

# Shoreline protection strategies:

Report of the Lake Charlevoix Shoreline Zoning Study Group  
South Arm Township



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# Introduction

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One of the most effective ways local communities can protect the water quality of Lake Charlevoix is to focus on the development and redevelopment of riparian properties along the shoreline and tributaries. Though upland issues can affect water quality, in the Lake Charlevoix Watershed the riparian zone is the area that has the most impact.



During early 2011 and 2012 MSU Extension conducted a mail survey of local officials in the Lake Charlevoix Watershed. The results of the surveys revealed that local elected and appointed officials strongly believed in the importance of Lake Charlevoix quality for economic development and quality of life. Local officials also indicated that they would support changes to their plan and ordinance to improve water quality.

A couple of results led the project team to think about additional ways to support local units. First, local officials varied widely in their awareness and use of planning and zoning practices to improve water quality. Second, one of the practices that respondents were least familiar with was coordinating water quality zoning provisions with neighboring communities.

To address these issues, a group of appointed and elected officials convened several times between May and September, 2012 to:

1. Review water quality science and shoreline protection strategies.
2. Review township and city master plans and zoning ordinances using the Tip of the Mitt Watershed Council Charlevoix County Local Ordinance Gaps Analysis as a guide.
3. Identify opportunities for greater coordination and consistency between ordinances.
4. Review specific possible ordinance language.
5. Produce a customized report for each participating township and city that summarized the discussion and outlines specific potential shoreline zoning ordinance changes.

This study group focused specifically on the Lake Charlevoix shoreline issues, **not those related to rivers and streams**. The recommendations of the group are intended to complement the analysis provided in the Tip of the Mitt Watershed Council Local Ordinance Gaps Analysis.

Technical and staff support from MSU Extension and the Tip of the Mitt Watershed Council was provided to the team.

### **Cities and townships – different approaches**

The focus of the recommendations is to maintain good water quality by ensuring that stormwater seeps into the ground before entering the lake, and preventing nutrients and pesticides from getting into the water. The study group recognized early on that while the principles are the same, there was no way to develop a uniform set of recommendations that applied equally to both townships and cities.

For townships, this is done primarily by vegetative means and by limiting the amount of impervious surface on shoreline properties. These solutions are non-engineered and rely on natural systems. Best practices include shoreline setbacks, limiting the amount of impervious surfaces and the maintenance or installation of greenbelt/buffer strips, and septic system regulation. These practices are both cost-effective and low maintenance methods for controlling the vast majority of potential runoff.

For cities, approaches focus on managing stormwater runoff through engineered systems. This can be achieved through both land use regulations and infrastructure improvements. There are, however, some shoreline areas within the city limits that have characteristics that are the same as parcels in the townships. Greenbelts, greater setbacks, and impervious surface requirements should be applied in these areas.

Given the differences in approaches for cities and townships, the study group recommends that leaders and staff in Boyne City, East Jordan and Charlevoix engage in a similar process to explore coordination and consistency in urban shoreline protection ordinances.

### **Zoning authority**

This report emphasizes zoning provisions upslope (toward the home) from the high water elevation. However, zoning authority extends to the water's edge and bottom lands, and is concurrent with state and federal regulations. The study group recommends that cities and townships take this into account when revising zoning strategies so that the whole shoreline area is protected.

# Recommendations

Two classes of recommendations are being made here. **Basic recommendations** are those that all communities should adopt in areas where single family waterfront residences predominate. Basic recommendations are the minimum requirements for water quality protection. Communities currently have or may set higher standards than these. **Enhanced recommendations** are those measures that communities may consider that will provide more flexibility, reduce shoreline erosion, and provide alternative methods of controlling runoff when application of the basic recommendations are not practical.



Specific ordinance language is also included for each community. This language is provided as a **starting point** for discussions, **not** an authoritative solution.

