



# Cheboygan County Local Ordinance Gaps Analysis

An essential guide for water protection

Tip of the Mitt Watershed Council  
Written and compiled by Grenetta Thomassey, Ph.D.



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## Table Of Contents

<b>SECTION I: INTRODUCTION</b>	<b>1</b>
<b>SECTION II: LITERATURE REVIEW</b>	<b>5</b>
<b>SECTION III: ANALYSIS</b>	<b>19</b>
Introduction	19
Chapter 1 Cheboygan County	21
Aloha Township	32
Beaugrand Township	33
Benton Township	33
Ellis Township	34
Forest Township	34
Grant Township	34
Hebron Township	35
Inverness Township	35
Koehler Township	35
Mackinaw Township	36
Mentor Township	36
Mullett Township	36
Munro Township	36
Nunda Township	36
Tuscarora Township	37
Walker Township	38
Waverly Township	38
Wilmot Township	38
Chapter 2 Burt Township	39
Chapter 3 City of Cheboygan	47
Chapter 4 Village of Mackinaw City	55
Chapter 5 Village of Wolverine	65
<b>SECTION IV: APPENDIX</b>	<b>73</b>
Appendix A: Document Review Evaluation Checklist	73
Appendix B: Additional Resources	93
Appendix C: Cheboygan County Map	98



**Mullett Lake**

## **SECTION I: Introduction**

# Protecting Lakes, Streams, Wetlands and Groundwater

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### **Prevent or Save?**

It is much easier to prevent degradation of a lake than to save it from the brink of ruin.

Some Michigan lakes are in trouble. People love these lakes, but failure to prevent degradation has resulted in real and difficult challenges for communities. Drinking water sources are threatened, recreational use is limited, and habitat is disappearing. These factors impact quality of water - and quality of life - and place property values at risk.

Fortunately, in Northern Michigan, most of our treasured lakes, streams, and groundwater sources are clean and plentiful. We still have wetlands to nurture these waters, drinking water is delicious and healthy, and recreational use abounds. Wildlife thrives among us, and property values are relatively solid. Because these conditions exist, more and more people want to be here. In addition to new opportunities, this also brings a new set of challenges to our area, especially for local governments. This Local Ordinance Gaps Analysis is designed to help local governments deal with the water resource-related challenges that come with this growth.

Contrary to widely-held beliefs, state and federal regulations do not adequately protect water resources and wetlands from impacts that can be prevented at the local level. For example, federal regulations mainly address discharge of fill material into wetlands, but do not protect against other significant impacts. The state of Michigan does have a statutory Wetland Protection Program in place, but it is constantly threatened with budget cuts and attempts to weaken it. Additionally, it can fail to protect local wetlands that fall outside of its scope.

Growth pressures bring a new awareness of the limitations of state and federal protections, and local governments have come to realize the need to fill in the gaps. Sensible local regulations create a certainty that protects investments, not only for homeowners but also for small business and developers of larger projects. They also allow economic growth while protecting vital water resources.

### **Purpose**

The purpose of this project is to give you, the local government official, a comprehensive picture of:

- the water resource protections now in place at the county and township levels, including your jurisdiction;
- our recommended local approaches to protect waters; and
- our suggestions to better protect your water resources.

Obviously, the “comprehensive picture” being presented here is a snapshot in time. However, every attempt has been made to give you a “living document” that should serve you for planning purposes, years into the future. Several items noted here as needing improvements may already be improved, by the time this document is published. Also, you might find an error, as this work was quite detail-oriented and it’s possible that we missed something. Nevertheless, most of this information should be timely, useful, and provide helpful guidance.

The project was done across the entire service area of Tip of the Mitt Watershed Council: Antrim, Charlevoix, Emmet, and Cheboygan Counties. Every jurisdiction in each county was included. The project is divided into four reports, and this report is for Cheboygan County.

## Critical Elements of this Project

This project was done with the underlying assumption that specific **Critical Elements** are considered vital to address, if a local government wants to create strong protections for local water resources. These **Critical Elements** are:

- Master Plan Components
- Basic Zoning Components
- Shorelines
- Impervious Surfaces and Stormwater Management
- Soil Erosion and Sediment Control
- Sewer/Septic
- Wetlands
- Groundwater and Wellhead Protection
- Other: Floodplains, Steep Slopes, and Critical Dunes

The reasons for creating this particular list are detailed in the **Literature Review** that is found in Section II. The **Literature Review** is a formal academic review, documenting the current relevant research literature for each of these items. It explains why the Critical Elements are considered important enough to include in this work.

## Project Evaluation and Analysis

An Evaluation Checklist was created to focus on the Critical Elements listed above, in accordance with the Literature Review. You will find a copy in the **Appendix**. It is important to note that the scoring system used with the Evaluation Checklist **does not** penalize a jurisdiction for missing ordinances that are not appropriate for their area, because of geographic or other circumstances. We understand that there cannot be a cookie cutter approach to water protections for any region. The cover page of the Evaluation Checklist gives you a detailed explanation of the system used to accommodate those situations.

Upon completion of a checklist section, the points were totaled and the section was ranked. The completed checklist for your jurisdiction is available upon request. The scores and rankings are included in each chapter that follows. The checklist was compared to each jurisdiction's Master Plan and any ordinances in place. The checklist question was asked. The answer was found and noted.



If the answer was “yes”, the question earned 3 points. If the answer was “yes, partially” the question earned 2 points. If the answer was “yes, minimally” the question earned 1 point. If the answer was no, the question earned 0 points and that item is considered to be missing. The score for each question was assigned and then the next question was asked, until the entire checklist was complete. Here are the Score Breakdowns for each Critical Element, and the related Ranking System:

## SCORE BREAKDOWNS

- Master Plan: 30-21=strong; 20-11=adequate; 10-0=weak
- Basic Zoning Elements: 54-37=strong; 36-19=adequate; 18-0=weak
- Shorelines: 60-41=strong; 40-21=adequate; 20-0=weak
- Impervious Surface Reduction: 33-23=strong; 22-12=adequate; 11-0=weak
- Stormwater Management: 27-19=strong; 18-10=adequate; 9-0=weak
- Soil Erosion and Sediment Control: 18-13=strong; 12-7=adequate; 6-0=weak
- Sewer/Septic: 24-17=strong; 16-9=adequate; 8-0=weak
- Wetlands: 21-15=strong; 14-8=adequate; 7-0=weak
- Groundwater and Wellhead Protection: 18-13=strong; 12-7=adequate; 6-0=weak
- Other Relevant Elements: 48-33=strong; 32-17=adequate; 16-0=weak

## RANKING SYSTEM

**STRONG** – The section of the ordinance being reviewed can be identified as more protective or better than most ordinances in the state, for reasons that can be clearly articulated. For example, the section replicates a model ordinance on the same topic, or minimum standards are exceeded.

**ADEQUATE** – The section of the ordinance being reviewed is on par with other ordinances in the state; it is at least as protective as ordinances for areas with similar water resource features.

**WEAK** – The section of the ordinance being reviewed is deemed weaker than similar ordinances in the state, for a specific reason that can be clearly articulated. For example, a model ordinance is changed by a local government to delete some protection that should have remained intact, and they use the ordinance in that less protective form.

**MISSING** – The topic is not included in the jurisdiction's ordinance.

An Analysis of the results was done when each checklist was finished, including Recommendations and Suggested Actions. Those are covered in Section III, with a Chapter devoted to each jurisdiction. Additionally, if an approved Watershed Management Plan exists for the jurisdiction, connections to plan implementation steps are also noted, where appropriate.

## Conclusion

Pressure from growth is quickly felt on surface and groundwater sources and the wetlands that guard them. If adequate protections are not put in place, our lakes and streams will degrade. Eventually, the natural resources that brought new growth and opportunity will suffer from neglect and abuse. The chain of threats to drinking water, habitat, recreation, and property values is strong and can become evident all too quickly.

At the point of degradation, we can decide to change things and try to reverse the trend. However, it is obviously much easier to think about these challenges ahead of time, and plan for prevention. Managing these threats improves our ability to protect this high quality of life, far into the future, for our grandchildren and beyond.

Prevention efforts can take some time to accomplish, which is all the more reason to evaluate where we are now, and what we should consider now to protect our water's future – which is our future, plain and simple. If we destroy our water, we destroy our health and property values.

It is our sincere hope that this project and report are helpful to you, when considering local planning and zoning decisions that can be used to protect your important water resources. Please do not hesitate to contact Tip of the Mitt Watershed Council with any questions you may have, or for additional help or information: (231) 347-1181.



*Lancaster Lake*

## SECTION II: Literature Review

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### Introduction

Michigan has abundant water resources, including more than 11,000 inland lakes (Michigan DNR, 2009) and nearly 4,000 miles of Great Lakes shoreline (Michigan DEQ, 2008a). These lakes are intricately connected to the region's rivers, wetlands, and underground aquifers. If cared for properly, Michigan's water resources can offer clean drinking water, healthy ecosystems and vital wildlife habitat, as well as provide ample opportunities for recreation and scenic views.

Because Michigan is a home rule state<sup>1</sup>, local master plans and ordinances play a crucial role in protecting environmental resources, such as water. We reviewed the water-related sections of local plans and ordinances within the Watershed Council's four-county service area. The review was based on several Critical Elements that account for the quality and reliability of local water resources:

- Master Plan Components
- Basic Zoning Components
- Shorelines
- Impervious Surfaces and Stormwater Management
- Soil Erosion and Sediment Control
- Sewer/Septic
- Wetlands
- Groundwater and Wellhead Protection
- Other: Floodplains, Steep Slopes, and Critical Dunes

The way these Critical Elements are taken into account by a local jurisdiction was evaluated by comparing recommendations about these elements to local government master plans and ordinances. An analysis was also done to include relevant comparisons to neighboring jurisdictions, compatibility with existing watershed management plans, and recommendations about the Critical Elements, including next steps.

### Literature Review

This literature review was conducted to provide a more in-depth explanation of why these specific factors are important to maintain water quality and aquatic ecosystem integrity. It also provides resources for local government entities. You will find a complete annotated list of these resources, following a brief summary of the highlights of the literature review, organized by each Critical Element.

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1 In Michigan, counties, townships, and villages meeting certain statutory requirements may become home-rule units of government. If those statutory requirements are not met, a local unit of government cannot engage in activities unless the state expressly grants authority for it to do so. By law in Michigan, all cities are home rule units (Public Sector Consultants, 2002).

## **Master Plan Components**

"A master plan is a comprehensive long range plan intended to guide growth and development of a community or region" (Antrim County Master Plan, 2008).

The Michigan Planning Enabling Act (PA33 2008) describes a master plan as: "A land use plan that consists in part of a classification and allocation of land for agriculture, residences, commerce, industry, recreation, ways and grounds, public buildings, schools, soil conservation, forests, woodlots, open space, wildlife refuges, and other uses and purposes." This Act provides for the formation of planning commissions and uniform procedures for preparing, adopting, amending, and implementing these plans. Master Plans are intended to provide a basis for a zoning ordinance within a jurisdiction, if justified, including natural resource protection or rehabilitation (Michigan Legislature 2008).

A master plan that is regularly updated provides your community with important tools. These include facts on existing conditions and trends to help understand the impact of decisions; and a description of where and what type of development is desired. It allows individuals and businesses to reliably plan for the purchase and use of property, consistent with community goals. It also promotes the wise use of resources by helping prioritize which projects to undertake while still preserving community character (Antrim County Master Plan, 2008).

