lake and reduce shoreline erosion.

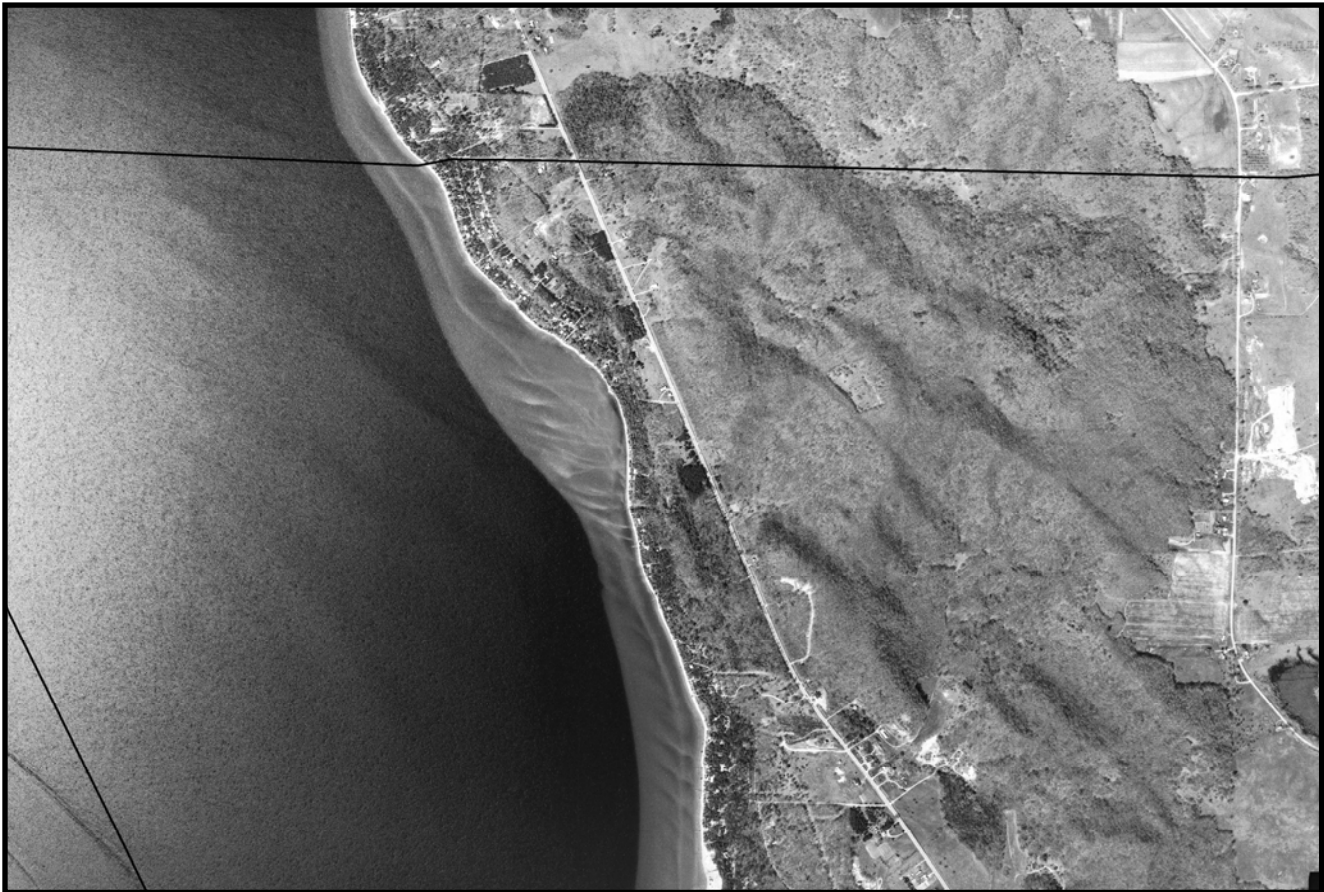
4. Prohibit Placement of Docks in Greenbelts/Wetlands

Maintaining shoreline greenbelts or vegetated buffer strips helps protect the water quality of the lake by cooling water, reducing shoreline erosion, slowing stormwater runoff rates, and filtering nutrients from stormwater before it reaches the lake. Placing or storing dockage within these areas can potentially cause damage to the vegetation and seed banks. As a result, it is recommended that the Township prohibit the placement of such structures within greenbelt areas and wetlands to preserve the functions and values of these vegetated areas, and require riparian users to appropriately place and store docks.



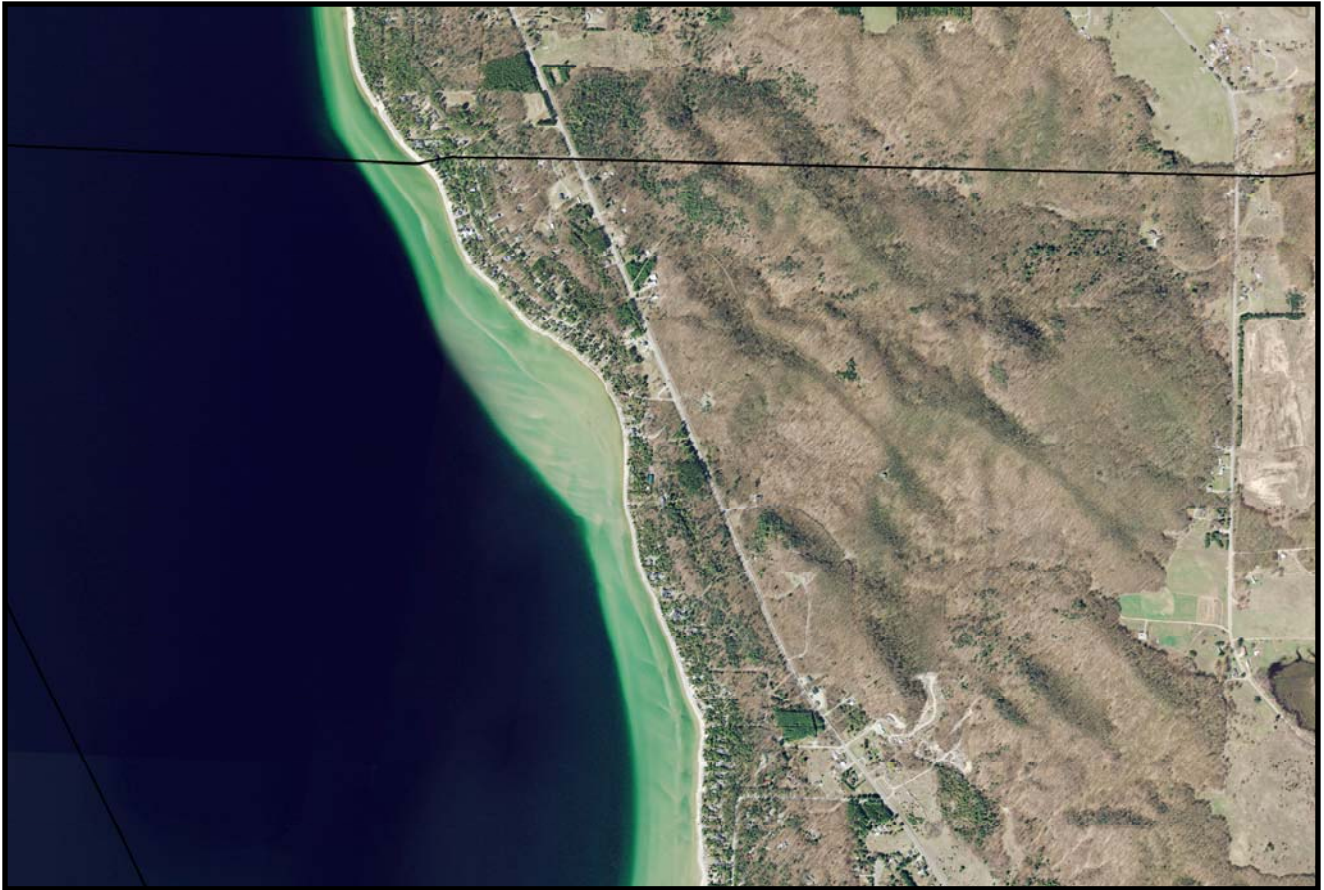
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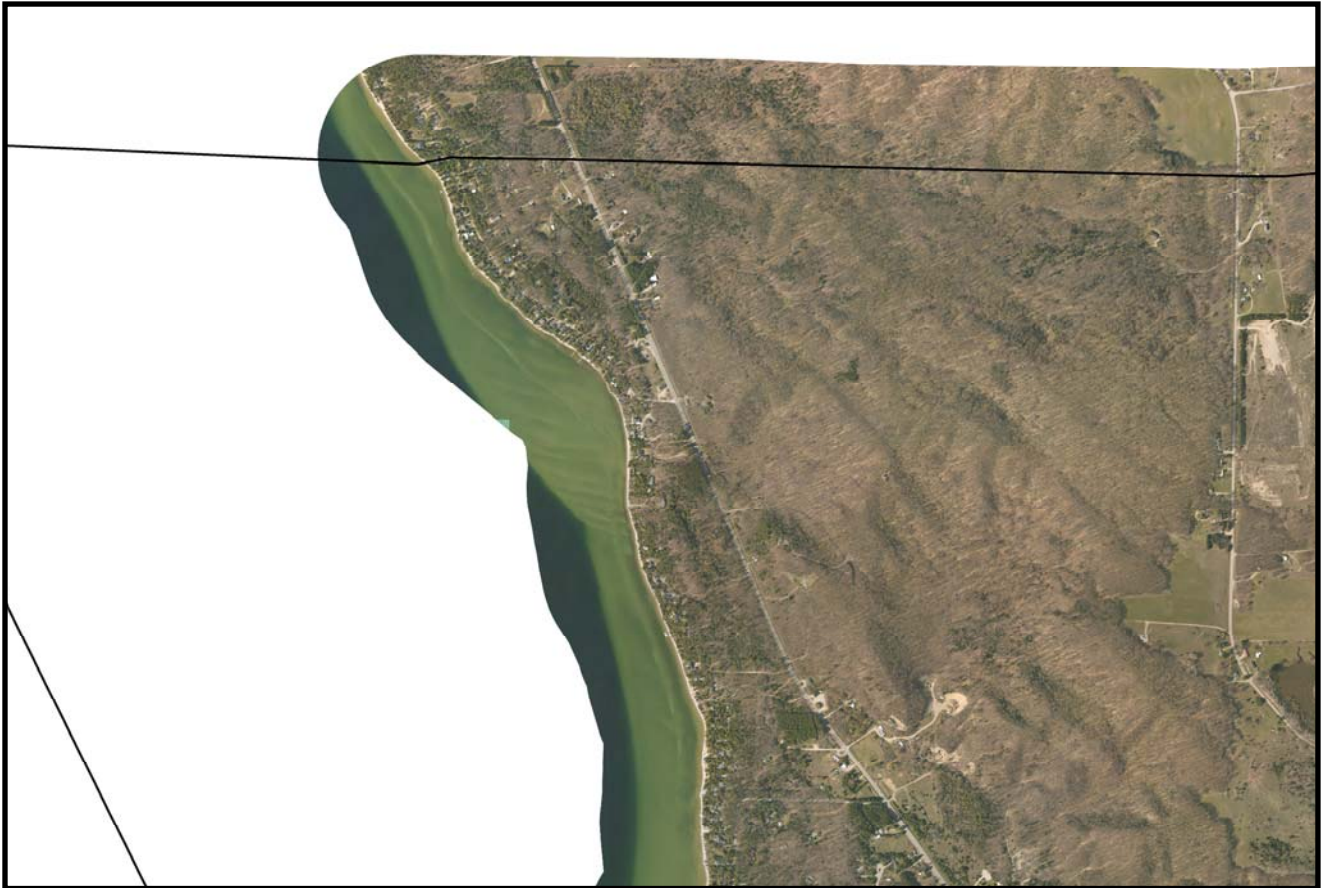