## High Water Elevation – All Areas

### Basic recommendation

All communities around Lake Charlevoix should adopt a uniform **high water elevation** of 582.35 IGLD. Great Lakes water levels can and do vary greatly, both seasonally and from year to year. In the past 50 years the water level of Lake Charlevoix has varied by over six feet. 582.35 IGLD is the highest level it has reached on Lake Charlevoix since records have been kept. Some communities around the lake have used an elevation of 581.5 IGLD, defined by the US Army Corps of Engineers as the ordinary high water mark (OHWM) for Lake Michigan/Huron. There are problems with this approach. First, the main purpose of the OHWM is to set the legal location in Lake Michigan/Huron beyond which Great Lakes riparian property owners do not own. This principle does not apply to inland lakes such as Lake Charlevoix. Here riparian property owners own the bottom land out to the center of the water body. Second, historical Lake Michigan/Huron water levels have frequently been higher than the OHWM and have been so for months at a time.

Although the 10-inch difference between the two elevations doesn't seem like much, that distance can be significant in areas with fairly flat shoreline areas. Using the lower elevation, loss of effective shoreline buffers may occur when high water levels return to the lake. Achieving consistency between governmental units on either the 582.35 IGDL or 581.5 IGDL number is advantageous for zoning administrators *and* landowners.

## Shoreline Setbacks – Single Family Residential Areas

### Basic recommendation

The ideal minimum setback width is determined primarily by slope, soils and the amount of impervious surface on the parcel. Those factors vary significantly at various locations around the lake, making it difficult to enact a single standard that will provide adequate protection for all parcels.

If a single “one-size-fits-all” standard applicable to all parcels is desired, the group recommends a minimum 100 foot setback.

### Enhanced recommendation

A more flexible approach can be applied whereby minimum setback is determined according to the specific site characteristics, or the predominant characteristics within a special shoreline zoning district.

Using this approach, the recommended minimum setback upland from the **high water elevation** for new development or redevelopment should be a minimum of 50 feet, though 100 feet would achieve greater buffering and should be considered when there are steeper slopes and/or greater impervious surface.

This recommendation, along with the minimum greenbelt/buffer strip width recommendation, is based on the USDA Natural Resources Conservation Service runoff equation which predicts the peak rate of stormwater runoff and the total volume. This equation was employed to determine the minimum building setback and green belt widths that would be necessary on a typical lot to prevent stormwater runoff from reaching the lake from a typical rainfall event. According to this equation, in order for all stormwater runoff to infiltrate into the soil before reaching the lake, the building setbacks should be a minimum of 50 feet upland from the water, and the greenbelt/buffer strip should be a minimum of 25 feet (see next section). This calculation applies on lots with:

- (a) well drained sandy loam or courser soils,
- (b) where slopes 12 percent or less predominate, and
- (c) contain 15 percent or less impervious surfaces.

Where steeper slopes, finer soil (sandy loams or loams), or poorer drainage predominate, greater setbacks and greenbelt/buffer strip widths should be required.



Certain shoreline areas in some of the townships are relatively steep. For lots where slopes greater than 12 percent predominate, a minimum 100-foot setback is recommended. This setback should be for all structures and impervious surfaces with the exception of necessary shoreline protection structures, docks, water viewing platforms, and paths and stairways accessing the lake.

## Greenbelt/Buffer Strips – Single Family Residential Areas

A 2007 study by the Tip of the Mitt Watershed Council found that that 30 percent of the parcels on Lake Charlevoix shoreline have "poor" shoreline buffers. Greenbelt requirements generally require 1) maintenance of the existing natural shoreline buffer, where it already exists, and 2) re-establishing a natural shoreline buffer where it has been altered.

### Basic recommendation

As with setback distances, the ideal greenbelt setback width is determined primarily by slope, soils, and the amount of impervious surface on the parcel. Those factors vary significantly at various locations around the lake, making it difficult to enact a single standard that will provide adequate protection for all parcels.

If a single "one-size-fits-all" standard applicable to all parcels is desired, the group recommends that a minimum 50-foot wide vegetative greenbelt extend upland from the high water elevation of the water body.

These provisions should be required for new development and redevelopment of shoreline parcels. *The Planning Commission may waive this requirement if it finds that existing vegetation is essentially equivalent to ordinance standards.*

- 1) All vegetation in the greenbelt/buffer strip should be native to this area and adapted to the specific site conditions.
- 2) All new low-growing plantings should be done at a spacing which should normally result in complete ground coverage within two years.
- 3) No lawn should be established or maintained between the greenbelt/buffer strip and the water's edge.
- 4) No structures except boat docks and shoreline protection structures should be permitted between the greenbelt/buffer strip and the water's edge.
- 5) A single waterfront viewing platform, a maximum of 120 square feet in area, (200 square feet on lots with 100-foot frontage or greater) may be allowed within the greenbelt/buffer strip.
- 6) A single path, a maximum of 6-feet wide, may be allowed through the green belt/buffer strip to provide access to the water.
- 7) Provisions allowing limited tree trimming within green belt/buffer strips for "filtered" views should be included.