## **Basic Zoning Components**

The Michigan Zoning Enabling Act (PA 110 of 2006) stipulates that a local unit of government may provide for the regulation of land development by using a zoning ordinance. It also allows the establishment of districts within its jurisdiction that regulate the use of land and structures to meet the needs of citizens for "food, fiber, energy, and other natural resources, places of residence, recreation, industry, trade, service, and other uses of land, to ensure that use of the land is situated in appropriate locations and relationships, to limit the inappropriate overcrowding of land and congestion of population, transportation systems, and other public facilities, to facilitate adequate and efficient provision for transportation systems, sewage disposal, water, energy, education, recreation, and other public service and facility requirements, and to promote public health, safety, and welfare" (Michigan Legislature, 2006). Corrective amendments to the Act (PA 12 of 2008) included clarification in Article III for transfer of powers to the planning commission and Article IV, providing for Zoning Adoption and Enforcement (Ball and Sweet, 2008).

Zoning ordinances are a very effective tool for protecting water resources. Zoning tools encourage sustainable development by using approaches that are flexible but protective. If done properly, this allows economic development of land to be done in environmentally sensitive ways. Zoning can help owners consider the unique features that present opportunities on a parcel of property, as well as avoid actions that present a challenge to water quality (Kauffman et al., revised 2005).

## **Shorelines**

### **Great Lakes:**

Development along coastal areas of the Great Lakes shoreline can have serious impacts on dunes, beaches, coastal wetlands, and the adjacent aquatic ecosystem. Coastal shorelines serve as an important interface between inland systems and the lake or ocean, both physically and biologically. For example, a review by Defeo et al. (2009) discussed the importance of coastal sandy beaches:

Physical: sand transport and storage, which protects the shoreline from permanent erosion; storm buffering; breakdown of pollutants; water filtration and purification; nutrient mineralization and recycling; aquifer recharge.

Biological: biodiversity; juvenile fish nurseries; nesting sites; prey resources for birds and terrestrial animals.

Whether Great Lakes coastal shorelines are sandy or rocky, the services and benefits of any natural shoreline can be impeded if they are overly developed or modified. Establishing a minimum setback distance can lessen

these impacts by concentrating development away from the water body and other important features (e.g. dunes, beaches). Beach grooming, a major impact that uses heavy equipment to rake and sieve the sand, creates large unvegetated areas, which can result in erosion and kill eggs, juvenile fish, turtles and shorebirds that nest in these areas (Defeo et al., 2009). Recreation is another major concern, as it can impact the behavior of species in the area. Motorized recreation, such as the use of Off Road Vehicles (ORVs), is particularly destructive due to trampling and loss of necessary dune vegetation (Defeo et al., 2009).

### **Inland Lakes and Streams:**

Shoreline development impacts lakes and streams as well as the surrounding terrestrial ecosystems. However, appropriate planning and management techniques can lessen these impacts. Techniques that benefit and protect inland lake and stream ecosystems include the use of vegetated buffer strips using native plant species, shoreline setbacks, and limits on development density and other human disturbances.

Shorelines are vital transition zones between land and water, where many important interactions occur that benefit the aquatic ecosystem, including food and nutrient exchange. These benefits are diminished when shoreline properties are developed and vegetation removed, but can be recovered by planting vegetated buffer strips using a variety of native species. Establishing a diverse vegetated buffer strip encourages a shoreline to revert to natural conditions, which improves the effectiveness of the transition zone in protecting lakes and streams from the negative impacts of adjacent land-use activity.

In the literature discussed below, authors advocate buffer strips be anywhere from 50 to 600 feet in width, depending on their intended purpose. Brooks et al. (2003) write that buffer strips have the following benefits: 1) reducing runoff velocity, which allows sediments, nutrients, and chemicals in the water to filter out before reaching the water; and 2) reducing the amount of solar radiation entering the water, creating cooler temperatures in the shoreline waters, which increases dissolved oxygen and protects sensitive aquatic life. The District of Muskoka, Ontario, Canada (2003) presented the following additional benefits of buffers: erosion protection, flood control, wildlife food and habitat, increased property value, and aesthetic value.

In terms of water quality, Woodward and Rock (1995) found that vegetated buffer strips reduce both phosphorus and total suspended solids (TSS) inputs, provided the buffer strips were constructed and maintained properly. They noted that large areas of exposed soil increased sediment loads entering the water. This point is critical. Improvements garnered by maintaining a vegetated buffer strip were the greatest at construction sites, where erosion is a major issue. A literature review by Norris (1993) concluded that three major factors affect how effective buffer strips are at improving water quality: 1) physical attributes of the buffer zone (width, vegetation type, soil type, etc.), 2) types of pollutants entering the buffer strip, and 3) proximity of buffer zone to pollution source.

Merrell, Howe and Warren (2009) studied 40 inland lakes in Vermont. They concluded that minimizing shoreline conversion to lawns and maximizing the extent of vegetated buffered shores will benefit lake ecosystems. Specifically, they found that compared to undeveloped or buffered sites, developed/unbuffered sites had less shoreline tree cover, less shading, less large and small woody structure in the shallow water zone, and less leaf litter; these sites also had less food sources, including biofilms on lakebed rocks, invertebrate exoskeletons, and aquatic plants. In a study focused on impacts of logging near small inland lakes, authors found that vegetated buffer strips prevented temperature increases in shallow waters along the shoreline (Steedman, Kushneriuk and France, 2001).

Shoreline setbacks are another tool used to lessen impacts of development on inland lakes and streams. Development directly along shorelines has been shown to have many negative effects on lakes. In a study of lakes in the Northeast United States, researchers observed that lakes with visible human activity in half or more of the shoreline area had highly disturbed shoreline habitat (Whittier et al., 2002). This point also relates to the issue of development density and keyhole funneling. Keyhole funneling allows direct access to lakes by people who do not own property on the lakeshore, thus increasing human impacts on that part of the shoreline.

In addition to protecting the lake ecosystem, lakefront property owners may benefit economically from utilizing shoreline protection techniques. A study in Minnesota found that property values increase as lake water clarity increases (Krysel, Boyer and Parson, 2003). According to Cappiella and Schueler (2001), natural shorelines are a major factor contributing to the high value of lakefront property and thus, shoreline buffers can be justified as much economically as ecologically. It therefore stands to reason that shoreline protection techniques that preserve and restore water quality and wildlife habitat are crucial for maintaining and increasing the value of shoreline properties.

### **Impervious Surface Reduction and Stormwater Management**

Stormwater is water that accumulates on land as a result of storms, and includes runoff from urbanized areas that have impervious surfaces. Impervious surfaces, such as roads, parking lots, roofs and walkways prevent infiltration, the process of water entering the soil, of stormwater. This significantly alters the quantity, quality and rate of stormwater entering surface waters. Conversely, pervious surfaces, such as unpaved ground, slow the movement of stormwater, allowing sediments, nutrients and other contaminants to infiltrate rather than flowing directly into the receiving water body. Best Management Practices (BMPs) are used to manage stormwater on site with simple, cost-effective practices by mimicking natural processes.



As water quality concerns grow, the demand for alternative surfacing materials is increasing. Today, materials such as porous asphalt are available as an alternative to traditional impervious materials. Porous asphalt has been shown to effectively remove contaminants from stormwater runoff. In a study examining runoff over porous versus non-porous (i.e., impervious) roads in Texas, scientists found that the porous asphalt removed approximately five times the amount of suspended solids (Barrett, Kearfort and Malina, 2006). Additionally, porous asphalt and comparable pavements reduce the volume of runoff from roads by allowing for infiltration (Roy and Braga, 2009).

Another option for protecting water bodies from contaminated stormwater runoff is to divert the water into treatment ponds or constructed wetlands. Under the correct conditions, appropriately constructed wetlands or detention ponds can be used for stormwater treatment. The long residence time of stormwater in treatment ponds and wetlands allows contaminants to settle out or be removed biologically through uptake by plants, thereby improving water

quality and recharging groundwater supplies. Harper et al. (1986) found that constructed wetlands removed a significant amount of heavy metals; they recommend using constructed wetlands to treat road runoff, which often contains heavy metals. A study in Massachusetts found that bioretention cells (i.e., landscaped depressions adjacent to paved surfaces) were successful at capturing runoff from parking lots, and contributed to increased water quality in a nearby lake (Roy and Braga, 2009).

Because Michigan experiences severe freezing in the winter months, it is important to note that many Low Impact Design (LID) systems have been tested for performance under winter conditions (Roseen et al., 2009). All three of the above-mentioned techniques were shown to function as well during winter months as summer months.

The traditional approach to stormwater is to design structural BMPs focused on drainage and flood control. Although effective at managing the stormwater volume, these approaches are less effective at protecting water quality. Traditional BMP design focuses on rainfall events that range from 2 to 10 inches of daily rainfall and occur at much longer return periods, ranging from 2- to 100-year storms. These standards, however, are not sufficient for the more frequent, smaller runoff event because there is too little retention time for effective pollutant treatment. The need to strike a balance between accommodating large volumes of stormwater and promoting water quality

is becoming more broadly recognized. As a result, municipalities are shifting their BMP design approach to encompass both the peak discharge hydrology and the more water quality-based small storm hydrology. One approach is to specify a treatment volume that is designed to capture the initial component of the stormwater runoff. In practice, this may be achieved by specifying a rainfall amount (e.g., the first ½-inch or 1-inch) or the capture of a stormwater runoff volume that correlates to a design storm (e.g., 6-month, 1-year, or 2-year frequency storm).

### **Soil Erosion and Sediment Control**

Sediment is a major pollutant in Michigan's surface waters. Soil erosion often results in increased sediment loads to lakes and rivers, which can adversely impact aquatic ecosystems in a number of ways. Increased turbidity from sedimentation decreases photosynthetic production (Berry, Rubinstein and Melzian, 2003). Suspended sediments interfere with ingestion and respiration of aquatic insects (Berry et al., 2003), which can decrease populations and consequently, affect the dynamics of entire food chains. Erosion and sedimentation can also introduce into the water harmful contaminants contained in soils from human activities, such as pesticides, household cleaning products, automotive fluids, or nutrients from pet waste. Although erosion is a natural process, development alters and accelerates that process by removing vegetation necessary for soil stabilization. Construction activity creates increased opportunities for erosion due to exposed soil. However, these impacts can be minimized by utilizing proper soil stabilization techniques. For example, Faucette et al. (2009) found that erosion control blankets (ECBs) successfully prevented soil erosion at construction sites; thicker blankets were more effective than thinner blankets.

Steep slopes or bluffs are especially vulnerable to erosion, particularly in areas with sandy soils, or areas subject to wave action, surface or subsurface drainage, or heavy precipitation. Reducing the volume and rate of water that reaches the bluff can help slow the erosion process; often this can be accomplished simply by preserving natural vegetation and features (e.g., rocks, driftwood, etc.) on the slope or bluff (UMN, 2008). In some cases where natural features are inadequate to slow erosion, French drains or other water diversion systems may be used (UMN, 2008) until water-absorbing vegetation can be reestablished.