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Evangeline Township—Lake Charlevoix Shoreline Development Air Photography



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Eveline Township

Eveline Township Recommendations:

1. Fulfill 2016 *Enacting Shoreline Zoning Protections around Lake Charlevoix Recommendations*

- **Require Formal Planning Commission Site Plan Review for All Waterfront Uses**

Requiring formal site plan review for any waterfront use gives local units of government detailed information and more precise documentation on proposed projects adjacent to the lake. The site plan review process ensures that each of these projects is meeting the required standards of the ordinance and allows zoning staff to simply verify that development is occurring according to the approved plans. Currently, all alterations within the greenbelt requires a Waterfront Greenbelt Landscaping Plan approved by the Zoning Administrator on lots with less than 100 feet of water frontage, whereas on lots with 100 feet or more of water frontage, the Planning Commission has authority to review and act. To ensure consistency in the review and decision-making process, it is recommended that the Planning Commission review all of the Waterfront Greenbelt Landscaping Plans, regardless of size of lot.

- **Modify Impervious Surface Coverage Standards for Waterfront Lots**

It is recommended that the Zoning Ordinance be amended to limit the maximum allowable impervious surface coverage on waterfront lots to 15%. Reducing the amount of impervious surface coverage on waterfront lots helps reduce the risk of shoreline erosion and the potential for pollutants to enter the lake through stormwater runoff.

- **Prohibit the Sanding of Beaches**

It is recommended that the Zoning Ordinance be amended to prohibit beach sanding both within the Natural Vegetative Strip and between the high water elevation and the water's edge. The sanding of beaches is often futile due to natural shoreline processes and variation in water levels. Beach sanding can also be detrimental to fish species within lakes when added beach sand covers important lake bottom habitats like gravel, rock, and weed beds.

2. Expand Conditions in which Greenbelts are Required

Eveline currently requires vegetation within the waterfront greenbelt area to remain in an undisturbed, natural state unless a Waterfront Greenbelt Landscape Plan is submitted and approved. However, Waterfront Greenbelt Landscape Plans are limited to individuals making alterations within the waterfront greenbelt area. By expanding the conditions upon which Waterfront Greenbelt Landscape Plans are required, Eveline Township could provide significantly more shoreline protection to Lake Charlevoix through the installation of more greenbelts within the community. It is recommended the following waterfront developments should require Waterfront Greenbelt Landscape Plans:

- Reconstruction of an existing structure, or;
- Changing the spatial dimensions of an existing structure, or;
- Enclosing portions of any building, or;
- The addition of new structures, or;
- The granting of any variance.

3. Regulate Greenbelts in the Short-Term Rental License

Similarly to expanding conditions under which Waterfront Greenbelt Landscape Plans are required, Eveline Township could incorporate a greenbelt requirement into the Short-Term Rental License. Short-term rentals are known for high occupancy rates. This generally equates to a large number of vehicles, which could result in an increase of contamination that might reach the lake through stormwater runoff. In addition, increased human activity can lead to increased erosion on site. Including greenbelt requirements in the Short-Term Rental License would help ensure that any additional pollution or contamination is filtered out before it reaches the lake and reduce shoreline erosion.

4. Grant Final Permits/Variations Only After Greenbelt is Verified Compliant

“Reasonable conditions may be required” by a planning commission for “other land uses or activities permitted by discretionary decision” (MCL 125.3504(4)). A planning commission, or other approving official, can conditionally approve “a site plan based upon requirement and standard contained in the zoning ordinance” (MCL 125.3501(4)). As a result, Eveline Township has the ability to issue conditional approval of permits and/or variations, and only issue final approval once applicants have proven compliance with Section 4.6 Waterfront Greenbelt and Water Quality Protection Alternatives of the Eveline Township Zoning Ordinance.



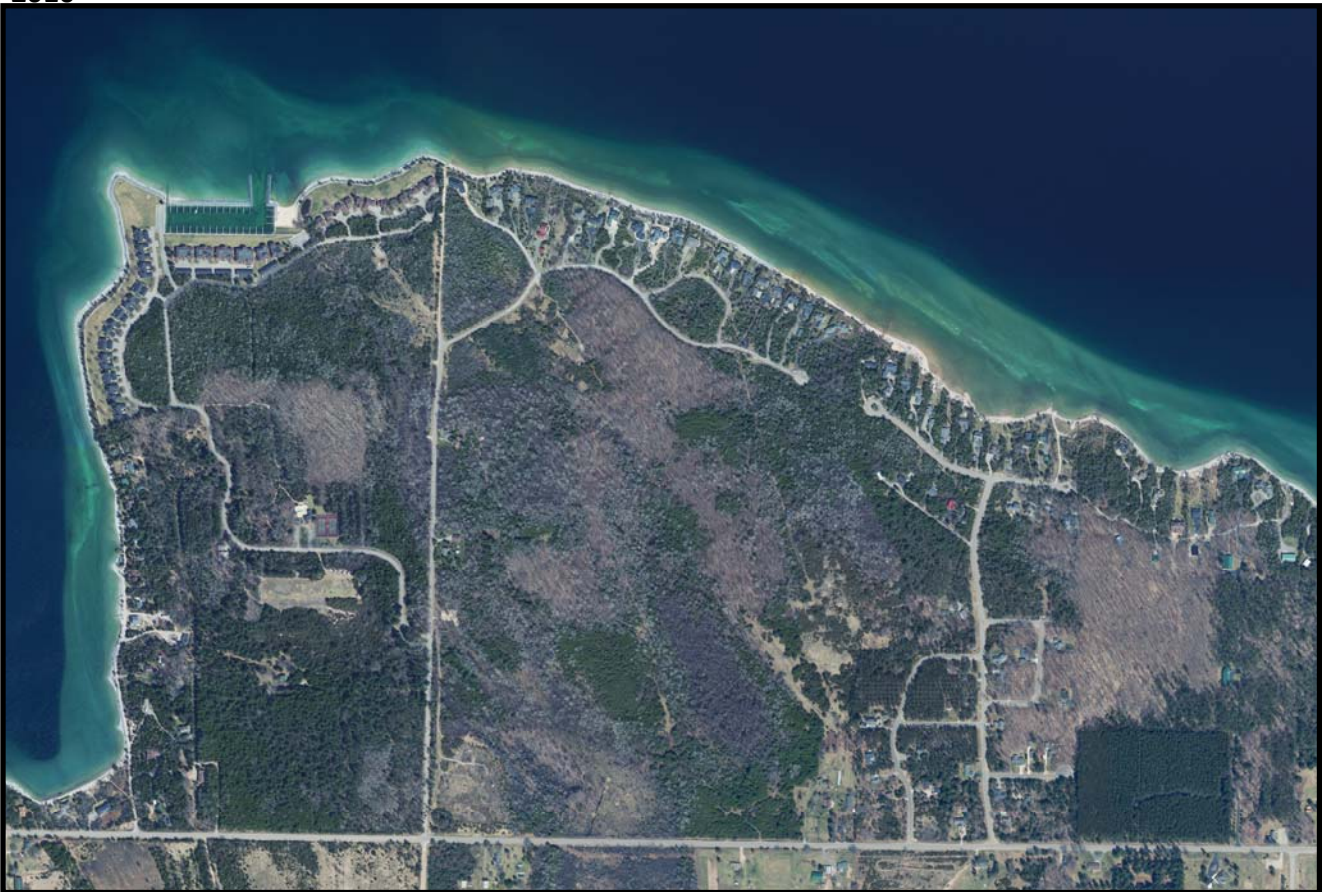
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Hayes Township

Hayes Township Recommendations:

1. Fulfill 2016 *Enacting Shoreline Zoning Protections around Lake Charlevoix Recommendations*

- Specific prohibition of lawn in greenbelt.
- Require that new low-growing plantings be spaced for complete ground coverage in two years.
- Require that all county, state, federal permits be obtained prior to zoning being issued.
- Require formal Planning Commission site plan review for all waterfront uses.

2. Prohibit Reclamation of Property Lost to Erosion/High Water

Shorelines are always changing. Erosion is an expected and natural process along waterways. Water levels and wave action move sand onshore and offshore. EGLE generally does not permit lakefront owners to reclaim property that may have been lost due to erosion over the years by placing a seawall or other shoreline protection out into the lake. In order to maintain a consistent and coordinated permit structure, Hayes Township should prohibit reclamation of land in the zoning ordinance.

3. Pursue a Pilot Project to Promote the Use of Bioengineering

The Township should consider a pilot project, jointly with Tip of the Mitt Watershed Council, at Camp Sea-Gull. Shoreline development, including beach sanding, shoreline and aquatic vegetation removal, construction of seawalls, dredging, filling, and other deleterious activities continue to impact water quality and habitat around Lake Charlevoix. To help counter these trends and address the underlying cause of impairment, the township, in tandem with the Watershed Council, should restore this high-energy shoreline with native trees, shrubs, and other herbaceous shoreline species to facilitate restoration of critical shoreline functions. The site, which is extremely popular for residents and visitors, can be used to educate riparian owners and others about proper shoreline stabilization methods, best management practices, and how everyone can help promote a healthy Lake Charlevoix. It could even potentially be an opportunity to offer a training session for local landscape contractors to learn about or get certified in bioengineering techniques.