**Enhanced recommendation**

Using a flexible approach, a 25-foot buffer width is a useful starting point for well-drained, gently-sloped parcels with modest impervious surface areas. Many parcels around Lake Charlevoix do not meet those criteria and require modification of the basic standards in order to provide optimal water quality protection. The minimum shoreline buffer width should be doubled in situations where the current and/or proposed impervious surface area exceeds 15 percent of the lot area within 500 feet of the high water elevation or on lots where slopes greater than 12 percent predominate on the lot within 500 feet of the high water elevation.

There is an advantage to maintaining trees in the greenbelt/buffer strip area to reduce velocity of downpours, thus allowing more infiltration. Forested areas have higher infiltration rates than non-forested areas. Trees should be scattered somewhat uniformly throughout the greenbelt/buffer strip area. The remainder of the green belt/buffer strip area (*including under trees*) should primarily consist of a dense covering of low-growing woody plants and shrubs.

**Maximum Impervious Surface Lot Coverage – Single Family Residential Areas**

Water runoff from impervious surfaces can lead to water quality problems. One common way to prevent runoff is to limit the percentage of waterfront lots covered by buildings, driveways and other surfaces that prevent water from infiltrating into the ground.

**Basic recommendation**

A standard allowing a maximum of 15 percent of the lot area of waterfront parcels within 500 feet of the high water elevation to be covered by impervious surfaces should be adopted.

**Enhanced recommendation**

Allow a maximum of 20 percent impervious surface in situations where greenbelt/buffer strip widths are doubled.

**Zoning Enforcement – Townships and Cities**

Committee members discussed at length the challenge of enforcing development standards in shoreline areas, and related many instances of site changes occurring without zoning approval, or completed in violation of zoning requirements.



**Members strongly believed that more rigorous enforcement procedures are a high priority.**

#### **Basic recommendation**

No site alterations should commence prior to issuance of all required state, federal and county permits, and a zoning permit.

#### **Enhanced recommendation**

**Formal Site Plan Review by the Planning Commission** - Planning Commissions should conduct a formal site plan review and give the approval on waterfront property development projects. (*Some minor projects may be exempted.*) An approved formal site plan provides more precise documentation on what will happen on the property. The Zoning Administrator then only has to insure that the project has been developed as per the approved site plan. It also provides the documentation if there are questions about violations in the future. This process also helps prevent misunderstandings between the community, the applicant and/or their agent(s). It sends the message that the community is serious about its ordinance standards being followed.

The Planning Commission in Evangeline Township has been conducting site plan review and approval on all waterfront development projects for a number of years. In their experience, it has both reduced misunderstandings and improved the compliance with zoning ordinance standards.

The site plan for waterfront parcels should include an accurate map of the parcel, drawn to scale. At minimum, it should show the following:

- The location of all property boundaries.
- The location of the **high water elevation**.
- Contour lines drawn at 2-foot intervals.
- The location of both existing and proposed structures, along with other impervious surfaces.
- Calculations of the percentage of existing impervious surface and proposed imperious surface lot coverage
- Details about the greenbelt/buffer strip, including a planting plan that describes the species to be planted, their locations and spacing.
- In some situations, the planning commission may require more information that it considers relevant for their review.

**Police powers ordinance directed at agents of property owners** – Zoning enforcement, by law, is directed at the property owner. With that in mind, the study group recommends that communities consider adopting a police power ordinance that subjects agents of property owners (*e.g. landscapers, contractors, etc.*) to penalties and fines if they violate waterfront zoning ordinance provisions. This would

also address those situations when a zoning permit or formal site plan review is not required for a project.

## Standards for Shoreline Protection Structures

### Basic recommendation

All county, state and federal permits must be obtained before any site alteration may commence.