### **Sewer and Septic Systems**

There are advantages and disadvantages to both public sewer systems (centralized) and septic or onsite systems (decentralized). Public sewers are necessary in heavily populated urban areas, mostly due to the amount of space septic tanks require and their low water-handling capacity (ANJEC, 2008). However, rural and sparsely populated areas have other options.

A big advantage of public sewer systems is that home and business owners are not responsible for maintenance and repair. Beyond reducing the user's burden of maintaining the system, public sewers also help protect surface waters that would otherwise potentially be polluted by individual septic systems that are not properly maintained. However, there are major drawbacks, such as the capacity of these systems to handle increasing loads of stormwater that often occur as a result of development (Minneapolis, 2009). Additionally, according to Kahn, et al. (2007), regional sewer systems in rural areas encourage loss of open space.

Public sewer systems can be either "combined" or "separate". Combined systems send both stormwater runoff and wastewater to treatment plants. Separate systems send only wastewater to treatment plants; stormwater may or may not be handled separately. In combined systems, large volumes of water from major storm events can exceed the capacity of treatment plants, resulting in untreated sewage and wastewater being discharged directly into nearby water bodies, as well as sewage backing up into homes. Obviously, this can have detrimental impacts on both humans and the environment. One activity in particular that places added stress on combined systems is the use of downspouts that direct rainwater from households or commercial areas straight into sewer systems (Minneapolis, 2009).

According to the USEPA (2009), septic tanks serve almost 25% of U.S. households. Cappiella and Schueler (2001) point out that septic systems commonly serve households along inland lakeshores due to the difficulty and distance involved with hooking up to public sewer systems. It can be costly to extend sewer lines from existing systems, or to build new public sewers where none currently exist. One advantage of septic systems is their ability to provide wastewater treatment where public sewer systems cannot. Additional advantages include 1) they are less expensive to homeowners over the long-term; 2) installation and maintenance is less disruptive to the environment; 3) they help replenish ground water resources; and 4) they provide simple, yet effective treatment of wastewater (NESC, 2004). They also mimic the natural water cycle, according to ANJEC (2008).

If septic systems are not properly maintained or are overloaded with more water than they are designed to accommodate, they can fail and release untreated sewage into the environment (USEPA, 2003). Because of this risk, and the liability that falls on the home or business owner, it is important that septic systems be thoroughly inspected before a transfer of property transaction is completed. This will ensure that the new owner has an adequately functioning septic system at the time of transfer, thereby minimizing the risk of liability for environmental contamination and public health threats resulting from a malfunctioning system. A legal phrase used for this process is “point of transfer inspection”. Provisions can be added to local ordinances to accommodate property sales in winter months, when inspections are not feasible. In addition to protecting property owners, “point of transfer inspection” ordinances also reduce pollution to lakes and other water sources by finding those systems that need repair or replacement. This practice, along with others discussed below, can help ensure septic systems do not contaminate precious water resources.

Standley et al. (2008) found that surface waters were more contaminated in residential areas containing many septic systems, particularly with pharmaceuticals and hormones. In a study on septic tanks in Florida, Arnade (1999) found a strong relationship between the distance of septic tanks from wells and the amount of fecal coliform bacteria, phosphorus, and nitrates found in the wells. She found the relationship to be even stronger during rainy months, when the water table rises and soils become saturated. For this reason, many local governments require minimum setback distances for septic tanks. These setbacks can be described as either “horizontal” or “vertical”. Horizontal separation distance refers to the distance a tank must be from drinking wells, lakes, rivers, and houses, in order to protect environmental and human health. Vertical separation distance refers to the distance a tank must be from the water table, in order to provide enough space for contaminants to be removed and allow for aerobic digestion of nutrients (NESC, 2008). With proper setbacks, design, maintenance and sludge removal, septic systems will only discharge treated water (e.g., clean and not harmful) into the surrounding environment.

## **Wetlands**

Wetlands are unique, diverse, and sensitive ecosystems. They provide important habitat for wildlife (particularly migratory birds), naturally filter surface water, and recharge groundwater supplies. Wetlands also store large quantities of water, which dampens the effects of major flood events. One acre of wetlands can store up to 1.5 million gallons of flood-derived water (Ardizzone and Wyckoff, 2003). Additional valuable functions provided by wetlands include: erosion reduction, shoreline stabilization, and scenic opportunities (Gordon, 1992). As they are difficult to re-create once destroyed, preserving and protecting wetlands today is the best option to ensure their benefits continue well into the future.

Wetlands in Michigan are found both inland and in coastal areas of the Great Lakes. Unfortunately, most coastal wetlands that once existed in the Great Lakes region have been drained or filled for development. As the ecological and water quality benefits of coastal wetlands become more readily acknowledged, more coastal wetland restoration projects are being implemented in the Great Lakes Basin (Mitsch and Wang, 2000). In fact, studies show that coastal wetland restoration can be a powerful tool for reducing nonpoint source pollution. Mitsch and Wang (2000) assessed the effectiveness of coastal wetland restoration in improving both water quality and wildlife habitat. They concluded that restoration is most effective when strategically located in areas receiving heavy nonpoint source pollution inputs with potential for productive habitat.

As with lakes, buffers and setbacks can be useful tools for wetland protection. However, Ludwa (1994) found that buffers and other mitigation measures only protected wetlands when land-use impacts were minimized

throughout the watershed. Wetlands in watersheds that had less impervious surface cover and more forest cover had better resistance to impacts than those in more vulnerable areas with more impervious surfaces.

However, even with buffers and setbacks, activities adjacent to sensitive wetlands can still degrade the quality of wetlands (Gordon, 1992). To reduce these impacts, a basin-wide approach to wetland protection can be adopted. Local regulations are extremely important when it comes to wetlands. Federal and state legislation offer some protection, but those laws only provide minimum standards for a larger geographical area, and local ordinances can improve them to match local conditions. To complement local wetland regulations, strategies such as preservation programs, restoration programs and public education can also be implemented (Gordon, 1992). Ensuring that existing wetlands are functioning and healthy will improve and protect the water quality of all related surface waters.

## **Groundwater**

Groundwater is a major source of freshwater, contributing about half of the total water consumed by humans for drinking, agriculture, and other purposes (New Jersey Geological Survey, 2009). In addition, depending on water table depth, groundwater may serve as a significant source of water to lakes, rivers and wetlands (Brooks et al., 2003). Groundwater protection, which includes consideration of both quantity and quality, is therefore crucial.

When groundwater resources are consumed using pumping and extraction, natural processes replenish them; this is known as “groundwater recharge” and typically occurs through precipitation, infiltration and percolation (South Brunswick ERI, 2007). The capacity for groundwater recharge in any given area depends on climate, soils, vegetation and land-use patterns (Charles et al., 1993). The relationship among soils, vegetation and land-use must be considered. In order to ensure ample groundwater recharge, areas that offer the highest potential for recharge (referred to as “groundwater recharge areas”) should be protected. Protection involves 1) identifying groundwater recharge areas, then 2) limiting development and other activities that impede infiltration or negatively impact water quality in those areas.

Some areas in Northern Michigan have municipal well fields. Recharge areas for those well fields are known as “wellheads” and they should be identified and protected. Wellhead Protection Plans identify contaminant sources and provide recommendations to prevent contamination. In other areas, groundwater recharge areas must be identified; various techniques, including mapping, can accomplish this. By combining local land-use/land-cover maps with local soil maps, approximate groundwater recharge areas for counties or municipalities can be determined (Charles et al., 1993). Today, GIS technology and digital maps are readily available to expedite this process.

Once groundwater recharge areas are identified, protection measures can be implemented to ensure their proper function. These include regulating development that increases impervious surface area, which can alter or obstruct groundwater recharge. If recharge rates are reduced, groundwater extraction can become unsustainable (Fayette County, 2000). The quality of groundwater can be compromised by various activities, such as storage and the subsequent leaking or spilling of hazardous materials, and the use of floor drains at commercial sites (Michigan DEQ, 2008b). According to the DEQ (2008b), even small traces of contaminants discharging into the ground can have enormous effects on groundwater quality. This is because contaminants will both accumulate in the soil and spread quickly once reaching the water source. Proper storage of hazardous materials to mitigate these effects includes appropriate site selection and leak-proof containers. Furthermore, underground storage tanks for fuel and other substances pose a risk to groundwater and should be identified, evaluated, monitored and repaired or removed as necessary.

Abandoned wells can also threaten groundwater quality (Michigan DEQ, 2007). Because wells connect the Earth’s surface with underground aquifers, the potential for harmful contaminants to enter groundwater resources exists. Plugging, or closing off, wells that are no longer in use can thereby reduce threats to groundwater quality.

## Works Cited - Annotated

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This chapter summarizes the focus, elements and considerations in developing the Antrim County Master Plan.

*Association of New Jersey Environmental Commissions. 2008. Clean Water, Sewers, Septics and Sprawl.* Retrieved from: [http://www.anjec.org/pdfs/Sewers\\_Web\\_Reader.pdf](http://www.anjec.org/pdfs/Sewers_Web_Reader.pdf)

This article stresses the importance of local wastewater management plans, and discusses the benefits and drawbacks of converting from septic systems to centralized sewer systems.

*Ardizzone K.A. and Wyckoff M.A., FAICP. Filling the Gaps: Environmental Protection Options for Local Governments, Michigan DEQ, Coastal Management Program with financial assistance from NOAA, authorized by the Coastal Zone Management Act of 1972. June, 2003.*

Addressing environmental protection at the county and city levels, this book pays special attention to water resources such as lakes, rivers, and wetlands. It discusses qualities, threats, and protection options.

*Arnade J.A. 1999. Seasonal correlation of well contamination and septic tank distance. Ground Water: 37(6): 920-923.*

This study examined the influence of seasonal precipitation on the relationship between well contamination from septic tanks, and the distance of the tanks. During the rainy months, the wells had higher concentrations of phosphorus, nitrates and fecal coliform.

*Ball, J. and Sweet, L. 2008. Summary of Changes to the Michigan Zoning Enabling Act (PA 110 of 2006) Made by PA 12 of 2008. Planning and Zoning News 26 (5): 6-7.*

This article summarizes changes to PA 110 of 2006 by the Michigan Legislature for each section amended including a brief explanation.

*Barrett M.E., Kearfott P., and Malina J.F. 2006. Stormwater quality benefits of a porous friction course and its effect on pollutant removal by roadside shoulders. Water Environment Research 78(11): 2177-2185.*

Stormwater study that examined the impact of porous friction courses (PFCs) on the quality of stormwater runoff from highways in Austin Texas, and additionally assessed the impact vegetative shoulder strips have on pollutant removal when used in conjunction with PFCs. The PFCs left very little (on average around 20 mg/L) total suspended solids (TSS) in the stormwater runoff, while the traditional asphalt left significantly more (on average over 100 mg/L).

*Berry W., Rubinstein N. and Melzian B. 2003. The biological effects of suspended and bedded sediment (SABS) in aquatic systems: a review. United States Environmental Protection Agency Internal Report.* Retrieved from: <http://www.epa.gov/waterscience/criteria/sediment/pdf/appendix1.pdf>

Published by the EPA, this report summarizes relevant literature pertaining to the impacts increased sediment loads have on lakes and rivers. Separate discussions are included for plants, invertebrates, fish, coral, etc.