Hayes Township—Lake Charlevoix Shoreline Development Air Photography



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Hayes Township—Lake Charlevoix Shoreline Development Air Photography



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Appendix: 2016 Shoreline Protection Recommendations Update

- Visioning and Shoreline Protection Project: 2016 Combined Recommendations
- Visioning and Shoreline Protection Project: 2016 Individual Community Recommendations
- Round 2 Visioning Session – Community Specific Recommendation Slides (from presentations)

2016 Recommendations for Shoreline Protection	Bay Township		Charlevoix Township		City of Boyne City		City of Charlevoix		City of East Jordan		Evangeline Township		Eveline Township		Hayes Township		Marion Township		South Arm Township	
	2016	2022	2016	2022	2016	2022	2016	2022	2016	2022	2016	2022	2016	2022	2016	2022	2016	2022	2016	2022
	Defined High Water Elevation/OHWM	No (581.5' IGLD)	No (581.5' IGLD)	No (579.8' IGLD)	No (579.8' IGLD)	Yes (582.4' IGLD)	Yes (582.4' IGLD)	No (581.5' IGLD)	No (581.5' IGLD)	No (as established by law)	Yes (582.35')	Yes (582.35' IGLD plus one (1) foot)	Yes (582.35' IGLD plus one (1) foot)	Yes (582.35' IGLD)	Yes (582.35' IGLD)	Yes (582.3' IGLD)	Yes (582.3' IGLD)	No (as established by law)	No (as established by law)	No (As established by law)
Setback from OHWM	Yes (65')	Yes (65')	Yes (50')	Yes (50')	No (35')	No (35')	Yes (50')	Yes (50')	No	No	Yes (50 or 100' steep slopes)	Yes (50-100')	Yes (50')	Yes (50')	Yes (100')	Yes (100')	Yes (100')	Yes (100')	Yes (100')	Yes (100')
Maximum Impervious Surface Lot Coverage	Yes ¹ (10-15%)	Yes ¹ (10-15%)	No 30% R-1 and 35% R-2	No 30% R-1 and 35% R-2	No 30% WRD, 40% CSD ⁸ , 100% CBD	No 40% WRD	No (40% R-1 and 30% R-2)	No (30%)	No	No	Yes ¹⁷ (15-25%)	Yes ¹⁷ (15-25%)	No (20%)	No (20%)	Yes in R-1 (15%), No in A (30%)	Yes in CR, RR-1, R-1 (15%)*	No	No	No (30%)	No
Shoreline Buffer/Greenbelt Requirement	No (45')	No (45')	Yes (50')	Yes (50')	No	No	No	No	No	No	No (25' or 50' for steep)	No (25' or 50' for steep)	Yes (50')	Yes (50') ²⁰	Yes (50')	Yes (50')	Yes (50')	Yes (50')	Yes (50')	Yes (50')
Native vegetation requirement in greenbelt	Yes	Yes	Yes ⁴	Yes ⁴	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Prohibition of pesticides, herbicides, and fertilizers in greenbelt	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Specific prohibition of lawn in greenbelt	No	No	Yes ⁵	Yes ⁵	No	No	No	No	No	No	Yes	Yes	No	Yes	No	No	No	No	No	No
Requirement of trees and woody plants in greenbelt	Yes	Yes	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes ²⁷	Yes	Yes
Cutting/pruning of greenbelt vegetation limited	Yes	Yes	Yes	Yes	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes ²⁴	No	No	Yes	Yes
Prohibition of beach sanding	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes ²⁵	No	Partially ²⁸	No	No
Prohibition of alternation of area between water's edge and high water elevation	No	No	Yes	Yes	No	No	No	No	No	No	No	Yes	No	Yes	No	No	No	No	No	No
Requires that new low-growing plantings be spaced for complete ground coverage in two years	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No	Yes	No	No	No	No	No	No
Allows a single, small (200 s.f.) waterfront viewing platform in the greenbelt	Yes	Yes	Yes	Yes	No	No	No	No	No	No	Yes	Yes (120 s.f. max)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes (80 s.f.)
Allows a single path (6' maximum width) through the greenbelt to the water	Yes	Yes (4' max width)	Yes	Yes	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes (4' max width)
Allows for the maintenance of existing natural shoreline buffers, where they exist	Yes	Yes	Yes	Yes	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Requirement of all county, state, federal permits be obtained prior to zoning being issued	Yes	Yes	Yes ⁶	Yes ⁶	No	No	No	Partially ¹⁰	No	No	Yes	Yes ¹⁸	No	No	Yes	No	Yes	No ²⁹	Yes	Yes
Formal Planning Commission Site Plan Review for all waterfront uses	No	No	No	No	No	No	No	Yes	No ¹⁴	No ¹⁴	Yes	Yes	No	Partially ²¹	No	Partially ²⁶	No	No	No	No
Number and Use of Docks	Yes	Yes	No	No	Yes	Yes	No	No	No	Partially ¹⁵	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Specific Keyhole or Funneling Standards	No	No	No	No	No	No	No	No	No	Yes	No	No	Yes	Yes ²²	Yes	Yes	No	No	Yes	Yes
Prohibition of Seawalls	No	No	No	No	No	No	No	No ¹¹	No	No	Yes	Yes ¹⁹	No	No	No	No	No	No	No	No
Engineered Stormwater Control Systems Requirement	Yes ²	Yes ³	Yes ⁷	Yes ⁷	Yes ⁹	Yes ⁹	Yes ¹²	Yes ¹³	Yes ¹⁶	Yes ¹⁶	Yes	Yes	Yes ²³	Yes ²³	Yes	Yes	Yes ³⁰	Yes ³⁰	Yes ³¹	Yes ³¹

- 1 *Based on average parcel slope.*
- 2 *Stormwater management systems are required as a standard for Site Plan Approval for all proposed development in Zoning District C.*
Stormwater flow from lots within the Waterfront Overlay district shall be directed to
- 3 *the non-lakeward side of any principal structure, be treated/disposed of on-site, and not leave the subject parcel above pre-development rates.*
- 4 *Waivers of the waterfront greenbelt provisions may be grants within t*Native plants required in first 25' from OHWM.*
- 5 *No cultivated varieties of vegetation or grass allowed within 25' of the OHWM.*
- 6 *All development subject to site plan review must meet requirements of other government agencies and have such approval obtained or assured.*
- 7 *Stormwater management and soil erosion control plans are required for proposed development except single- and two-family homes.*
- 8 *Maximum lot area covered by buildings.*
Stormwater plans that comply with the Charlevoix County Stormwater Ordinance are
- 9 *required in all zoning districts for all proposed uses except single-family, detached residential uses.*
The Planning Commission may approve an application conditioned on obtaining
- 10 *agency permits, or may, if the permit is critical to the site plan, require the permit or approval prior to issuance of their approval.*
- 11 *Seawalls may not be extended lakeward, nor shall any filling take place for the purposes of increasing lot size or relocating the rear lot line.*
- 12 *All site plans submitted for approval must show the location and type of all proposed surface water drainage facilities.*
- 13 *All projects must meet the City of Charlevoix Storm Water Ordinance.*
- 14 *Required for I, R3, and WF Districts.*
- 15 *Number of docks limited in RA District.*
All proposed development in the R-3, WF, and I districts, except single-family homes
- 16 *in the R-3 district, must meet the surface water drainage requirements of the ordinance.*
- 17 *P zone allows 25% coverage.*
A Zoning Permit shall not be issued until all other necessary permits required by
- 18 *statute have been obtained or waived with exception of those permits issued by the Charlevoix County Department of Building Safety.*
Standard sheet piling or concrete seawalls are prohibited except where the applicant
- 19 *can demonstrate to the Planning Commission that no other practical alternative exists.*
- 20 *Waivers of the waterfront greenbelt provisions may be granted within the Village Commercial Zoning District or the Village Mixed Use Zoning District.*
All alterations within the greenbelt requires a Waterfront Greenbelt Landscaping
- 21 *Plan approved by the Zoning Administrator on lots with less than 100 feet of water frontage or Planning Commission on lots with 100 feet or more of water frontage.*
- 22 *Not applicable to any development within the Village Mixed Use District.*
- 23 *All proposed development requiring site plan review must conform with Charlevoix County Drain Commission standards.*
- 24 *20% in R-2; 30% in A-1 and R-3; 50% in R-4; and 60% in C-1, C-2, and I-1.*
- 25 *Except to remove dead trees or shrubs, remove invasive species, or for selective trimming of trees for a view corridor or filtered view.*
A Shoreland Protection Subcommittee of the Planning Commission reviews
- 26 *waterfront development proposals to provide input and recommendations to the zoning administrator and/or planning commission.*
Natural vegetation cover, including trees, shrubs or herbaceous plants shall be
- 27 *maintained on a least seventy percent (70%) of the lake or stream frontage within the greenbelt, unless a landscape plan is submitted and approved by the Planning Commission.*
- 28 *No dredging or filling shall be allowed except for reasonable sanding of beaches where permitted by state or federal law.*
Permits must be obtained for fill material to be placed to create usable or buildable
- 29 *space to take on the Zoning District and accompanying provisions of the land abutting the fill area.*
- 30 *All development requiring site plan review shall comply with the terms of the Charlevoix County Stormwater Runoff Control Ordinance.*
- 31 *Stormwater retention consistent with the Charlevoix County Stormwater program required on all site for all development.*

LAKE CHARLEVOIX

Visioning and Shoreline Protection Project



BAY TOWNSHIP

2016 Recommendations for Shoreline Protection	Met or Exceeded Recommendations in 2016	Meets or Exceeds Recommendation as of 2022
Defined High Water Elevation/OHWM	No (581.5' IGLD)	No (581.5' IGLD)
Setback from OHWM	Yes (65')	Yes (65')
Maximum Impervious Surface Lot Coverage	Yes* (10-15%)	Yes* (10-15%)
Shoreline Buffer/Greenbelt Requirement	No (45')	No (45')
Native vegetation requirement in greenbelt	Yes	Yes
Prohibition of pesticides, herbicides, and fertilizers in greenbelt	No	No
Specific prohibition of lawn in greenbelt	No	No
Requirement of trees and woody plants in greenbelt	Yes	Yes
Cutting/pruning of greenbelt vegetation limited	Yes	Yes
Prohibition of beach sanding	No	No
Prohibition of alternation of area between water's edge and high water elevation	No	No
Requires that new low-growing plantings be spaced for complete ground coverage in two years	No	No
Allows a single, small (200 s.f.) waterfront viewing platform in the greenbelt	Yes	Yes
Allows a single path (6' maximum width) through the greenbelt to the water	Yes	Yes (4' maximum width)
Allows for the maintenance of existing natural shoreline buffers, where they exist	Yes	Yes
Requirement of all county, state, federal permits be obtained prior to zoning being issued	Yes	Yes
Formal Planning Commission Site Plan Review for all waterfront uses	No	No
Number and Use of Docks	Yes	Yes
Specific Keyhole or Funneling Standards	No	No
Prohibition of Seawalls	No	No
Engineered Stormwater Control Systems Requirement	Yes**	Yes***

* Based on average parcel slope.