### Enhanced recommendation

In situations where shoreline erosion control structures are necessary, communities should adopt standards that discourage seawalls in favor of revetments (rock rip-rap) and engineered natural shorelines. This could be accomplished by prohibiting seawalls, except when there is no other practical alternative.

## Waterfront Districts – Townships and Cities

### Basic recommendation

Given the importance of high Lake Charlevoix water quality, all waterfront areas, both in townships and cities, residential and commercial areas should include special zoning provisions in shoreline areas to protect the lake from nutrients and pollutants. In cities, standards in those areas may emphasize stormwater management and erosion control instead of setbacks and buffer strips.

### Enhanced recommendation

Establish multiple shoreline districts. Shoreline development along Lake Charlevoix is very diverse. While the basic recommendations outlined above will work in most areas where single family waterfront development predominates, there are areas even in this class where some of them are not practical. For example, in areas where pre-existing shallow lots predominate, some of the setback, greenbelt/buffer strip and maximum impervious recommendations might not be practical and may need to be modified. Stormwater runoff control practices that are more highly engineered may be needed. (*e.g. pervious paving, rain gardens, vegetated roof tops, retention basins, etc.*) In these cases, a separate waterfront district specific to these areas may be called for. The same applies to situations with multi-family, commercial and public use areas. Again, in these areas, large waterfront setbacks and wide greenbelt/buffer strips may not always be practical and more engineered stormwater control solutions may be called for.

## Septic Systems

Improperly functioning septic systems may leak nutrients into Lake Charlevoix causing excessive near-shore algae growth. This is an on-going issue, especially with older and undersized systems.

**Basic recommendations** - Zoning permits should not be issued until the district health department issues a septic system permit.

**Enhanced recommendation** - Study group members discussed the challenge of assuring that septic systems were functional and did not impact water quality. One approach used by other communities in Michigan is to adopt a police-power ordinance requiring comprehensive septic system inspection by the District Health Department when property is sold or transferred (time-of-sale). The study group recommends that townships enact a sensible, long-term strategy, including time of sale inspections, and/or periodic inspections for all systems on shoreline parcels.

## It's Not Just Zoning

Planning commissions, township and city governments may also use education as a tool to protect water quality. Many Lake Charlevoix residents have little experience with shoreline living and, consequently, develop their property or make major modifications that impact water quality.

### **Basic recommendation**

Township and city planning commissions should develop educational materials and conduct periodic training sessions to help property owners, lake association leaders/members, contractors, landscapers and realtors understand shoreline protection goals and ordinance standards in their community.

### **Enhanced recommendation**

Township and cities should work together to develop and fund education programs about shoreline protection and zoning requirements, perhaps in conjunction with the county planning commission and other organizations.

## Other Issues

**Beach sanding** – Establishing beaches in areas where beaches don't naturally exist poses a water quality risk from erosion and harm to shoreline habitats. The study group discussed this issue, but didn't come up with any specific zoning recommendations. Zoning could limit the extent that beach sanding is permitted.

Beach sanding requires Michigan Department of Environmental Quality/Army Corp of Engineers permits.

**Marina regulations** – Study group members brought up concerns about potential water quality concerns related to marinas. These issues were not discussed at length by the group, but were identified as a topic for future discussions.

## Final Thoughts

This project provided an excellent forum for elected and appointed officials to discuss common waterfront zoning issues, concerns and frustrations. It was just a beginning, though. Regulation of shoreline areas is complicated and ever-changing, with new people coming into the process all the time. An on-going forum is recommended to continue efforts toward achieving consistent, coordinated and effective waterfront zoning around Lake Charlevoix. We need to continue the conversation.

## Specific Zoning Ordinance Recommendations

In order to bring the South Arm Township Zoning Ordinance in line with the recommendations of this report, the following language additions/changes are suggested. This language is provided as a **starting point** for discussions, **not** an authoritative solution.

### Section 2.02 – DEFINITIONS

Delete Ordinary High Water Mark from the definitions section and replace it with the following: **High Water Elevation**- For Lake Charlevoix, the highest water elevation recorded on Lake Michigan/Huron at recorded by the US Army Corp of Engineers (currently 582.35' IGLD) plus one foot. On an inland lake which has had a level established by law, it means the high established level. On a river or stream, the ordinary high water mark shall be the ten-year flood limit line.