*Brooks K.N., Ffolliott P.F., Gregersen H.M., and DeBano L.F. Hydrology and the Management of Watersheds. Iowa 2003: Iowa State Press, pp. 334-337.*

A textbook in which the authors draw upon various scientific studies to discuss watershed processes and recommend management practices for lakes, rivers, and other hydrologic systems.

*Cappiella K. and Schueler T. 2001. Crafting a lake protection ordinance. Urban Lake Management 3(4): 751-768.*

This article outlines the major necessary elements for ordinances to protect lakes in developed areas. It includes descriptions of protection measures from the lakeshore to the entire watershed.

Charles E.G., Behroozi C., Schooley J., and Hoffman J.L. 1993. *A method for evaluating ground-water recharge areas in New Jersey*. New Jersey Geological Survey Report (GSR) 32.

Published to assist municipalities with identifying groundwater recharge areas and ranking them by importance, this report provides detailed methods of such, along with example maps and tables.

Defeo O., McLachlin A., Schoemann D.S., Schlacher T.A., Dugan J., Jones A., Lastra M., and Scapini F. 2009. *Threats to sandy beach ecosystems: a review*. *Estuarine, Coastal and Shelf Science* 81: 1-12.

This is a literature review, discussing the importance of coastal beaches, and activities that have great impacts on them. Surface and sub-surface physical and biological processes are addressed.

Faucette L.B., Scholl B., Beighley R.E., and Governo J. 2009. *Large-scale performance and design for construction activity erosion control best management practices*. *Journal of Environmental Quality* 38(3): 1248-1254.

This study examined the effectiveness of various impact-mitigation techniques at construction sites. Thick erosion control blankets (ECBs) over large areas significantly delayed riling and disturbance.

Fayette County, Georgia. *Groundwater Recharge Area Protection Ordinance (June 22, 2000 Ord. 2000-13)*. Retrieved from: <http://www.fayettecountyga.gov/engineering/pdf/Art11GroundwaterRechargeAreaProtectionOrdinance.pdf>

This is an example of an ordinance to protect groundwater recharge areas from various pollution sources.

Gordon D.G. Ed. *Designing Wetland Preservation Programs for Local Governments: A Guide to Non-Regulatory Protection*. Washington State Department of Ecology, March 1992.

This is a manual discussing the importance of creating — as well as guidelines for designing — wetland preservation programs in order to meet federal, state and local goals of “no net loss”.

Harper H.H., Wanielista M.P., Baker D.M., Fries B.M., and Livingston E.H. 1986. *Treatment efficiencies for residential stormwater runoff in a hardwood wetland*. *Lake and Reservoir Management* 2(1): 351-356.

How effective wetlands are at removing heavy metals and nutrients? The results of this study suggest that wetlands are very effective at removing heavy metals, but not as effective at removing nutrients. The authors recommend wetlands be used to filter stormwater off of systems such as highways, where heavy metals are of a greater concern than nutrient pollution.

Kahn L., Hulls J., and Aschwanden P. *The Septic System Owner's Manual*. Bolinas, California 2007: Shelter Publications, Inc., p. 127

More than 28 million households have septic systems, but few homeowners know how they operate or how to maintain them. This illustrated guide addresses that need. It emphasizes conventional septic systems powered by gravity flow, filtering through soil, and the natural soil organisms that purify sewage. It also discusses maintenance, what to do if things go wrong, and alternative systems such as mounds and sand filters.

Kauffman Gerald J., Wozniak Sara L., Vonck Kevin J. March 2004, revised May 2005. *Source Water Protection Guidance Manual for the Local Governments of Delaware*. Retrieved from: [http://www.wr.udel.edu/swaphome\\_old/phase2/SWPguidancemanual.html](http://www.wr.udel.edu/swaphome_old/phase2/SWPguidancemanual.html)

The State of Delaware Source Water Protection Law of 2001 requires local governments with year-round populations of 2,000 or more to implement protections for the quality and quantity of public water supplies by 2007. The purpose of this manual was to provide local governments with measures meant to comply with the legislation, and encourage smaller jurisdictions protect their sources of public drinking water.

Krysel, C, Boyer E.M., Parson, C, and Welle, P. 2003. *Lakeshore Property Values and Water Quality. Evidence from Property Sales in Mississippi Headwater Region*. Submitted to the Legislative Commission on Minnesota Resources. Retrieved from: [http://www.friendscvsf.org/bsu\\_study.pdf](http://www.friendscvsf.org/bsu_study.pdf)

From the Forward to this report: “For the first time, this study defines the dollar value of water quality to the northern Minnesota economy. The State of Minnesota consists of a well-educated population,

aware of the value of the State's most valuable resource, clean water. In today's political/budgetary climate, support of the environment that maintains water quality has been viewed as frivolous, anti-business, or an unnecessary expense. Through objective scientific method and hedonic modeling, this study attaches tremendous economic value to investing in a clean environment."

Ludwa K.A. 1994. *Wetland water quality impacts in developing watersheds: empirical models and biological indicators*. *Lake and Reservoir Management* 9(1): 75-79.

This study examined how deforestation and urban development can impact wetland systems, and how to best mitigate those impacts. Watershed-wide measures were found to be most effective.

Merrell K., Howe E.A., and Warren S. 2009. *Examining shorelines, littorally*. *Lake Line* 29(1): 8-13.

40 natural lakes in Vermont were examined in this study, observing differences between undeveloped or buffered sites, and developed/unbuffered sites. Many physical and biological differences were found.

Michigan Department of Environmental Quality. 2007. *Plugging abandoned wells*. *Groundwater Protection Fact Sheet 1*.

This fact sheet discusses how to identify abandoned wells and how to close them off. It also outlines the hazards associated with abandoned wells.

Michigan Department of Environmental Quality. 2008(a). *Michigan Great Lakes plan: our path to protect and restore Michigan's natural treasures*. Retrieved from: [http://www.michigan.gov/documents/deq/Draft\\_MI\\_Great\\_Lakes\\_Plan\\_251564\\_7.pdf](http://www.michigan.gov/documents/deq/Draft_MI_Great_Lakes_Plan_251564_7.pdf)

This is a manual of strategies for restoration and increased protection in the state of Michigan, aligned with the 2005 Great Lakes Regional Collaborative "Strategy to Restore and Protect the Great Lakes." It also contains background information on Michigan's natural areas.

Michigan Department of Environmental Quality. 2008(b). *Pollution prevention at small commercial and industrial facilities*. *Groundwater Protection Fact Sheet 2*.

This fact sheet contains a list of commercial and industrial activities potentially hazardous to ground water. It also contains a section on floor drains.

Michigan Department of Natural Resources. 2009. *Michigan's Waters*.

Retrieved from: [http://www.michigan.gov/dnr/0,1607,7-153-30301\\_31431---,00.html](http://www.michigan.gov/dnr/0,1607,7-153-30301_31431---,00.html).

Description and maps for Michigan's waters.

Michigan Legislature. 2006 PA 110. *Michigan Zoning Enabling Act, Article II. Zoning Authorization and Initiation, Section 125.3201 (1)*. Retrieved from: [http://www.legislature.mi.gov/\(S\(taxk4345o1gumu550g1u2zfc\)\)/mileg.aspx?page=getObject&objectName=mcl-125-3201](http://www.legislature.mi.gov/(S(taxk4345o1gumu550g1u2zfc))/mileg.aspx?page=getObject&objectName=mcl-125-3201)

"AN ACT to codify the laws regarding local units of government regulating the development and use of land; to provide for the adoption of zoning ordinances; to provide for the establishment in counties, townships, cities, and villages of zoning districts; to prescribe the powers and duties of certain officials; to provide for the assessment and collection of fees; to authorize the issuance of bonds and notes; to prescribe penalties and provide remedies; and to repeal acts and parts of acts."

Michigan Legislature. 2008 PA 33. *Michigan Planning Enabling Act, Article II. Planning Commission Creation and Administration, Section 125.3811 and Article III. Preparation and adoption of Master Plan, 125.3833 Parts (2)(a),(c),(d)*. Retrieved from: [http://www.legislature.mi.gov/\(S\(xupi1mesibiknsmtetqka5g55\)\)/mileg.aspx?page=GetObject&objectname=mcl-act-33-of-2008](http://www.legislature.mi.gov/(S(xupi1mesibiknsmtetqka5g55))/mileg.aspx?page=GetObject&objectname=mcl-act-33-of-2008)

"AN ACT to codify the laws regarding and to provide for county, township, city, and village planning; to provide for the creation, organization, powers, and duties of local planning commissions; to provide for the powers and duties of certain state and local governmental officers and agencies; to provide for the regulation and subdivision of land; and to repeal acts and parts of acts."

Minneapolis, City of. 2009. *History of Stormwater and Wastewater Drainage Systems in Minneapolis*.

Retrieved from: <http://www.ci.minneapolis.mn.us/stormwater/overview/construction-history.asp>

This site discussed both combined and separate sewer systems, mainly stressing the advantages of converting to separate systems.

Mitsch, W.J. and N. Wang. 2000. *Large-scale coastal wetland restoration on the Laurentian Great Lakes: Determining the potential for water quality improvement. Ecological Engineering 15: 267-282*

FROM THE ABSTRACT: Coastal wetlands around the Great Lakes are rarely restored for water quality enhancement of the Great Lakes, despite the need for minimizing phosphorus and other pollutant inputs to the lakes. A simulation model, developed and validated for a series of created experimental marshes in northeastern Illinois, was aggregated and simplified to estimate the nutrient retention capacity of hypothetical large-scale coastal wetland restoration in Michigan and Ohio. A wetland distribution model developed for a Saginaw Bay site illustrated a technique for identifying sites that have high potential for being transition zones between open water and upland and thus logical locations for wetland restoration.

Mortsch, L., M. Alden and J. Scheraga. August 2003. *Climate change and water quality in the Great Lakes Region – Risks, Opportunities and Responses. Retrieved from:*

[http://www.ijc.org/rell/pdf/climate\\_change\\_2003\\_part3.pdf](http://www.ijc.org/rell/pdf/climate_change_2003_part3.pdf)

This report was prepared for the International Joint Commission (IJC). Recognizing that Climate Change was an emerging issue that required a survey of potential impacts and the ability to adapt, the IJC Great Lakes Water Quality Board commissioned this white paper to explore implications of a changing climate on the Great Lakes watershed. It addresses four broad questions: 1) What are the Great Lakes water quality issues associated with climate change? 2) What are the potential impacts of climate change on the “beneficial uses” in the Great Lakes Water Quality Agreement? 3) How might these impacts vary across the Great Lakes? and 4) What are the implications for decision-making?

Muskoka, District of, Planning and Economic Development Department. 2003. *Shoreline vegetative buffers. Retrieved: <http://muskoka.fileprosite.com/Documents/DocumentList.aspx?ID=4844>*

This publication defines vegetated buffer strips and discusses the various benefits of using them to protect water quality. Authors recommend different widths for buffers based on intended use and benefit (e.g. water quality versus mammal habitat).

National Environmental Service Center. 2004. *Septic systems—a practical alternative for small communities. Pipeline 15(3): 1-8.*

This article discusses septic systems, providing an insightful list of “pros” and “cons” for using septic systems versus sewer systems.