** Stormwater management systems are required as a standard for Site Plan Approval for all proposed development in Zoning District C.

*** Stormwater flow from lots within the Waterfront Overlay district shall be directed to the non-lakeward side of any principal structure, be treated/disposed of on-site, and not leave the subject parcel above pre-development rates.

Based upon the *Enacting Shoreline Zoning Protections around Lake Charlevoix* Lake Charlevoix Watershed Recommendations, the following amendments to the Zoning Ordinance were recommended in 2016.



Redefine High Water Elevation

It is recommended that the Zoning Ordinance be amended to define the High Water Elevation of Lake Charlevoix as 582.35' I.G.L.D. This elevation is the highest water level recorded on the lake and historical lake levels have frequently been higher than the defined Ordinary High Water Mark (OHWM) of 581.5'. Standardizing a High Water Elevation of 582.35' helps ensure the effectiveness of shoreline buffers around the lake.

Modify Natural Vegetative Strip Standards

It is recommended that the Zoning Ordinance be amended to include additional regulations for Natural Vegetated Strips on waterfront parcels. Specifically, the recommended additions are:

- The prohibition of the use of pesticides, herbicides, and fertilizers in the Natural Vegetative Strip.
- The specific prohibition of lawn within the Natural Vegetative Strip.
- The inclusion of a requirement that new low-growing plantings within the Natural Vegetative Strip be spaced for complete ground coverage in two years.

The addition of these regulations would further increase the effectiveness of the shoreline buffer to slow runoff, reduce erosion, and protect the Lake from pollution.

Prohibit the sanding of beaches

It is recommended that the Zoning Ordinance be amended to prohibit beach sanding both within the Natural Vegetative Strip and between the high water elevation and the water's edge. The sanding of beaches is often futile due to natural shoreline processes and variation in water levels. Beach sanding can also be detrimental to fish species within lakes when added beach sand covers important lake bottom habitats like gravel, rock, and weed beds.

Prohibit the alteration of the area between the water's edge and the high water elevation

Jurisdiction over inland lake bottomlands between the high water elevation and the water's edge is concurrently held by both the Michigan Department of Environmental Quality, now known as the Michigan Department of Environment Great Lakes and Energy, and local units of government. Local zoning ordinances can regulate activities that take

place in these areas, including the alteration of the ground and the construction of structures. It is recommended that the Zoning Ordinance be amended to prohibit the alteration of the area between the defined high water elevation and the water's edge. The alteration of bottomlands between the water's edge and high water elevation can negatively impact habitat that would be underwater when lake levels are high. It can also increase the risk of shoreline erosion.

Require formal Planning Commission site plan review for all waterfront uses

Requiring formal site plan review for any waterfront use gives local units of government detailed information and more precise documentation on proposed projects adjacent to the Lake. The site plan review process ensures that each of these projects is meeting the required standards of the ordinance and allows zoning staff to simply verify that development is occurring according to the approved plans.

Specifically regulate or prohibit keyhole/funnel development

It is recommended that the Zoning Ordinance specifically regulate or prohibit keyhole, or funnel, development where multiple property owners or parcels are allowed lake access on a single waterfront parcel. Keyhole practices can greatly increase the number of docks and motorized watercraft on the lake, increase runoff and pollution, and increase shoreline erosion. By limiting the number of motorized boats that are able to be docked on individual waterfront parcels, water quality can be protected by reducing the potential for fuel and chemical spills. Additionally, congestion and aesthetic issues are reduced when keyholing/funneling is prevented.

Prohibit the construction of seawalls

Seawalls can cause degradation of shoreline areas on the waterside of the wall and additional erosion of adjacent shorelines on either side of the wall. It is recommended that the construction of seawalls be prohibited within the Zoning Ordinance in favor of revetments and engineered natural shorelines, except where there is no other practical alternative.

Funding for this project generously provided by the Charlevoix County Community Foundation and the Lake Charlevoix Association.



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LAKE CHARLEVOIX

Visioning and Shoreline Protection Project



CITY OF BOYNE CITY

2016 Recommendations for Shoreline Protection	Met or Exceeded Recommendations in 2016	Meets or Exceeds Recommendation as of 2022
Defined High Water Elevation/OHWM	Yes (582.4' IGLD)	Yes (582.4' IGLD)
Setback from OHWM	No (35')	No (35')
Maximum Impervious Surface Lot Coverage	No 30% WRD, 40% CSD*, 100% CBD	No 40% WRD
Shoreline Buffer/Greenbelt Requirement	No	No
Native vegetation requirement in greenbelt	No	No
Prohibition of pesticides, herbicides, and fertilizers in greenbelt	No	No
Specific prohibition of lawn in greenbelt	No	No
Requirement of trees and woody plants in greenbelt	No	No
Cutting/pruning of greenbelt vegetation limited	No	No
Prohibition of beach sanding	No	No
Prohibition of alternation of area between water's edge and high water elevation	No	No
Requires that new low-growing plantings be spaced for complete ground coverage in two years	No	No
Allows a single, small (200 s.f.) waterfront viewing platform in the greenbelt	No	No
Allows a single path (6' maximum width) through the greenbelt to the water	No	No
Allows for the maintenance of existing natural shoreline buffers, where they exist	No	No
Requirement of all county, state, federal permits be obtained prior to zoning being issued	No	No
Formal Planning Commission Site Plan Review for all waterfront uses	No	No
Number and Use of Docks	Yes	Yes
Specific Keyhole or Funneling Standards	No	No
Prohibition of Seawalls	No	No
Engineered Stormwater Control Systems Requirement	Yes**	Yes**

* Maximum lot area covered by buildings

** Stormwater plans that comply with the Charlevoix County Stormwater Ordinance are required in all zoning districts for all proposed uses except single-family, detached residential uses.



Based upon the *Enacting Shoreline Zoning Protections around Lake Charlevoix Lake Charlevoix Watershed Recommendations*, the following amendments to the Zoning Ordinance were recommended in 2016.

Conditions for Issuance of Zoning Permits

By requiring that all necessary permits be obtained prior to the issuance of a zoning permit, jurisdictions can be sure that the requirements of all other agencies are being met by the proposed development.

Require formal Planning Commission site plan review for all waterfront uses

Requiring formal site plan review for any waterfront use gives local units of government detailed information and more precise documentation on proposed projects adjacent to the Lake. The site plan review process ensures that each of these projects is meeting the required standards of the ordinance and allows zoning staff to simply verify that development is occurring according to the approved plans.

Shoreline Protection Structures

Seawalls can cause degradation of shoreline areas on the waterside of the wall and additional erosion of adjacent shorelines on either side of

the wall. It is recommended that the construction of seawalls be prohibited within the Zoning Ordinance in favor of revetments and engineered natural shorelines, except where there is no other practical alternative.

Specifically regulate or prohibit keyhole/funnel development

It is recommended that the Zoning Ordinance specifically regulate or prohibit keyhole, or funnel, development where multiple property owners or parcels are allowed lake access on a single waterfront parcel. Keyhole practices can greatly increase the number of docks and motorized watercraft on the lake, increase runoff and pollution, and increase shoreline erosion. By limiting the number of motorized boats that are able to be docked on individual waterfront parcels, water quality can be protected by reducing the potential for fuel and chemical spills. Additionally, congestion and aesthetic issues are reduced when keyholing/funneling is prevented.

Funding for this project generously provided by the Charlevoix County Community Foundation and the Lake Charlevoix Association.



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LAKE CHARLEVOIX

Visioning and Shoreline Protection Project



CITY OF CHARLEVOIX

2016 Recommendations for Shoreline Protection	Met or Exceeded Recommendations in 2016	Meets or Exceeds Recommendation as of 2022
Defined High Water Elevation/OHWM	No (581.5' IGLD)	No (581.5' IGLD)
Setback from OHWM	Yes (50')	Yes (50')
Maximum Impervious Surface Lot Coverage	No (40% R-1 and 30% R-2)	No (30%)
Shoreline Buffer/Greenbelt Requirement	No	No
Native vegetation requirement in greenbelt	No	No
Prohibition of pesticides, herbicides, and fertilizers in greenbelt	No	No
Specific prohibition of lawn in greenbelt	No	No
Requirement of trees and woody plants in greenbelt	No	No
Cutting/pruning of greenbelt vegetation limited	No	No
Prohibition of beach sanding	No	No
Prohibition of alternation of area between water's edge and high water elevation	No	No
Requires that new low-growing plantings be spaced for complete ground coverage in two years	No	No
Allows a single, small (200 s.f.) waterfront viewing platform in the greenbelt	No	No
Allows a single path (6' maximum width) through the greenbelt to the water	No	No
Allows for the maintenance of existing natural shoreline buffers, where they exist	No	No
Requirement of all county, state, federal permits be obtained prior to zoning being issued	No	Partially*
Formal Planning Commission Site Plan Review for all waterfront uses	No	Yes
Number and Use of Docks	No	No
Specific Keyhole or Funneling Standards	No	No
Prohibition of Seawalls	No	No**
Engineered Stormwater Control Systems Requirement	Yes***	Yes****

* The Planning Commission may approve an application conditioned on obtaining agency permits, or may, if the permit is critical to the site plan, require the permit or approval prior to issuance of their approval.

** Seawalls may not be extended lakeward, nor shall any filling take place for the purposes of increasing lot size or relocating the rear lot line.

*** All site plans submitted for approval must show the location and type of all proposed surface water drainage facilities.

**** All projects must meet the City of Charlevoix Storm Water Ordinance.



Based upon the *Enacting Shoreline Zoning Protections around Lake Charlevoix* Lake Charlevoix Watershed Recommendations, the following amendments to the Zoning Ordinance were recommended in 2016.