**Impervious Surfaces**-Any surface or structure incapable of or highly resistant to penetration by water including, but not limited to roofs of any type, concrete, asphalt or bituminous paving, compacted gravel or earth, flagstone or brick.

**Greenbelt** - Replace the current definition with the following language: “A strip of land on waterfront lots located upland from the **High Water Elevation** composed to a mixture of both trees and an understory of low growing woody shrubs all of which are native to the area and adapted to the specific conditions of the site.”

### **Section 3.14 – SITE PLAN REVIEW**

Amend Section 3.14 A - Circumstances Requiring Site Plan - to require Planning Commission site plan review for all waterfront parcels including one and two family residential.

Amend Section 3.14B - SITE PLAN SUBMITTAL REQUIREMENTS to include the following items for waterfront parcels:

- The location of the **High Water Elevation**.
- Contour lines drawn at 2-foot intervals.
- The location of both existing and proposed structures along with other impervious surfaces.
- Calculations of the percentage of existing impervious and proposed impervious surface lot coverage.
- Details about the Greenbelt including a planting plan that describes the species to be planted, their locations and spacing.
- Other information the planning commission may require that it considers relevant for their review.

### **Add a Section 3.23 – ESTABLISHING SHORELINE PROTECTION STRUCTURES**

In situations where shoreline protection structures are required either natural engineered or revetment (rock rip-rip) structures meeting US Army Corp of Engineers or Tip of the Mitt Watershed Council construction standards shall be allowed. Standard sheet piling or concrete seawalls are prohibited except in those situations where the Planning Commission finds that due to topographical limitations or other spatial factors no other practical alternatives exist.

### **Section 5.02 – SINGLE FAMILY GREENBELT RESIDENTIAL DISTRICT (R-2)**

Amend Section 5.02 C3 to allow a maximum of 15% impervious surface (*20% if the Greenbelt width is doubled*).

Amend Section 5.02 E1 renaming Front Setback to Waterfront Setback and replace ordinary high water mark with **High Water Elevation**.

Replace language in 5.02 H to read:

1. To enhance protection of water quality, when any of the situations listed in this subsection occur on waterfront lots or site condominium projects which do not presently have a Greenbelt meeting the requirements of this section, as a condition for development a Greenbelt shall be established and maintained as a required condition for site plan approval. The following situations shall require the establishment of a Greenbelt:

- a. The addition of new structures, or
  - b. Reconstruction of an existing structure, or;
  - c. Changing the spatial dimensions of an existing structure, or;
  - d. Enclosing portions of any building, or;
  - e. The granting of any variance.
2. The Greenbelt shall meet the following specifications:
- a. The Greenbelt shall be located upland from the High Water Elevation as defined.
  - b. The minimum depth shall be fifty (50) feet and shall extend across the full width of the waterfront portion of the lot except for a single waterfront access path a maximum of 6 feet in width. Spacing of new plantings shall be done in a manner that full coverage of the ground within the Greenbelt shall be achieved within a period of two (2) full growing seasons. *(Note: In areas where existing waterfront lots less than 200 feet in depth predominate, the Township may wish to create another Waterfront district which allows Greenbelt widths to be reduced to 25 feet. This should only be considered in areas with well drained soils, where slopes less than 12% predominate and maximum impervious surface shall not exceed 15% of upland lot area.)*
  - c. A single water front viewing platform a maximum of 120 sq. ft. in area shall be allowed per principle dwelling within the Greenbelt area.
  - d. No lawn or structures except for docks and shoreline protection structures shall be allowed between the Greenbelt and the water's edge.
  - e. No supplemental plant nutrients shall be allowed in the Greenbelt except for at the time of establishment.
- 3 The Planning Commission may waive the requirement for installation of a new Greenbelt upon a finding that exiting vegetation meets the standards of a Greenbelt.
4. Notwithstanding any other provision in this ordinance, any existing vegetation within the area of the Greenbelt strip shall be preserved whether or not the vegetation meets the specifications described above. The requirements in this subsection shall not be construed as preventing the establishment of new vegetation which better complies with the standards of this section.

### **Section 10.02- ZONING PERMITS**

Add to following language to this section:

Excluding building permits issued by the Charlevoix County Building Department, no zoning permit shall be issued until all other required local, state and federal permits have been issued.