National Environmental Service Center. 2008. *Ground water Protection and Your Septic System. Retrieved from: [http://www.nesc.wvu.edu/pdf/ww/septic/septic\\_tank3.pdf](http://www.nesc.wvu.edu/pdf/ww/septic/septic_tank3.pdf)*

This document discusses the connection between groundwater and septic tanks. Included is a description of both “horizontal” and “vertical” separation distances.

New Jersey Geological Survey. 2009. *Aquifer Recharge Mapping. Retrieved from: <http://www.state.nj.us/dep/njgs/enviroed/aqfrchrg.htm>*

This website describes the process of aquifer recharge, and presents an example of creating a map highlighting recharge areas.

Norris V. 1993. *The use of buffer zones to protect water quality: a review. Water Resources Management 7: 257-272.*

This literature review assesses how effective buffer strips are at filtering out harmful inputs due to land-use practices. The author concluded that their effectiveness can be attributed to three major factors: 1) physical attributes of the buffer zone (width, vegetation type, soil type, etc.), 2) types of pollutants entering buffer strip, and 3) proximity of buffer zone to pollution source.

*Public Sector Consultants. 2002. Michigan in Brief: 2002–03. Retrieved from:*

*<http://www.michiganinbrief.org/edition07/Chapter5/LocalGov.htm>*

Michigan in Brief: 2002–03, prepared and published by Public Sector Consultants, Inc., provides information about Michigan and more than 40 public policy topics of concern to residents and elected representatives. Each policy topic is presented in four parts: a glossary; background information; discussion of policy options, including a balanced, nonpartisan presentation of various viewpoints; and sources of additional information, including telephone and FAX numbers as well as Web sites where available.

*Roseen R.M., Ballesterio T.P., Houle J.J., Avalleneda P., Briggs J., Fowler G., and Wildey R. 2009. Seasonal performance variations for storm-water management systems in cold climate conditions.*

*Journal of Environmental Engineering 135(3): 128-137.*

Research shows that winter freezing does not inhibit the performance of certain low-impact design (LID) systems for storm-water management. Contaminant removal was not impeded by the freezing. Design systems that were tested included: bioretention systems, surface sand filter, subsurface gravel wetland, street tree, and porous asphalt.

*Roy S.P. and Braga A.M. 2009. Saving Silver Lake. Civil Engineering 79(2): 72-29.*

This article presented the findings of a study in Massachusetts, involving improving lake water quality. Techniques used included LIDs, such as porous pavement, bioretention cells, rain gardens, and vegetated swales.

*Severson J.P., Nawrot J.R. and Eichholz M.W. 2009. Shoreline stabilization using riprap breakwaters on a Midwestern reservoir. Lake and Reservoir Management 25(2): 208-216.*

This study explored an off-shore erosion mitigation technique that reduced wave height. The study areas that used breakwaters showed higher densities of shoreline vegetation than the control areas.

*Standley L.J., Rudel R.A., Swartz C.H., Attfield K.R., Christian J., Erikson M., and Brody J.G. 2008. Wastewater-contaminated ground water as a source of endogenous hormones and pharmaceuticals to surface water ecosystems. Environmental Toxicology and Chemistry 27(12): 2457-2468.*

This study examined the potential impacts of increased residential development—and resulting increase in septic systems—on the amount and concentrations of prescription pills and hormones in surface ponds. Authors found the level of development to be an indicator of pollution levels.

*Steedman R.J., Kushneriuk R.S., and France R.L. 2001. Littoral water temperature to experimental shoreline logging around small boreal forest lakes. Canadian Journal of Fisheries and Aquatic Sciences 58: 1638-1647.*

The effects of various logging practices on lake temperatures were examined in this study. The authors found that control and buffered areas did not experience the temperature increases (15%) that clear cut areas experienced.

*Township of South Brunswick Environmental Resource Inventory of 2007. "Ground water Recharge Areas." Retrieved from: <http://www.sbtnj.net/vertical/Sites/%7B9E5944A6-A9C2-418C-9E3F-EB23EB627DB9%7D/uploads/%7B10BD2265-5249-4D2D-8CD8-2F3B574EA6EB%7D.PDF>*

South Brunswick, NJ compiled this Environmental Resource Inventory (ERI) to describe the state of various environmental resources in the community. It is a compilation of text and maps the community can use to evaluate, and possibly revise, planning documents, policy initiatives, and local ordinances.

*University of Minnesota. 2008. Stabilizing your shoreline to prevent erosion: shoreland best management practices. Retrieved from: <http://www.extension.umn.edu/distribution/naturalresources/components/DD6946g.html>.*

This is part 7 of an 18-document series on protecting water resources in Minnesota. The focus is on best management practices to reduce harmful consequences of increased shoreline erosion.

U.S. Environmental Protection Agency. 2003. *A Homeowners Guide to Septic Systems*. Retrieved from: [http://www.epa.gov/owm/septic/pubs/homeowner\\_guide\\_long.pdf](http://www.epa.gov/owm/septic/pubs/homeowner_guide_long.pdf)

Intended as a guide for homeowners, this document provides information on installation, operation and maintenance of onsite septic systems, as well as substances and activities that can result in septic failure.

USEPA. 2009. *Septic (Onsite) Systems*. Retrieved from: <http://cfpub.epa.gov/owm/septic/index.cfm>

This site provides information on individual and community septic systems, including links to case studies and data on U.S. septic system use, management, and preventative measures against pollution.

Whittier T.R., Paulsen S.G., Larsen D.P., Peterson S.A., Herlihy A.T., and Kauffman P.R. 2002. *Indicators of ecological stress and their extent in the population of Northeastern lakes: a regional scale assessment*. *Bioscience* 52(3): 235-247.

Authors assessed the results of a study conducted by the EPA and USFWS in the early 1990's, which examined 345 lakes in the northeast U.S. to determine how much of an impact various stressors have on lake ecosystems. Lakes with visible human activity in half of the shoreline area or more had highly disturbed shoreline habitat.

Woodward S.E. and Rock C.A. 1995. *Control of residential stormwater by natural buffer strips*. *Lake and Reservoir Management* 11(1): 37-45.

This study examined the effectiveness of natural buffer strips at removing pollutants such as Phosphorus (P) and TSS from residential runoff. All sites from the study showed 50 ft buffer strips to bring P levels within average control values; the authors recommend that this minimum width be implemented for single family homes. This width may need to be doubled for more impacting activities and greater slope locations. Exposed soil in buffer strips may actually increase sediment loads, though.





*Indian River*

## **SECTION III: Analysis**

### Introduction

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#### No matter where you are, you are in a watershed.

In a watershed, melting snow and rainfall create flowing water over the landscape. This flowing water eventually drains into surface water bodies, groundwater recharge areas, and wetlands. This flow is also absorbed into the ground along the way, as it moves to the drainage destination. How this water flows and where it drains creates the boundaries of our watershed. In Cheboygan, drainage destinations include lakes, streams, wetlands, and groundwater – all familiar and important characteristics in our landscape. They provide us with numerous recreational uses, making significant and meaningful contributions to our local economies. And, the aesthetic character of these waters is also a source of immense value to local residential and business property owners.

Treated and untreated wastewater and stormwater flow directly into these valuable waters. If ignored, the waters will degrade, which is unfortunate because these same waters also provide habitat for numerous plants, animals, and birds. This illustrates an historic clash that can create a source of tension among various users of water and wetlands.

When land use in a watershed is changed, the flow it contributes to water bodies and wetlands is impacted by those changes. For example, when farmland is converted for housing, business, and entertainment uses, there is an increase in impervious surfaces – places where rain drops and snow melt cannot permeate the ground. The flow is then affected by these hard surfaces, such as rooftops and parking lots, creating what is known as nonpoint source water pollution. The flow collects oil, pollutants, salt, grit, etc., as it moves and eventually dumps into drainage areas – our beloved lakes, rivers, wetlands, and groundwater recharge regions. Hard ground can also impact the amount and velocity of runoff water. Not surprisingly, this can lead to other undesirable conditions, such as increased flooding, erosion, and loss of habitats, in addition to decreased water quality.

This project is intended to help you protect the watershed that encompasses your jurisdiction, and work with watershed partners who do so. The following Chapters summarize results of this project for Cheboygan County. It begins with a chapter devoted to the County itself, and is followed by separate chapters devoted to each city, township, or village in the County.



*Black River*

## **SECTION III: Analysis**

### **Chapter 1 Cheboygan County**

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#### **Introduction**

The slogan for the Cheboygan Area Chamber of Commerce and Visitors Bureau is “Cheboygan: Gateway to the Waterways” – and what a fitting description for the County, the City, and the region ([www.cheboygan.com](http://www.cheboygan.com)). Breathtaking water resources dot the landscape of this large, beautiful County in Northern Michigan, which includes a border along the magnificent Lake Huron coastline. From that Great Lake you can access the famous Inland Waterway, a trip that takes you over 40 miles of lakes and streams in Cheboygan County. The Chamber description of the Inland Waterway is also a perfect sampling of County water resources: “Put simply, it is a trip through three rivers and three lakes that takes the boater on an inland journey of fresh, pure and clean water, gorgeous scenery, and majestic wildlife. While many homes dot the route, so too do wetlands, swamps, and many areas of undisturbed beauty...Starting in Cheboygan, the route begins by going up the beautiful Cheboygan River and into chilly Mullett Lake. From here, venture into the serene beauty of Indian River and into Burt Lake. Next, enter the aptly named Crooked River and into Crooked Lake.” ([www.cheboygan.com/visitors/inlandwaterway](http://www.cheboygan.com/visitors/inlandwaterway))

In addition to the Inland Waterway, Cheboygan County is home to other fantastic rivers and lakes. These include the Sturgeon River, which winds its way through the Village of Wolverine and eventually spills into Burt Lake. The Pigeon River makes its way into Mullett Lake, after flowing through such a beautiful and popular landscape that an Advisory Committee was established to manage and protect “Pigeon River Country.” The Black River flows through the Pigeon River Country State Forest and drains into stunning Black Lake, which has a unique distinction in the area. It is home to many ancient and threatened Lake Sturgeon, protected by the Black Lake Chapter of Sturgeon for Tomorrow. Other magnificent water features in the County include Cheboygan Twin Lakes, Lake Sixteen, and Long Lake in the east, with Douglas Lake, Munro Lake, and part of Paradise Lake in the west.

The following pages summarize results of the Local Ordinance Gaps Analysis project for Cheboygan County and include suggested actions. In accordance with the Literature Review, each Critical Element below is scored and ranked. The Project Evaluation and Analysis section of the Introduction to this book describes the scoring and ranking, and the entire completed checklist is available upon request.

The County Planning & Zoning Department handles Soil Erosion and Stormwater compliance for the entire County. However, County Zoning enforcement excludes: the City of Cheboygan, Burt Township, and the Villages of Mackinaw City and Wolverine. Each of those jurisdictions has their own chapter and analysis in this book. Additionally, Cheboygan County Zoning enforcement covers 18 of the County’s 19 townships: Aloha, Beaugrand, Benton, Ellis, Forest, Grant, Hebron, Inverness, Koehler, Mackinaw, Mentor, Mullett, Munro, Nunda, Tuscarora, Walker, Waverly, and Wilmot. All 18 will be addressed at the end of this Chapter.

## Evaluation Scores and Summary: Cheboygan County

### Master Plan Components

POSSIBLE SCORE: 30

TOTAL SCORE: 20, ADEQUATE

Cheboygan County's current Master Plan is hot off the presses – just updated and approved on January 15, 2014. It can be viewed on their website at: [www.cheboygancounty.net/MasterPlan](http://www.cheboygancounty.net/MasterPlan).