Redefine Ordinary High Water Mark

It is recommended that the Zoning Ordinance be amended to define the Ordinary High Water Mark of Lake Charlevoix as 582.35' I.G.L.D. This elevation is the highest water level recorded on the lake and historical lake levels have frequently been higher than the defined Ordinary High Water Mark (OHWM). Standardizing a High Water Elevation of 582.35' helps ensure the effectiveness of shoreline buffers around the lake.

Conditions for Issuance of Zoning Permits

By requiring that all necessary permits be obtained prior to the issuance of a zoning permit, jurisdictions can be sure that the requirements of all other agencies are being met by the proposed development. This recommendation has been partially implemented in that the Planning Commission may approve an application conditioned on obtaining agency permits, or may, if the permit is critical to the site plan, require the permit or approval prior to issuance of their approval.

Require formal Planning Commission site plan review for all waterfront uses

Requiring formal site plan review for any waterfront use gives local units of government detailed information and more precise documentation on proposed projects adjacent to the Lake. The site plan review process ensures that each of these projects is meeting the required standards of the ordinance and allows zoning staff to simply verify that development is occurring according to the approved plans. This recommendation has been implemented.

Shoreline Protection Structures

Seawalls can cause degradation of shoreline areas on the waterside of the wall and additional erosion of adjacent shorelines on either side of the wall. It is recommended that the construction of seawalls be prohibited within the Zoning Ordinance in favor of revetments and engineered natural shorelines, except where there is no other practical alternative. While seawalls are not prohibited, seawalls may not be extended lakeward, nor shall any filling take place for the purposes of increasing lot size or relocating the rear lot line.

Specifically regulate number of docks allowed

It is recommended that the Zoning Ordinance specifically regulate the number of docks allowed for each waterfront parcel to help protect water quality by limiting the opportunity for erosion and fuel and chemical pollution from increased boat dockage on the Lake.

Specifically regulate or prohibit keyhole/funnel development

It is recommended that the Zoning Ordinance specifically regulate or prohibit keyhole, or funnel, development where multiple property owners or parcels are allowed lake access on a single waterfront parcel. Keyhole practices can greatly increase the number of docks and motorized watercraft on the lake, increase runoff and pollution, and increase shoreline erosion. By limiting the number of motorized boats that are able to be docked on individual waterfront parcels, water quality can be protected by reducing the potential for fuel and chemical spills. Additionally, congestion and aesthetic issues are reduced when keyholing/funneling is prevented.

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LAKE CHARLEVOIX

Visioning and Shoreline Protection Project



CHARLEVOIX TOWNSHIP

2016 Recommendations for Shoreline Protection	Met or Exceeded Recommendations in 2016	Meets or Exceeds Recommendation as of 2022
Defined High Water Elevation/OHWM	No (579.8' IGLD)	No (579.8' IGLD)
Setback from OHWM	Yes (50')	Yes (50')
Maximum Impervious Surface Lot Coverage	No 30% R-1 and 35% R-2	No 30% R-1 and 35% R-2
Shoreline Buffer/Greenbelt Requirement	Yes (50')	Yes (50')
Native vegetation requirement in greenbelt	Yes*	Yes*
Prohibition of pesticides, herbicides, and fertilizers in greenbelt	No	No
Specific prohibition of lawn in greenbelt	Yes**	Yes**
Requirement of trees and woody plants in greenbelt	No	No
Cutting/pruning of greenbelt vegetation limited	Yes	Yes
Prohibition of beach sanding	No	No
Prohibition of alternation of area between water's edge and high water elevation	Yes	Yes
Requires that new low-growing plantings be spaced for complete ground coverage in two years	No	No
Allows a single, small (200 s.f.) waterfront viewing platform in the greenbelt	Yes	Yes
Allows a single path (6' maximum width) through the greenbelt to the water	Yes	Yes
Allows for the maintenance of existing natural shoreline buffers, where they exist	Yes	Yes
Requirement of all county, state, federal permits be obtained prior to zoning being issued	Yes***	Yes***
Formal Planning Commission Site Plan Review for all waterfront uses	No	No
Number and Use of Docks	No	No
Specific Keyhole or Funneling Standards	No	No
Prohibition of Seawalls	No	No
Engineered Stormwater Control Systems Requirement	Yes****	Yes****

*Waivers of the waterfront greenbelt provisions may be grants within †Native plants required in first 25' from OHWM.

**No cultivated varieties of vegetation or grass allowed within 25' of the OHWM.

***All development subject to site plan review must meet requirements of other government agencies and have such approval obtained or assured.

****Stormwater management and soil erosion control plans are required for proposed development except single- and two-family homes.

Based upon the *Enacting Shoreline Zoning Protections around Lake Charlevoix* Lake Charlevoix Watershed Recommendations, the following amendments to the Zoning Ordinance were recommended in 2016.



Redefine High Water Elevation

It is recommended that the Zoning Ordinance be amended to define the High Water Elevation of Lake Charlevoix as 582.35' I.G.L.D. This elevation is the highest water level recorded on the lake and historical lake levels have frequently been higher than the defined Ordinary High Water Mark (OHWM). Standardizing a High Water Elevation of 582.35' helps ensure the effectiveness of shoreline buffers around the lake.

Modify impervious surface coverage standards for waterfront lots

It is recommended that the Zoning Ordinance be amended to limit the maximum allowable impervious surface coverage on waterfront lots to 15%. Reducing the amount of impervious surface coverage on waterfront lots helps reduce the risk of shoreline erosion and the potential for pollutants to enter the lake through stormwater runoff.

Modify Shoreline Protection Regulations

It is recommended that the Zoning Ordinance be amended to include additional shoreline protection regulations for waterfront parcels. Specifically, the recommended additions are:

- The prohibition of the use of pesticides, herbicides, and fertilizers in the Natural Vegetative Strip.
- The inclusion of a requirement that specifically requires the planting of trees and/or woody plants in the shoreline protection zone.
- The inclusion of a requirement that new low-growing plantings within the Natural Vegetative Strip be spaced for complete ground coverage in two years.

The addition of these regulations would further increase the effectiveness of the shoreline buffer to slow runoff, reduce erosion, and protect the Lake from pollution.

Prohibit the sanding of beaches

It is recommended that the Zoning Ordinance be amended to prohibit beach sanding within the shoreline protection zone. The sanding of beaches is often futile due to natural shoreline processes and variation in water levels. Beach sanding can also be detrimental to fish species within lakes when added beach sand covers important lake bottom habitats like gravel, rock, and weed beds.

Require formal Planning Commission site plan review for all waterfront uses

Requiring formal site plan review for any waterfront use gives local units of government detailed information and more precise documentation on proposed projects adjacent to the Lake. The site plan review process ensures that each of these projects is meeting the required standards of the ordinance and allows zoning staff to simply verify that development is occurring according to the approved plans.

Specifically regulate number of docks allowed

It is recommended that the Zoning Ordinance specifically regulate the number of docks allowed for each waterfront parcel to help protect water quality by limiting the opportunity for erosion and fuel and chemical pollution from increased boat dockage on the Lake.

Specifically regulate or prohibit keyhole/funnel development

It is recommended that the Zoning Ordinance specifically regulate or prohibit keyhole, or funnel, development where multiple property owners or parcels are allowed lake access on a single waterfront parcel. Keyhole practices can greatly increase the number of docks and motorized watercraft on the lake, increase runoff and pollution, and increase shoreline erosion. By limiting the number of motorized boats that are able to be docked on individual waterfront parcels, water quality can be protected by reducing the potential for fuel and chemical spills. Additionally, congestion and aesthetic issues are reduced when keyholing/funneling is prevented.

Prohibit the construction of seawalls

Seawalls can cause degradation of shoreline areas on the waterside of the wall and additional erosion of adjacent shorelines on either side of the wall. It is recommended that the construction of seawalls be prohibited within the Zoning Ordinance in favor of revetments and engineered natural shorelines, except where there is no other practical alternative.

Funding for this project generously provided by the Charlevoix County Community Foundation and the Lake Charlevoix Association.



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LAKE CHARLEVOIX

Visioning and Shoreline Protection Project



CITY OF EAST JORDAN

2016 Recommendations for Shoreline Protection	Met or Exceeded Recommendations in 2016	Meets or Exceeds Recommendation as of 2022
Defined High Water Elevation/OHWM	No (Legally established surface water level)	Yes (582.35')
Setback from OHWM	Partially (R1 and R3 - 35' RA-40', WF and CR 50' 1-75')	Partially (R1-15', RA-40', WF-50')
Maximum Impervious Surface Lot Coverage	No	No
Shoreline Buffer/Greenbelt Requirement	No	No
Native vegetation requirement in greenbelt	No	No
Prohibition of pesticides, herbicides, and fertilizers in greenbelt	No	No
Specific prohibition of lawn in greenbelt	No	No
Requirement of trees and woody plants in greenbelt	No	No
Cutting/pruning of greenbelt vegetation limited	No	No
Prohibition of beach sanding	No	No
Prohibition of alternation of area between water's edge and high water elevation	No	No
Requires that new low-growing plantings be spaced for complete ground coverage in two years	No	No
Allows a single, small (200 s.f.) waterfront viewing platform in the greenbelt	No	No
Allows a single path (6' maximum width) through the greenbelt to the water	No	No
Allows for the maintenance of existing natural shoreline buffers, where they exist	No	No
Requirement of all county, state, federal permits be obtained prior to zoning being issued	No	No
Formal Planning Commission Site Plan Review for all waterfront uses	No*	No*
Number and Use of Docks	No	Partially**
Specific Keyhole or Funneling Standards	No	Yes
Prohibition of Seawalls	No	No
Engineered Stormwater Control Systems Requirement	Yes***	Yes***

* Required for I, R3, and WF Districts.

** Number of docks limited in RA District.

*** All proposed development in the R-3, WF, and I districts, except single-family homes in the R-3 district, must meet the surface water drainage requirements of the ordinance.



Photo courtesy of East Jordan Chamber of Commerce

Based upon the *Enacting Shoreline Zoning Protections around Lake Charlevoix Lake Charlevoix Watershed Recommendations*, the following amendments to the Zoning Ordinance were recommended in 2016.

Redefine Ordinary High Water Mark

It is recommended that the Zoning Ordinance be amended to define the Ordinary High Water Mark of Lake Charlevoix as 582.35' I.G.L.D. This elevation is the highest water level recorded on the lake and historical lake levels have frequently been higher than the defined Ordinary High Water Mark (OHWM). Standardizing a High Water Elevation of 582.35' helps ensure the effectiveness of shoreline buffers around the lake. **This recommendation has been implemented.**

Conditions for Issuance of Zoning Permits

By requiring that all necessary permits be obtained prior to the issuance of a zoning permit, jurisdictions can be sure that the requirements of all other agencies are being met by the proposed development.

Require formal Planning Commission site plan review for all waterfront uses

Requiring formal site plan review for any waterfront use gives local units of government detailed information and more precise documentation on proposed projects adjacent to the Lake. The site plan review process ensures that each of these projects is meeting the required standards of the ordinance and allows zoning staff to simply verify that development is occurring according to the approved plans. Currently, the City of East Jordan does not require formal site plan review for single family residential development (RA and R1).

Shoreline Protection Structures

Seawalls can cause degradation of shoreline areas on the waterside of the wall and additional erosion of adjacent

shorelines on either side of the wall. It is recommended that the construction of seawalls be prohibited within the Zoning Ordinance in favor of revetments and engineered natural shorelines, except where there is no other practical alternative.

Specifically regulate number of docks allowed

It is recommended that the Zoning Ordinance specifically regulate the number of docks allowed for each waterfront parcel to help protect water quality by limiting the opportunity for erosion and fuel and chemical pollution from increased boat dockage on the Lake. **This recommendation has been partially implemented, the number of docks are limited in the RA Single-Family Residential District.**

Specifically regulate or prohibit keyhole/funnel development

It is recommended that the Zoning Ordinance specifically regulate or prohibit keyhole, or funnel, development where multiple property owners or parcels are allowed lake access on a single waterfront parcel. Keyhole practices can greatly increase the number of docks and motorized watercraft on the lake, increase runoff and pollution, and increase shoreline erosion. By limiting the number of motorized boats that are able to be docked on individual waterfront parcels, water quality can be protected by reducing the potential for fuel and chemical spills. Additionally, congestion and aesthetic issues are reduced when keyholing/funneling is prevented. **This recommendation has been implemented.**

Funding for this project generously provided by the Charlevoix County Community Foundation and the Lake Charlevoix Association.



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LAKE CHARLEVOIX

Visioning and Shoreline Protection Project



EVANGELINE TOWNSHIP

2016 Recommendations for Shoreline Protection	Met or Exceeded Recommendations in 2016	Meets or Exceeds Recommendation as of 2022
Defined High Water Elevation/OHWM	Yes (582.35' IGLD plus one (1) foot)	Yes (582.35' IGLD plus one (1) foot)
Setback from OHWM	Yes (50 or 100' steep slopes)	Yes (50-100')
Maximum Impervious Surface Lot Coverage	Yes* (15-25%)	Yes* (15-25%)
Shoreline Buffer/Greenbelt Requirement	No (25' or 50' for steep slopes)	No (25' or 50' for steep slopes)
Native vegetation requirement in greenbelt	Yes	Yes
Prohibition of pesticides, herbicides, and fertilizers in greenbelt	Yes	Yes
Specific prohibition of lawn in greenbelt	Yes	Yes
Requirement of trees and woody plants in greenbelt	Yes	Yes
Cutting/pruning of greenbelt vegetation limited	Yes	Yes
Prohibition of beach sanding	No	No
Prohibition of alternation of area between water's edge and high water elevation	No	Yes
Requires that new low-growing plantings be spaced for complete ground coverage in two years	Yes	Yes
Allows a single, small (200 s.f.) waterfront viewing platform in the greenbelt	Yes	Yes (120 s.f. maximum)
Allows a single path (6' maximum width) through the greenbelt to the water	Yes	Yes
Allows for the maintenance of existing natural shoreline buffers, where they exist	Yes	Yes
Requirement of all county, state, federal permits be obtained prior to zoning being issued	Yes	Yes**
Formal Planning Commission Site Plan Review for all waterfront uses	Yes	Yes
Number and Use of Docks	Yes	Yes
Specific Keyhole or Funneling Standards	No	No
Prohibition of Seawalls	Yes	Yes***
Engineered Stormwater Control Systems Requirement	Yes	Yes

* P zone allows 25% coverage.

** A Zoning Permit shall not be issued until all other necessary permits required by statute have been obtained or waived with exception of those permits issued by the Charlevoix County Department of Building Safety.

*** Standard sheet piling or concrete seawalls are prohibited except where the applicant can demonstrate to the Planning Commission that no other practical alternative exists.



Based upon the *Enacting Shoreline Zoning Protections around Lake Charlevoix* Lake Charlevoix Watershed Recommendations, the following amendments to the Zoning Ordinance were recommended in 2016.

Prohibit the sanding of beaches

It is recommended that the Zoning Ordinance be amended to prohibit beach sanding both within the natural vegetation waterfront buffer strip and between the high water elevation and the water's edge. The sanding of beaches is often futile due to natural shoreline processes and variation in water levels. Beach sanding can also be detrimental to fish species within lakes when added beach sand covers important lake bottom habitats like gravel, rock, and weed beds.

Prohibit the alteration of the area between the water's edge and the high water elevation

Jurisdiction over inland lake bottomlands between the high water elevation and the water's edge is concurrently held by both the Michigan Department of Environmental Quality, now known as the Michigan Department of Environment, Great Lakes, and Energy (EGLE), and local units of government. Local zoning ordinances can regulate activities that take place in these areas, including the alteration of the ground and the construction of structures. It is recommended that the Zoning Ordinance be amended to prohibit

the alteration of the area between the defined high water elevation and the water's edge. The alteration of bottomlands between the water's edge and high water elevation can negatively impact habitat that would be underwater when lake levels are high. It can also increase the risk of shoreline erosion. **This recommendation has been implemented.**

Specifically regulate or prohibit keyhole/funnel development

It is recommended that the Zoning Ordinance specifically regulate or prohibit keyhole, or funnel, development where multiple property owners or parcels are allowed lake access on a single waterfront parcel. Keyhole practices can greatly increase the number of docks and motorized watercraft on the lake, increase runoff and pollution, and increase shoreline erosion. By limiting the number of motorized boats that are able to be docked on individual waterfront parcels, water quality can be protected by reducing the potential for fuel and chemical spills. Additionally, congestion and aesthetic issues are reduced when keyholing/funneling is prevented.

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LAKE CHARLEVOIX

Visioning and Shoreline Protection Project



EVELINE TOWNSHIP

2016 Recommendations for Shoreline Protection	Met or Exceeded Recommendations in 2016	Meets or Exceeds Recommendation as of 2022
Defined High Water Elevation/OHWM	Yes (582.35' IGLD)	Yes (582.35' IGLD)
Setback from OHWM	Yes (50')	Yes (50')
Maximum Impervious Surface Lot Coverage	No (20%)	No (20%)
Shoreline Buffer/Greenbelt Requirement	Yes (50')	Yes (50')*
Native vegetation requirement in greenbelt	Yes	Yes
Prohibition of pesticides, herbicides, and fertilizers in greenbelt	Yes	Yes
Specific prohibition of lawn in greenbelt	No	Yes
Requirement of trees and woody plants in greenbelt	Yes	Yes
Cutting/pruning of greenbelt vegetation limited	Yes	Yes
Prohibition of beach sanding	No	No
Prohibition of alternation of area between water's edge and high water elevation	No	Yes
Requires that new low-growing plantings be spaced for complete ground coverage in two years	No	Yes
Allows a single, small (200 s.f.) waterfront viewing platform in the greenbelt	Yes	Yes
Allows a single path (6' maximum width) through the greenbelt to the water	Yes	Yes
Allows for the maintenance of existing natural shoreline buffers, where they exist	Yes	Yes
Requirement of all county, state, federal permits be obtained prior to zoning being issued	No	No
Formal Planning Commission Site Plan Review for all waterfront uses	No	Partially**
Number and Use of Docks	Yes	Yes
Specific Keyhole or Funneling Standards	Yes	Yes***
Prohibition of Seawalls	No	No
Engineered Stormwater Control Systems Requirement	Yes****	Yes****

*Waivers of the waterfront greenbelt provisions may be granted within the Village Commercial Zoning District or the Village Mixed Use Zoning District.

**All alterations within the greenbelt requires a Waterfront Greenbelt Landscaping Plan approved by the Zoning Administrator on lots with less than 100 feet of water frontage or Planning Commission on lots with 100 feet or more of water frontage.

***Not applicable to any development within the Village Mixed Use District.

****All proposed development requiring site plan review must conform with Charlevoix County Drain Commission standards.

Multiple improvements for shoreline protection have been made by Eveline Township, including the prohibition of a lawn in the greenbelt area and requiring that new low-growing plants be spaced for complete ground coverage in two years, prohibiting alterations between the water's edge and the high water elevation except for certain circumstances, and incorporation of approval of the Waterfront Greenbelt Landscaping Plan.

Based upon the *Enacting Shoreline Zoning Protections around Lake Charlevoix Lake Charlevoix Watershed Recommendations*, the following amendments to the Zoning Ordinance were recommended in 2016.

Modify impervious surface coverage standards for waterfront lots

It is recommended that the Zoning Ordinance be amended to limit the maximum allowable impervious surface coverage on waterfront lots to 15%. Reducing the amount of impervious surface coverage on waterfront lots helps reduce the risk of shoreline erosion and the potential for pollutants to enter the lake through stormwater runoff.

Modify Shoreline Protection Regulations

It is recommended that the Zoning Ordinance be amended to include additional shoreline protection regulations for waterfront parcels. The addition of these regulations would further increase the effectiveness of the Greenbelt to slow runoff, reduce erosion, and protect the Lake from pollution.

Specifically, the recommended additions are:

- Prohibits lawns within the greenbelt; and
- Requires that new low-growing plantings be spaced for complete ground coverage in two years.

These recommendations have been implemented.

Prohibit the sanding of beaches

It is recommended that the Zoning Ordinance be amended to prohibit beach sanding within the greenbelt. The sanding of beaches is often futile due to natural shoreline processes and variation in water levels. Beach sanding can also be detrimental to fish species within lakes when added beach sand covers important lake bottom habitats like gravel, rock, and weed beds.

Prohibit the alteration of the area between the water's edge and the high water elevation

Jurisdiction over inland lake bottomlands between the high water elevation and the water's edge is concurrently held by both the Michigan Department of Environmental Quality, now known as the Michigan Department of Environment, Great Lakes, and Energy, and local units of government. Local zoning ordinances

can regulate activities that take place in these areas, including the alteration of the ground and the construction of structures. It is recommended that the Zoning Ordinance be amended to prohibit the alteration of the area between the defined high water elevation and the water's edge. The alteration of bottomlands between the water's edge and high water elevation can negatively impact habitat that would be underwater when lake levels are high. It can also increase the risk of shoreline erosion. These recommendations have been implemented.