The Master Plan states that “Cheboygan County . . . is within the Cheboygan River Watershed. Within the Cheboygan River Watershed and the boundary of Cheboygan County are the sub-watersheds of the Sturgeon, Pigeon and Black Rivers.” (Master Plan, p. 67) The Master Plan lists the lakes, rivers and wetlands located within the County stating that “Within each of these watersheds are numerous lakes and rivers. The Sturgeon River Watershed, in the western portion of the county, includes the Sturgeon River, which drains into Burt Lake. Directly adjacent is the renowned Pigeon River Watershed. The Pigeon River flows into Mullett Lake which empties into the Cheboygan River and directly into Lake Huron. The western portion of the county includes the Black River Watershed. The Upper Black River and its tributaries within the county drain directly into Black Lake. The Black River flows into the Cheboygan River.” (p. 67)

One natural resources goal indicates the County will “leverage the natural resources for appropriate forms of economic development while maintaining excellent conditions of natural resources.” (p. 14) Objective (a) of the goal is to “monitor [the] condition of natural resources, educate citizens on causes of deterioration and incentivize maintenance of natural resources.” Another objective is to “Ensure adequate protection of high water quality.” (p. 14)

The Master Plan also elaborates upon the importance of groundwater to the County: “The groundwater of Cheboygan County is an extremely valuable resource. Groundwater discharge is important to the recreational values of the county. Groundwater is the principal source of water in streams and rivers during drier, rainless periods, providing Cheboygan County with rivers and streams that flow year-round. Groundwater is also a major control of water temperatures. Groundwater leaves the ground at a constant temperature year round; therefore, it has the effect of moderating water temperature. Streams that receive large amounts of groundwater are generally cooler in summer and warmer in winter than those where groundwater inputs are small. These temperature moderations and year-round flows provide ideal conditions for many fish, including trout, as well as other wildlife.” (p. 68) However, the Plan does not identify or map groundwater recharge areas, in order to protect them.

The Master Plan has a goal for conservation of Open Space, stating the community will “encourage retention of Open Space and scenic vistas using Planned Unit Developments (PUD) and provide incentives for clustering of non-farm development.” (p. 15) The Master Plan does not include stormwater management in any of the goal statements; however there is a section on stormwater management included in the Master Plan, which states “On-site inspections are made of the commercial, industrial and residential building sites and other assorted projects that include any earth changes throughout the County to ensure full compliance with the act and county ordinance. The Soil Erosion officer ensures that construction is in conformance with plans and specifications and requires that violations be corrected. The program ensures that the water quality of Cheboygan County is not adversely impacted by construction activities.” (p. 86)

The Master Plan does not call for minimizing impervious surfaces, nor does it identify wildlife corridors. However, it does include identification and preservation of natural areas as a part of the future land use plan categories for Lake, River & Stream protection. This section states, “The Lake, River, and Stream Protection category contains undeveloped land as well as developed residential and recreational uses. This classification applies to both current and future residential and smaller commercial uses along the shores of all the County's lakes and inland waterways.” (p. 23)

### Master Plan Components: RECOMMENDATIONS

Updating the Master Plan for a community is very hard work, and we commend the County for this new document that expresses appreciation for and values water resources. We have a few suggestions for the next time the plan is updated.

**SUGGESTED ACTION:** The Master Plan mentions the importance and value of groundwater. For the next update, we suggest identifying and mapping groundwater recharge areas.

**SUGGESTED ACTION:** The next Master Plan should also call for minimizing impervious surfaces in new construction and redevelopment projects, to reduce stormwater runoff and improve infiltration. The Planning Commission, in conjunction with the Drain Commissioner and the Soil Erosion Control Officer where appropriate, should provide local units of government and developers with recommendations on ways to reduce or eliminate stormwater runoff.

**SUGGESTED ACTION:** The Master Plan should also acknowledge the importance of well-constructed and maintained road stream crossings on the quality of stream and water resources.

**SUGGESTED ACTION:** The Master Plan should also note that County Officials will participate in the development and updating of watershed management plans for watersheds in the county.

### Basic Zoning Components

POSSIBLE SCORE: 54

TOTAL SCORE: 42, STRONG

Cheboygan County's Zoning Ordinance includes a statement of purpose to protect water and natural resources, which reads as follows: "The provisions herein are intended to encourage the use of lands, waters and other natural resources as they pertain to the social, physical and economic well-being of the county, to limit the improper use of land and natural resources." (Section 1.2, available at <http://www.cheboygancounty.net/ordinances/>)

The Ordinance contains an extensive fee system in Section 21.8.1, the purpose of which is to "assist in defraying the costs of investigating, reviewing and administering zoning applications, appeals, rezoning requests from individual property owners, and other types of decisions which result in extra costs to the County." The Ordinance also gives the Zoning Administrator "the power to issue zoning permits and to make inspections of buildings or premises necessary to carry out his duties in the enforcement of this ordinance." (Section 21.3.2) This section goes on to state that "If the Zoning Administrator shall find that any of the provisions of this ordinance are being violated, he shall notify in writing the person responsible for such violations, indicating the nature of the violation and ordering the action necessary to correct it. He shall order discontinuance of illegal use of land, buildings, or structures; removal of illegal buildings or structures or of discontinuance of any illegal work being done; or shall take any other action authorized by this ordinance to ensure compliance with or to prevent violation of its provisions." (Section 21.2.2)

There are references throughout the Ordinance that indicate the proposal review process is coordinated with the receipt of other County, State and Federal permits. For example: "All habitations shall be provided with sanitary waste disposal facilities approved by the District Health Department." (Section 11.3.5) And "All dredging, filling, grading and other earth changes shall comply with the provisions of Michigan's Inland Lakes and Streams Act (P.A. 346 of 1972), and the Soil Erosion and Sedimentation Act (P.A. 347 of 1972) and the Wetlands Protection Act (P.A. 203 of 1979)." (Section 7.4.7)

The Zoning Ordinance does not require a pre-application or pre-construction meeting but: “The procedure for processing site plans includes a pre-application conference, if desired by the applicant or the Planning Commission, and final site plan approval.” (Section 20.4) The Site Plan is required to indicate all natural features: “Location and elevations of existing water courses and water bodies, including county drains and man-made surface drainage ways, stormwater controls, flood plains, and wetlands.” [Section 20.7(e)] Site Plan reviews are required for: “new construction in a commercial or industrial zoning district except single-family duplex residential, and private storage buildings,” “any development, except single-family and duplex residential, for which off-street parking areas are provided,” “all platted subdivisions.” (Section 20.3)

There is also an environmental design requirement as part of the Planned Unit Development process that states that “Any portion of the PUD site, if deemed environmentally significant, and not already excluded from the developable area, may upon review by the Planning Commission, be preserved in its natural state. The internal vehicular circulation system of the PUD shall be designed and constructed so as not to reduce the slope of the natural terrain by more than 7%.” [Section 19.3.5(b)]

The Site Plan review requires identification of “proposed location, dimension and details of common Open Spaces,” [Section 20.7(l)], as well as the “location and specifications for all existing and proposed perimeter and internal landscaping and other buffering features.” [Section 20.7(n)] Article 19, devoted to Planned Unit Developments, states that “the designated common Open Space shall comprise at least 30% of the total developable area of the PUD to be used for recreational, park or environmental amenities for collection enjoyment by occupants of the development but shall not include public or private streets, driveways, or utility easements, provided, however, that up to 10% of the required Open Space may be composed of Open Space on privately owned properties dedicated by easement to assure that the Open Space will be permanent.” [Section 19.3.5(d)]

The PUD section also allows for an “increase of total additional dwelling units to be allowed as an incentive for designating additional Open Space within the developable area of the PUD.” [Section 19.3.5(e)(1)] Although there is not a specific requirement that Open Space must be managed in a natural condition, the design guidelines for new parcels state that “Diversity and originality in parcel layout shall be encouraged to achieve the best possible relationship between Buildable and Conservation Land areas.” (Section 16.2.3) Included in these guidelines are the following: first, “As practical, preserves and maintains existing fields, meadows, crop land, pastures, and orchards and creates significant buffer areas to minimize conflicts between residential and agriculture/forestry uses,” [Section 16.2.3(b)], and second, “Maintains or creates a buffer of natural native species vegetation of at least 40 feet in depth adjacent to wetlands and surface waters.” [Section 16.2.3(c)] The ordinance does not limit allowable uses in Open Spaces to low impact uses. However, the PUD section does state that “The remaining 50% or greater of the parent parcel shall be kept as Open Space, or Conservation Land, in perpetuity by conservation easement, plat dedication, restrictive covenant, or other legal means acceptable to the Planning Commission.” (Section 16.2)

### **Basic Zoning Components: RECOMMENDATIONS**

The Cheboygan County Zoning Ordinance has critical components in place to protect water resources, and we commend them for this effort.

**SUGGESTED ACTION:** The County should consider a requirement that applicants consult with the Michigan Department of Environmental Quality about Threatened or Endangered Species on site, especially along the Lake Huron coastline but in other undeveloped areas, as well.

## Shorelines

POSSIBLE SCORE: 60

TOTAL SCORE: 28, ADEQUATE

In the Cheboygan County Zoning Ordinance, Article 11 is the Natural Rivers Protection District, dealing with unique areas of the County landscape. “The area of the Pigeon River and its tributaries and an area of the Upper Black River and its tributaries has been assigned a Natural Resource Protection land use designation pursuant to the Cheboygan County Comprehensive Plan.” (Section 11.1.1) In this District, “Building setbacks for new structures or appurtenances shall be 200 feet from the water’s edge along the mainstreams and 150 feet from the water’s edge along tributaries.” (Section 11.3.1)

Further, a vegetation strip is required “on each side of [a] stream to a distance of 100 feet along the mainstreams and 75 feet along tributaries.” (Section 11.5.2) “Planting of native species is encouraged in the vegetation strip to enhance and protect the river’s edge.” [Section 11.5.2(f)] And, “Trees, shrubs and other vegetation native to the Pigeon and Upper Black River areas shall be maintained.” (Section 11.5.1)

Article 12 is the Resource Conservation District, “... designed to protect, preserve or manage natural, recreational, historic and scenic resources such as wetlands, prime forestlands, aquifer recharge areas, flood hazard zones, fish spawning areas, wildlife habitats, parks, campgrounds, swimming areas, historic structures, archeological discoveries, scientific and educational facilities, open spaces and similar resources.” (Section 12.1)

Further, “Development in this district shall be closely regulated to protect against erosion, water supply contamination, flood damage, malfunctioning waste disposal systems, permanent loss of fish and wildlife habitats and destruction of historical structures or archeological remains, while allowing for the management of resources as permitted in this article. Examples of Resource Conservation areas include Dingman Marsh, Black Mountain Recreation Area, and Mackinaw State Forest. Privately owned parcels within the Resource Conservation zone are not part of the Resource Conservation zone, but are in fact Agriculture/Forestry.” (Section 12.1) There are no specifications for setbacks/vegetation strips because there is very little development in these areas. They are left in their natural state, for the most part.

The Purpose of Article 10, the Lake and Stream Protection District, is stated in striking fashion: “Cheboygan County has the distinction of having more water surface than any other county in the State of Michigan. 77.3 square miles (9.69% of its area) are inland waters. The county has 344 inland lakes and 420 miles of streams. When 32 miles of Lake Huron shoreline are added, it becomes apparent that there is considerable pressure for development of waterfront property for homes, tourism and recreation. It is vital to the orderly future development of the county that these waters and natural resources be protected and that environmental control be exercised.” (Section 10.1.1)

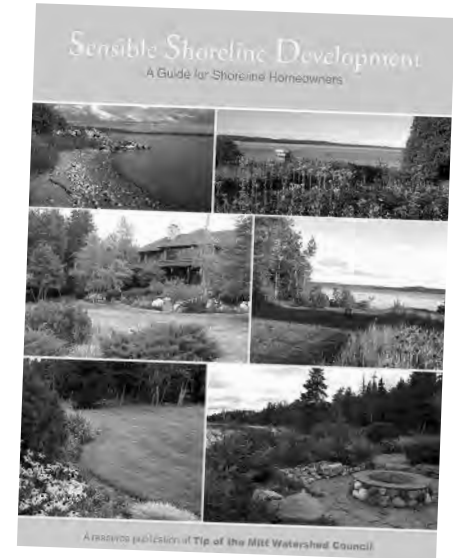
More on this district: “The Lake and Stream Protection District includes all property within five hundred (500) feet of the shoreline’s ordinary high water mark (measured horizontally and perpendicular to the shoreline) of any river, stream, pond or lake.” (Section 10.1.2) The District has a setback provision: “Buildings, permanent structures, parking lots and other impervious surfaces, except boat docks, boat slips, ramps, marinas or other water dependent uses, shall observe a minimum setback of forty (40) feet from the ordinary high water mark.” (Section 10.4.6)

Unfortunately, the following section is close to what should be done, but ultimately misses the mark. That is because it clearly articulates steps needed to protect shorelines under pressure from development, but does not require them in this important district (bold emphasis added): “Native trees, shrubs and vegetation (**should be**) maintained and enhanced along the banks of the rivers, streams, ponds and lakes in this district. Maintenance of the natural vegetation strip is required to help stabilize the riverbanks, minimize erosion, provide shading

which will help maintain cool water temperatures, help protect water quality by absorbing nutrients from surface water run-off, provide screening of manmade elements and protect fisheries and wildlife habitat. The zoning administrator shall notify each applicant for a building permit of the purpose of the natural vegetation strip and of the provisions of this section.” (Section 10.5.1) All of the language in the quote is great, except the words “should be.” This language expresses the exact reasons why such vegetation strips are needed. Then it falls short of requiring the practice, subjecting our waters to additional stress. To make this element strong, the “should be” must be changed to “shall.”

There is one strong point, however, related to vegetation strips in this district. That is: “The zoning administrator should annually publicize through local media the desirability and need for establishment of waterfront natural vegetation strips on existing waterfront properties.” (10.5.6) This education element is very important to help citizens understand the need for shoreline protection strips, which can range from very wild looking to a managed and manicured look that provides both lake access and views.

The Zoning Ordinance regulates dock lot minimum frontage in the context of shared waterfront access, stating “The land providing the shared waterfront access shall have no less than 150 feet of frontage as measured at the ordinary high water mark and shall be no less than 22,500 square feet in area.” (Section 10.4.4.1) This section provides important protections against keyhole/funnel development.



Docks are also regulated in the Natural River Protection District: “The construction of docks along streams and tributaries in the Natural River Protection District is strongly discouraged. However, if necessary to provide safe and ecologically sound access for the riparian landowner, ‘log-sod covered docks’ may be constructed of natural materials.” (Section 11.9.1)

Marinas are regulated in the County using special land use permits. This is done in the Residential Development District (Section 4.3.11); the Lakes and Streams Protection District (Section 10.3.5); and in the Village Center Topinabee Residential Overlay District (Section 13E.3.10).



## Shorelines: RECOMMENDATIONS

**SUGGESTED ACTION:** Require Natural Vegetation Strips in the Lakes and Streams Protection District. Require native vegetation and prohibit invasive species from being used in the vegetation strip.

**SUGGESTED ACTION:** Restrict boat repair and maintenance activities in marinas to clearly marked areas, to prevent contaminants and debris from falling into the water and limit the spread of invasive species. Also, require marina fueling stations to have spill containment equipment that is stored in a clearly marked location. Require a spill contingency plan and post emergency phone numbers in a prominent location. Finally, signs of leakage or spillage should be investigated immediately, and cleanup undertaken in accordance with applicable Best Management Practices (BMPs).

**SUGGESTED ACTION:** *Phragmites* is a concern mostly on Great Lakes shorelines, but it has also become established on some inland waters and road ditches. We encourage all local governments to initiate a program designed to ensure that the invasive strain of *Phragmites* does not become established in their jurisdiction. Such a project would involve an initial inventory to determine if there are non-native stands of *Phragmites*, treat those stands if they are in existence, and conduct a follow up inventory and treatment, if necessary.

### Impervious Surfaces

POSSIBLE SCORE: 33

TOTAL SCORE: 7, WEAK

The more a local government can do to reduce or limit new impervious surfaces, the better for water quality. Impervious surfaces (streets, roofs, sidewalks, etc.) generate much more stormwater runoff than natural, forested, or even agricultural land uses. They stop rainwater and snowmelt from naturally percolating into soils, reducing the opportunity for contaminants to be removed from the resulting stormwater runoff, before it flows into lakes, rivers, and wetlands.

Substances finding their way onto rooftops, driveways, streets, and sidewalks are likely to be washed into waters by rainfall and snowmelt. This includes things like bacteria from pet and animal wastes, fertilizer, oil and grease, sediment, heavy metals, salt, etc. Mitigating impacts from existing impervious surfaces and limiting new ones help to keep waters clean.

One low cost approach to doing so is to retain or restore native vegetation in riparian areas and in Open Spaces. Minimizing impervious surfaces can also be addressed in creative and cost-effective ways, ranging from using Low Impact Design (LID) techniques in development plans, to incentives for limiting impervious lot coverage. Lot design and general development provisions in Zoning Ordinances provide great opportunities to encourage alternatives to and reductions of impervious surfaces, such as shared driveways.

One example of incentivizing these approaches already exists in the ordinance. It states that the height of buildings may be increased past the maximum as long as “the percent of lot coverage for all buildings, parking lots and other impervious surfaces do not exceed 50%.” [Section 17.2.9(3)]

Additionally, unlike many zoning ordinances, there is no requirement to pave parking lots, leaving options open to the developer to create pervious parking areas. The zoning ordinance requires a “dust-free surface resistant to erosion.” [Section 17.4.8.b.]

There are no mentions in the Zoning Ordinance about maximum lot coverage standards, although the ordinance does limit the lot coverage in the more urban areas of Indian River and Topinabee to 80%. (Section 17.1.1) When

it comes to parking, the ordinance also states that “The Zoning Board of Appeals may grant variances from these parking requirements where it is satisfied under the circumstances prevailing that the requirements for off-street parking are excessive for the particular development.” (Section 17.4.7) Additionally, in Planned Unit Developments “No more than 12 parking spaces shall be permitted in a continuous row without being interrupted by landscaping.” [19.3.5.g(5)]

### Impervious Surfaces: RECOMMENDATIONS

The point of doing Impervious Surface Assessments is to understand the current impact of development and trends for the region, so as to manage the addition of hard surfaces. Tools exist to help with future development pressures, such as road construction standards and allowances for parking lot construction.

**SUGGESTED ACTION:** Conduct an Impervious Surface Assessment for the County. Review and establish trends for the County to inform next steps. Connect the impervious surface assessment to recommendations that guide Stormwater Management in the County.

### Stormwater Management

POSSIBLE SCORE: 27

TOTAL SCORE: 27, STRONG

The County of Cheboygan has a dedicated Soil Erosion Sedimentation and Stormwater Runoff Control Ordinance that can be accessed here: [http://www.cheboygancounty.net/\\_\\_library/sessrc\\_ordinance.pdf](http://www.cheboygancounty.net/__library/sessrc_ordinance.pdf). This program requires permit applications that are reviewed by the County Soil Erosion Control Officer. On site facilities “which protect water quality and prevent flooding shall be required for all sites, except single family sites, unless a proposal for off-site stormwater runoff control has been approved.” [B(1)] For these facilities “the required volume shall be calculated by comparing the undeveloped conditions from a 2 year, 24 hour frequency storm event to the developed condition for a 25 year, 24 hour frequency storm event.” [B(7)]

The ordinance also regulates the velocity of runoff leaving the site: “drain spouts from roofs and sump pumps from basements shall be directed to on-site swales, detention basins or other measures designed to slow the flow of stormwater runoff to non-erosive velocities.” [C(3)] Further, “no direct or indirect discharge of stormwater to receiving bodies of water, including lakes, streams or wetlands shall be allowed unless sediment is trapped prior to discharge and stormwater flows are limited to non-erosive velocities.” [C(4)]



**Burt Lake**

For any stormwater that has been exposed to harmful sources, the ordinance notes that “construction of floor drains, storm drains, drainage wells, septic systems or other conduits by which stormwater or washwater containing oil, grease, toxic chemicals or other hazardous substances may reach groundwater shall be prohibited unless proposed systems meet the requirements of the appropriate State of Michigan Agency.” [C(6)]

The ordinance also seeks to limit land disturbance and grading by stating that “lakes and streams, together with their adjacent banks shall not be dredged, cleared of vegetation, deepened, widened, straightened, stabilized or otherwise altered without

state or county permits. Approval from the Department of Environmental Quality is required for proposed alterations of lakes and streams below the ordinary high water mark. Approval from the Soil Erosion Control Officer is required for proposed alterations of lakes and streams above the ordinary high water mark.” C(5).

Finally, the ordinance states “stormwater retention, detention and infiltration basins shall be maintained by the property owner unless assurance of proper maintenance can be provided through a government agency program. A maintenance plan shall be submitted for approval that as a minimum include, but not be limited to: removal of accumulated sediment, periodic structural repairs, reseeding or replacement of vegetative cover and regular clipping.” B(19).

### **Stormwater Management: RECOMMENDATIONS**

The Soil Erosion Sedimentation and Stormwater Runoff Control Ordinance is strong, and we commend the County for this. We have no additional suggestions.

#### **Soil Erosion and Sediment Control**

POSSIBLE SCORE: 18

TOTAL SCORE: 18, STRONG

At the state level, Part 91 of the Natural Resources and Environmental Protection Act 1994 PA 451, as amended, addresses Soil Erosion and Sedimentation Control (SESC). From Part 91, a state program was implemented to regulate the pollution of Michigan waters, due to improper construction site management practices, including improper stormwater runoff. Counties are mandated to administer and enforce Part 91.