Conditions for Issuance of Zoning Permits

By requiring that all necessary permits be obtained prior to the issuance of a zoning permit, jurisdictions can be sure that the requirements of all other agencies are being met by the proposed development.

Require formal Planning Commission site plan review for all waterfront uses

Requiring formal site plan review for any waterfront use gives local units of government detailed information and more precise documentation on proposed projects adjacent to the Lake. The site plan review process ensures that each of these projects is meeting the required standards of the ordinance and allows zoning staff to simply verify that development is occurring according to the approved plans. This recommendation has been partially implemented. The Planning Commission still does not review waterfront uses on lots with less than 100 feet of frontage.

Prohibit the construction of seawalls

Seawalls can cause degradation of shoreline areas on the waterside of the wall and additional erosion of adjacent shorelines on either side of the wall. It is recommended that the construction of seawalls be prohibited within the Zoning Ordinance in favor of revetments and engineered natural shorelines, except where there is no other practical alternative.

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LAKE CHARLEVOIX

Visioning and Shoreline Protection Project



HAYES TOWNSHIP

2016 Recommendations for Shoreline Protection	Met or Exceeded Recommendations in 2016	Meets or Exceeds Recommendation as of 2022
Defined High Water Elevation/OHWM	Yes (582.3' IGLD)	Yes (582.3' IGLD)
Setback from OHWM	Yes (100')	Yes (100')
Maximum Impervious Surface Lot Coverage	Yes in R-1 (15%), No in A (30%)	Yes in CR, RR-1, R-1 (15%)*
Shoreline Buffer/Greenbelt Requirement	Yes (50')	Yes (50')
Native vegetation requirement in greenbelt	Yes	Yes
Prohibition of pesticides, herbicides, and fertilizers in greenbelt	Yes	Yes
Specific prohibition of lawn in greenbelt	No	No
Requirement of trees and woody plants in greenbelt	Yes	Yes
Cutting/pruning of greenbelt vegetation limited	Yes	Yes*
Prohibition of beach sanding	No	Yes**
Prohibition of alteration of area between water's edge and high water elevation	No	No
Requires that new low-growing plantings be spaced for complete ground coverage in two years	No	No
Allows a single, small (200 s.f.) waterfront viewing platform in the greenbelt	Yes	Yes
Allows a single path (6' maximum width) through the greenbelt to the water	Yes	Yes
Allows for the maintenance of existing natural shoreline buffers, where they exist	Yes	Yes
Requirement of all county, state, federal permits be obtained prior to zoning being issued	Yes	No
Formal Planning Commission Site Plan Review for all waterfront uses	No	Partially***
Number and Use of Docks	Yes	Yes
Specific Keyhole or Funneling Standards	Yes	Yes
Prohibition of Seawalls	No	No
Engineered Stormwater Control Systems Requirement	Yes	Yes

*20% in R-2; 30% in A-1 and R-3; 50% in R-4; and 60% in C-1, C-2, and I-1.

**Except to remove dead trees or shrubs, remove invasive species, or for selective trimming of trees for a view corridor or filtered view.

***A Shoreland Protection Subcommittee of the Planning Commission reviews waterfront development proposals to provide input and recommendations to the zoning administrator and/or planning commission.



Based upon the *Enacting Shoreline Zoning Protections around Lake Charlevoix Lake Charlevoix Watershed Recommendations*, the following amendments to the Zoning Ordinance were recommended in 2016.

Modify Shoreline Protection Regulations

It is recommended that the Zoning Ordinance be amended to include additional shoreline protection regulations for waterfront parcels. Specifically, the recommended additions are:

- Specific prohibition of lawn in greenbelt; and
- Require that new low-growing plantings be spaced for complete ground coverage in two years.

The addition of these regulations would further increase the effectiveness of the Greenbelt to slow runoff, reduce erosion, and protect the Lake from pollution.

Prohibit the sanding of beaches

It is recommended that the Zoning Ordinance be amended to prohibit beach sanding within the greenbelt. The sanding of beaches is often futile due to natural shoreline processes and variation in water levels. Beach sanding can also be detrimental to fish species within lakes when added beach sand covers important lake bottom habitats like gravel, rock, and weed beds. **This recommendation has been implemented.**

Prohibit the alteration of the area between the water's edge and the high water elevation

Jurisdiction over inland lake bottomlands between the high water elevation and the water's edge is concurrently held by both the Michigan Department of Environmental Quality, now known as the Michigan Department of Environment, Great Lakes and Energy, and local units of government. Local zoning ordinances can regulate activities that take place in these areas, including the alteration of the ground and the

construction of structures. It is recommended that the Zoning Ordinance be amended to prohibit the alteration of the area between the defined high water elevation and the water's edge. The alteration of bottomlands between the water's edge and high water elevation can negatively impact habitat that would be underwater when lake levels are high. It can also increase the risk of shoreline erosion.

Require formal Planning Commission site plan review for all waterfront uses

Requiring formal site plan review for any waterfront use gives local units of government detailed information and more precise documentation on proposed projects adjacent to the Lake. The site plan review process ensures that each of these projects is meeting the required standards of the ordinance and allows zoning staff to simply verify that development is occurring according to the approved plans.

Prohibit the construction of seawalls

Seawalls can cause degradation of shoreline areas on the waterside of the wall and additional erosion of adjacent shorelines on either side of the wall. It is recommended that the construction of seawalls be prohibited within the Zoning Ordinance in favor of revetments and engineered natural shorelines, except where there is no other practical alternative.

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LAKE CHARLEVOIX

Visioning and Shoreline Protection Project



MARION TOWNSHIP

2016 Recommendations for Shoreline Protection	Met or Exceeded Recommendations in 2016	Meets or Exceeds Recommendation as of 2022
Defined High Water Elevation/OHWM	No (as established by law)	No (as established by law)
Setback from OHWM	Yes (100')	Yes (100')
Maximum Impervious Surface Lot Coverage	No	No
Shoreline Buffer/Greenbelt Requirement	Yes (50')	Yes (50')
Native vegetation requirement in greenbelt	No	No
Prohibition of pesticides, herbicides, and fertilizers in greenbelt	Yes	Yes
Specific prohibition of lawn in greenbelt	No	No
Requirement of trees and woody plants in greenbelt	No	Yes*
Cutting/pruning of greenbelt vegetation limited	No	No
Prohibition of beach sanding	No	Partially**
Prohibition of alternation of area between water's edge and high water elevation	No	No
Requires that new low-growing plantings be spaced for complete ground coverage in two years	No	No
Allows a single, small (200 s.f.) waterfront viewing platform in the greenbelt	Yes	Yes (Prohibited)
Allows a single path (6' maximum width) through the greenbelt to the water	Yes	No
Allows for the maintenance of existing natural shoreline buffers, where they exist	Yes	Yes
Requirement of all county, state, federal permits be obtained prior to zoning being issued	Yes	No***
Formal Planning Commission Site Plan Review for all waterfront uses	No	No
Number and Use of Docks	No	No
Specific Keyhole or Funneling Standards	No	No
Prohibition of Seawalls	No	No
Engineered Stormwater Control Systems Requirement	Yes****	Yes****

*Natural vegetation cover, including trees, shrubs or herbaceous plants shall be maintained on a least seventy percent (70%) of the lake or stream frontage within the greenbelt, unless a landscape plan is submitted and approved by the Planning Commission.

** No dredging or filling shall be allowed except for reasonable sanding of beaches where permitted by state or federal law.

***Permits must be obtained for fill material to be placed to create usable or buildable space to take on the Zoning District and accompanying provisions of the land abutting the fill area.

****All development requiring site plan review shall comply with the terms of the Charlevoix County Stormwater Runoff Control Ordinance.

Based upon the *Enacting Shoreline Zoning Protections around Lake Charlevoix* Lake Charlevoix Watershed Recommendations, the following amendments to the Zoning Ordinance were recommended in 2016.

Redefine High Water Elevation

It is recommended that the Zoning Ordinance be amended to define the High Water Elevation of Lake Charlevoix as 582.35' I.G.L.D. This elevation is the highest water level recorded on the lake and historical lake levels have frequently been higher than the defined Ordinary High Water Mark (OHWM). Standardizing a High Water Elevation of 582.35' helps ensure the effectiveness of shoreline buffers around the lake.

Modify impervious surface coverage standards for waterfront lots

It is recommended that the Zoning Ordinance be amended to limit the maximum allowable impervious surface coverage on waterfront lots to 15%. Reducing the amount of impervious surface coverage on waterfront lots helps reduce the risk of shoreline erosion and the potential for pollutants to enter the lake through stormwater runoff.

Modify Shoreline Protection Regulations

It is recommended that the Zoning Ordinance be amended to include additional shoreline protection regulations for waterfront parcels. Specifically, the recommended additions are:

- The specific requirement that native vegetation be planted in the Greenbelt
- The specific prohibition of lawns within the Greenbelt.
- The inclusion of a requirement that specifically requires the planting of trees and/or woody plants in the Greenbelt. This recommendation has been implemented.
- The inclusion of a requirement that new low-growing plantings within the Greenbelt be spaced for complete ground coverage in two years.

The addition of these regulations would further increase the effectiveness of the Greenbelt to slow runoff, reduce erosion, and protect the Lake from pollution.

Prohibit the sanding of beaches

It is recommended that the Zoning Ordinance be amended to prohibit beach sanding within the greenbelt. The sanding of beaches is often futile due to natural shoreline processes and variation in water levels. Beach sanding can also be detrimental to fish species within lakes when added beach sand covers important lake bottom habitats like gravel, rock, and weed beds. This recommendation has been partially implemented. Beach sanding is limited to reasonable beach sanding as permitted by the Michigan Department of Environment, Great Lakes, and Energy.

Prohibit the alteration of the area between the water's edge and the high water elevation

Jurisdiction over inland lake bottomlands between the high water elevation and the water's edge is concurrently held by both the Michigan Department of Environmental Quality, now known as the Michigan Department of Environment, Great Lakes, and Energy, and local units of government. Local zoning ordinances can regulate activities that take place in these areas, including the alteration of the ground and the construction of structures. It is recommended that the Zoning Ordinance be amended to prohibit the alteration of the area between the defined high water elevation and the water's edge. The alteration of bottomlands between the water's edge and high water elevation can negatively impact habitat that would be underwater when lake levels are high. It can also increase the risk of shoreline erosion.

Require formal Planning Commission site plan review for all waterfront uses

Requiring formal site plan review for any waterfront use gives local units of government detailed information and more precise documentation on proposed projects adjacent to the Lake. The site plan review process ensures that each of these projects is meeting the required standards of the ordinance and allows zoning staff to simply verify that development is occurring according to the approved plans.

Specifically regulate number of docks allowed

It is recommended that the Zoning Ordinance specifically regulate the number of docks allowed for each waterfront parcel to help protect water quality by limiting the opportunity for erosion and fuel and chemical pollution from increased boat dockage on the Lake.

Specifically regulate or prohibit keyhole/funnel development

It is recommended that the Zoning Ordinance specifically regulate or prohibit keyhole, or funnel, development where multiple property owners or parcels are allowed lake access on a single waterfront parcel. Keyhole practices can greatly increase the number of docks and motorized watercraft on the lake, increase runoff and pollution, and increase shoreline erosion. By limiting the number of motorized boats that are able to be docked on individual waterfront parcels, water quality can be protected by reducing the potential for fuel and chemical spills. Additionally, congestion and aesthetic issues are reduced when keyholing/funneling is prevented.

Prohibit the construction of seawalls

Seawalls can cause degradation of shoreline areas on the waterside of the wall and additional erosion of adjacent shorelines on either side of the wall. It is recommended that the construction of seawalls be prohibited within the Zoning Ordinance in favor of revetments and engineered natural shorelines, except where there is no other practical alternative.

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LAKE CHARLEVOIX

Visioning and Shoreline Protection Project



SOUTH ARM TOWNSHIP

2016 Recommendations for Shoreline Protection	Met or Exceeded Recommendations in 2016	Meets or Exceeds Recommendation as of 2022
Defined High Water Elevation/OHWM	No (As established by law)	Yes
Setback from OHWM	Yes (100')	Yes (100')
Maximum Impervious Surface Lot Coverage	No (30%)	No
Shoreline Buffer/Greenbelt Requirement	Yes (50')	Yes (50')
Native vegetation requirement in greenbelt	No	No
Prohibition of pesticides, herbicides, and fertilizers in greenbelt	No	No
Specific prohibition of lawn in greenbelt	No	No
Requirement of trees and woody plants in greenbelt	Yes	Yes
Cutting/pruning of greenbelt vegetation limited	Yes	Yes
Prohibition of beach sanding	No	No
Prohibition of alternation of area between water's edge and high water elevation	No	No
Requires that new low-growing plantings be spaced for complete ground coverage in two years	No	No
Allows a single, small (200 s.f.) waterfront viewing platform in the greenbelt	Yes	Yes (80 s.f.)
Allows a single path (6' maximum width) through the greenbelt to the water	Yes	Yes (4' maximum width)
Allows for the maintenance of existing natural shoreline buffers, where they exist	Yes	Yes
Requirement of all county, state, federal permits be obtained prior to zoning being issued	Yes	Yes
Formal Planning Commission Site Plan Review for all waterfront uses	No	No
Number and Use of Docks	Yes	Yes
Specific Keyhole or Funneling Standards	Yes	Yes
Prohibition of Seawalls	No	No
Engineered Stormwater Control Systems Requirement	Yes*	Yes*

*Stormwater retention consistent with the Charlevoix County Stormwater program required on all site for all development.

The only documented change between 2016 and 2022 has been the definition of high water elevation/ordinary high water mark. In 2016, the definition was "as established by law." Per the 2016 recommendation, the Ordinary High Water Mark is now defined on Lake Charlevoix as the legally established lake level of 582.3 feet IGLD 1985.

Based upon the *Enacting Shoreline Zoning Protections around Lake Charlevoix Lake Charlevoix Watershed Recommendations*, the following amendments to the Zoning Ordinance were recommended in 2016.

Redefine High Water Elevation

It is recommended that the Zoning Ordinance be amended to define the High Water Elevation of Lake Charlevoix as 582.35' I.G.L.D. **This recommendation has been implemented.**

Modify impervious surface coverage standards for waterfront lots

It is recommended that the Zoning Ordinance be amended to limit the maximum allowable impervious surface coverage on waterfront lots to 15%. Reducing the amount of impervious surface coverage on waterfront lots helps reduce the risk of shoreline erosion and the potential for pollutants to enter the lake through stormwater runoff.



Modify Shoreline Protection Regulations

It is recommended that the Zoning Ordinance be amended to include additional shoreline protection regulations for waterfront parcels. Specifically, the recommended additions are:

- Require native vegetation in the greenbelt zone;
- Prohibit pesticides, herbicides, and fertilizers in the greenbelt zone;
- Prohibit a lawn in the greenbelt zone;
- Require that new low-growing plantings be spaced for complete ground coverage in two years.

The addition of these regulations would further increase the effectiveness of the Greenbelt zone to slow runoff, reduce erosion, and protect the Lake from pollution.

Prohibit the sanding of beaches

It is recommended that the Zoning Ordinance be amended to prohibit beach sanding within the greenbelt. The sanding of beaches is often futile due

to natural shoreline processes and variation in water levels. Beach sanding can also be detrimental to fish species within lakes when added beach sand covers important lake bottom habitats like gravel, rock, and weed beds.

Prohibit the alteration of the area between the water's edge and the high water elevation

Jurisdiction over inland lake bottomlands between the high water elevation and the water's edge is concurrently held by both the Michigan Department of Environment, Great Lakes, and Energy and local units of government. Local zoning ordinances can regulate activities that take place in these areas, including the alteration of the ground and the construction of structures. It is recommended that the Zoning Ordinance be amended to prohibit the alteration of the area between the defined high water elevation and the water's edge. The alteration of bottomlands between the water's edge and high water elevation can negatively impact habitat that would be underwater when lake levels are high. It can also increase the risk of shoreline erosion.

Require formal Planning Commission site plan review for all waterfront uses

Requiring formal site plan review for any waterfront use gives local units of government detailed information and more precise documentation on proposed projects adjacent to the Lake. The site plan review process ensures that each of these projects is meeting the required standards of the ordinance and allows zoning staff to simply verify that development is occurring according to the approved plans.

Prohibit the construction of seawalls

Seawalls can cause degradation of shoreline areas on the waterside of the wall and additional erosion of adjacent shorelines on either side of the wall. It is recommended that the construction of seawalls be prohibited within the Zoning Ordinance in favor of revetments and engineered natural shorelines, except where there is no other practical alternative.

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BAY TOWNSHIP CONCERNS/CHALLENGES

- Enforcement
- Education
- Ordinary High-Water Mark
- Communication/Collaboration
- Uniformity in review of plans
- Variability of shorelines
- Permit application
- Solutions much be realistic
- Prioritize recommendations



RECOMMENDATIONS FOR BAY TOWNSHIP

- Fulfill 2016 Recommendations
- Finalize Waterfront Overlay Zoning District Ordinance Language
- Update Permit Application
- Develop Online Permit Application and BMPs
- Stormwater Management – need clarification

BOYNE CITY CONCERNS/CHALLENGES

- Education
- City Already Developed
- Hardened Shorelines
- Communication/Collaboration
- Stormwater/Swales
- Septic System
Management/Inspections
- City Needs to Lead By
Example





RECOMMENDATIONS FOR BOYNE CITY

- Require Formal Planning Commission Site Plan Review for All Waterfront Uses
- Ban Construction of Seawalls
- Require Greenbelts on All Public Waterfront Properties
- Require Greenbelts on Newly Developed or Renovated Properties
- Develop Stringent Greenbelt Parameters
- Pursue a County Septic Ordinance
- Install Trash Capture Technologies in Stormwater System

THE CITY OF CHARLEVOIX CONCERNS/CHALLENGES

- Enforcement
- Education
- Few Properties for Oversight
- Wealth Brings in Larger Development





RECOMMENDATIONS FOR THE CITY OF CHARLEVOIX

- Redefine Ordinary High Water Mark
- Prohibit Seawalls, Where Feasible
- Require Greenbelts on All Public Waterfront Properties
- Require Greenbelts on Newly Developed or Renovated Properties
- Develop Stringent Greenbelt Parameters
- Install Trash Capture Technologies in Stormwater System

CHARLEVOIX TOWNSHIP CONCERNS/CHALLENGES

- Education
- Enforcement/Lawsuits
- Road Ends
- Conflicting Information
- Importance of Natural Shorelines





RECOMMENDATIONS FOR CHARLEVOIX TOWNSHIP

- Fulfill 2016 Recommendations
 - Prohibit beach sanding
 - Redefine the high water elevation
 - Establish a 15% maximum for impervious surface coverage for all waterfront lots
 - Require formal Planning Commission site plan review for all waterfront uses
 - Regulate the number of docks allowed
- Regulate Septic Systems in the Short Term Rental Ordinance
- Ban Seawalls



RECOMMENDATIONS FOR THE CITY OF EAST JORDAN

- Require formal Planning Commission site plan review for all waterfront uses
- Institute a Waterfront Overlay for the Industrial District occupied by East Jordan Iron Works to ensure shoreline protections prior to development
- Require Greenbelts on All Public Waterfront Properties
- Require Greenbelts on Newly Developed or Renovated Properties
- Develop Stringent Greenbelt Parameters
- Install Trash Capture Technologies in Stormwater System

EVANGELINE TOWNSHIP CONCERNS/CHALLENGES

- Education
- Collaboration
- Enforcement
- Cohesiveness/Consistency
- Lawns to the Lake
- Ordinances Provide "Teeth"





RECOMMENDATIONS FOR EVANGELINGE TOWNSHIP

- Establish a 15% maximum impervious surface for all waterfront lots in Pinehurst District
- Regulate Greenbelts in Short-Term Rental License
- Prohibit Alteration Between OHWM and Water's Edge
- Prohibit Placement of Docks in Greenbelts/Wetlands (i.e. winter storage)
- Pursue a Pilot Project to Promote the Use of Bioengineering

EVELINE TOWNSHIP CONCERNS/CHALLENGES

- Enforcement
- Education
- OHWM
- Communication/Collaboration
- Science Doesn't Matter to Money





RECOMMENDATIONS FOR BOYNE CITY

- Require Formal Planning Commission Site Plan Review for All Waterfront Uses
- Ban Construction of Seawalls
- Require Greenbelts on All Public Waterfront Properties
- Require Greenbelts on Newly Developed or Renovated Properties
- Develop Stringent Greenbelt Parameters
- Pursue a County Septic Ordinance
- Install Trash Capture Technologies in Stormwater System

HAYES TOWNSHIP CONCERNS/CHALLENGES

- Enforcement
- Educations
- OHWM
- Communication/Collaboration
- One Size Fits All Does Not Work
- Negotiations Successful
- Science Doesn't Matter to Money