As noted earlier, Cheboygan County also has a dedicated Soil Erosion Sedimentation and Stormwater Runoff Control Ordinance. The County ordinance notes as part of the permit approval process “the Soil Erosion Control Officer may convene a meeting with state agency representatives to assure consistency with state laws and regulatory requirements.” (F.1)

The ordinance does not explicitly state that all the requirements must be in place before permits will be granted, but it does appear that this is the process, as there is a thirty day waiting period, E.1, during which time the SESC officer can meet with other agencies (F.1). The County ordinance does require that “soil erosion & sediment control measures shall be installed before grading, filling or removal of vegetative cover is initiated.” (A.7) Additionally, the ordinance contemplates the maintenance and monitoring of soil erosion and sedimentation controls, requiring that “control measures shall be maintained throughout the duration of the earth change, including the later stages of development. Maintenance activities include, but are not limited to: removal of accumulated sediment, structural repairs, reseeding or replacement of vegetative cover, and removal of lawn clippings.” (A.16)

Importantly, the ordinance states that “violations of permit requirements will initially be brought to the attention of the individual in charge of on-site construction activities. Should efforts towards immediate compliance be unsuccessful, a stop-work order may be issued. Said order shall describe the specific alleged violation and the steps deemed necessary to bring the project back into compliance.” (I.1)

### **Soil Erosion and Sediment Control: RECOMMENDATIONS**

Here again, the County ordinance is strong, and we thank them for these water protections. We have no additional suggestions.

## Sewer/Septic

POSSIBLE SCORE: 24

TOTAL SCORE: 14, ADEQUATE

The County does not provide water and sewer service to its communities. The City of Cheboygan, the Township of Inverness, and the Village of Mackinaw provide these utilities, while the rest of the County is served by individual well and septic tanks.

The Zoning Ordinance addresses septic systems within the Natural Rivers Protection District, stating “The setback for septic tanks and absorption fields shall be a minimum of 150 feet from the ordinary high water mark.” (Section 11.6.1)

The ordinance does not require inspection of septic tanks but does state that in all areas “New wells, septic systems and absorption fields shall comply with District Health Department standards.” (Section 7.4.4)

### Sewer/Septic: RECOMMENDATIONS

**SUGGESTED ACTION:** Educate residents about proper septic system management and encourage them to maintain septic systems on a regular basis.

**SUGGESTED ACTION:** Consider the benefits of enacting a county “point of transfer” septic inspection ordinance, working in coordination with local municipalities and the Health Department.

## Wetlands

POSSIBLE SCORE: 21

TOTAL SCORE: 2, WEAK

Wetlands are some of our most valuable water resources. They provide excellent wildlife habitat, help control flooding, and contribute to water quality protection. Wetlands are critical to the health of Cheboygan County’s vast water resources, and they are difficult to restore, once they are damaged or filled.

Although Michigan has a statewide wetland protection statute, not all wetlands are covered and not all activities that could impact wetlands are regulated. Local governments have the opportunity to supplement the state’s wetland protection program. Citizens in Cheboygan County continue to be interested in wetland protection because of the public benefits they provide.

While not providing extensive or detailed protection to wetlands, Cheboygan County does use coordination with state and federal agencies to help protect them. The County ordinance states that “In addition to the provisions of this ordinance, provisions contained in the following federal, state and county laws and regulations shall be complied with: PA 203, Wetland Protection Act.” (3.16, General Provisions) Unfortunately, there is a typographical error in this statement; the state Wetland Protection Act is Part 303 of the Natural Resources and Environmental Protection Act, Act 451 of 1994.

### Wetlands: RECOMMENDATIONS

**SUGGESTED ACTION:** Given the crucial role that wetlands play in overall water health, broadly educate citizens about the benefits of wetland protection.

**SUGGESTED ACTION:** Consider establishing a wetland setback of at least 25’, similar to shoreline setbacks. Couple this with the provision that state permits must be issued in regulated

wetlands, before the County Zoning permit is issued. Used this way, setbacks will help protect these valuable resources. Eventually, a local wetland ordinance could be enacted to fill in any gaps in state protections, if needed, to respond to future growth pressures.

**SUGGESTED ACTION:** The County should adopt minimum shoreline lot frontage to help prevent the creation of unbuildable lots that consist of mostly wetlands.

### Groundwater and Wellhead Protection

POSSIBLE SCORE: 18

TOTAL SCORE: 10, ADEQUATE

Groundwater is the primary source of drinking water for nearly all Northern Michigan residents, including most of Cheboygan County. Protecting groundwater resources from contamination is vitally important.

The Cheboygan County Soil Erosion Sedimentation and Stormwater Runoff Control Ordinance states “Construction of floor drains, storm drains, drainage wells, septic systems or other conduits by which stormwater or washwater containing oil, grease, toxic chemicals or other hazardous substances may reach groundwater shall be prohibited unless proposed systems meet the requirements of the appropriate State of Michigan Agency.” [C(6)]

In the Zoning Ordinance, the preliminary plan for a Planned Unit Development requires a statement about the impact of the development on groundwater. The requirements for PUDs are that “detailed information on the development’s impact on soils, surface and groundwater’s, existing vegetation, wildlife and other natural features of the site” may be requested as additional information to the preliminary plan. [Section 19.3.2(c)(2)]

Cheboygan County does not have municipal well fields.

### Groundwater and Wellhead Protection: RECOMMENDATIONS

Groundwater is vital for not only drinking water, but also to feed tributaries, seeps, springs, and wetland resources with fresh water supplies to support ecosystems, including important recreational fisheries.

**SUGGESTED ACTION:** Since many common activities can impact groundwater quality, provide groundwater education materials to County residents.

**SUGGESTED ACTION:** Complete and maintain a comprehensive inventory of potential threats to groundwater. This will be particularly important as the County continues to grow and more people rely on groundwater as a drinking water source.

**SUGGESTED ACTION:** Ensure that groundwater protection requirements are included for mining operations in the County.

**SUGGESTED ACTION:** Protect groundwater from potential contamination by requiring Pollution Incident Prevention Plans for storage of hazardous materials, in coordination with Local Emergency Planning Committee efforts.

## Other

POSSIBLE SCORE: 48

TOTAL SCORE: 33, STRONG

Cheboygan County provides help to townships that enroll in the National Flood Insurance Program by doing building code enforcement, in addition to offering Soil Erosion and Sediment Control services and GIS for help with mapping, etc.

We have no additional recommendations on this element, which also includes High Risk Erosion Areas and Critical Dunes. Neither of those is present in Cheboygan County.

This concludes the Project Analysis for the County. Next, the 18 Townships covered by County Zoning will be presented.

## Evaluation Scores and Summary: Townships under County Zoning

As noted in the Introduction to this chapter, the Cheboygan County Zoning Ordinance covers 18 jurisdictions. One benefit of this arrangement is that planning and staff resources are provided for smaller communities that may not have them. However, local zoning decisions include coordination between County and township officials. There is no requirement that the County consult with local leaders, but it is their practice to do so. Township representatives weigh in, as they see fit. Some Township officials regularly attend County Planning Commission meetings. Any Township official who wants to be on the County mailing list is also notified of every meeting. Additionally, the County makes a special effort to contact Township officials when an application is in their jurisdiction.

The County serves as an information center for development and conservation projects in these 18 Townships, and this can play a vital role in protecting water resources, which do not obey jurisdictional boundaries. These Townships are summarized below, as appropriate to this project.



### Aloha Township

It's been said that the name of this Township came from one of its Founding Fathers, who visited Hawaii. No matter how it was named, Aloha Township is a dazzling destination, partially located on about 4 miles of Mullett Lake's northeastern shoreline. This is also the location of the Aloha State Park, described on the Michigan Department of Natural Resources (MDNR) website: "Aloha State Park offers modern camping on beautiful Mullett Lake. Whether fishing, boating, swimming or picnicking, Aloha is close to many of Michigan's most famous travel attractions at the Straits of Mackinaw. Mullett Lake is at the center of the Inland Lakes Waterways and campsites are near the Park's boat launch for those traveling this route."

Aloha is entirely located in the Cheboygan River Watershed. Other important water resources in Aloha include: Devereaux Lake, Ballard Creek, Hatt Creek, Mann Creek, Little Mud Creek, Long Lake, and the headwater portion of Long Lake Creek. It also includes 1.75 miles of Upper Black River shoreline, forming the northeast corner of the Township.

Aloha has a helpful website at: [www.alohatownship.com](http://www.alohatownship.com).



### **Beaugrand Township**

Beaugrand Township includes a breathtaking border along roughly 7.5 miles of the Lake Huron coastline. Its water resources include small coastal watersheds and drainage areas: Dynamite Creek, West Branch of the Little Black River, and downstream portions of the Little Black River. It is entirely located in the Lake Huron Watershed.

The Township does not have a website, but the contact information is:

Beaugrand Township  
PO Box 5205  
Cheboygan, MI 49721  
Phone: (231) 627-6052

The Township hall is located at 1999 Old Mackinaw Rd., Cheboygan.

### **Benton Township**

Benton Township has a stunning border along roughly 17 miles of the Lake Huron coastline, which includes the eastern boundary of Duncan Bay, and all of Grass Bay. This part of the Township also includes Cheboygan State Park, a special asset described this way on the MDNR website: “Located on the Straits of Mackinac and Duncan Bay in upper Lake Huron, this gem of a state park has seven miles of Great Lakes frontage. Its rich mixture of habitats is one of its strong points. Habitats close to the lake range from Great Lakes marshes, to cobblestone and lake sand beaches, to open sand dunes, to inter-dunal wetlands. Inland habitats are forested, ranging from dry maple, beach, and oak forests, to moist northern white cedar and lowland conifer swamps. The park offers modern camping facilities, rustic cabins, marked hiking and skiing trails, and a rich diversity of plants and animals. The seven miles of marked hiking trails pass through diverse habitats and offer hikers great wildlife viewing opportunities.”

Benton is an oddly-shaped township in the northeastern corner of the County. It also has a beautiful border along the northeast shoreline of Mullett Lake. It is partially located in the Lake Huron Watershed, with the remaining portion located in the Cheboygan River Watershed. Other important water resources include a portion of the Cheboygan River and the headwater portion of Ballard Creek, Upper Black River, Beechnut Creek, Myers Creek, Spring Creek, Wixon Creek, Duck Lake, Duck Marsh, Elliot Creek, Grass Lake, Grass Creek, Green Creek and Mud Lake.

The Township website can be found here: [www.bentontwp.org](http://www.bentontwp.org).

### **Ellis Township**

Charming Ellis Township is found near the southwestern corner of Cheboygan County, east of Mentor Township, west of Walker Township and directly south of Indian River. It is located entirely in the Cheboygan River Watershed, and includes magnificent scenery with important water resources: the Little Sturgeon River, a small segment of the Sturgeon River, the middle section of the Pigeon River, Crumley Creek, Goose Lake, Johnson Creek, and Wukes Creek.

The Township does not have a website, but their contact information is:

Ellis Township  
6916 Cut Off Rd.  
Afton, MI 49705-9702  
Phone: (231) 238-8803

The Township hall is located at 9605 Afton Rd., Wolverine.

### **Forest Township**

Forming the southeastern corner of the County border, gorgeous Forest Township is located entirely within the Cheboygan River Watershed. It is heavily forested – the Mackinaw State Forest covers almost 50% of the township, including a significant amount of wetlands. The Upper Black River snakes through the township on its way to Black Lake.

Other important water resources include Canada Creek, Gillis Creek, Lyons Creek, the upstream reaches of McMaster's Creek, the downstream reaches of Milligan Creek, Oxbow Creek, Tower Pond, and Welch Creek. The township also features many lakes and ponds including Dorsy Lake, Kleber Lake, Marsh Lake, McLavey Lake, Silver Lake and Tower Pond.

Forest Township does not have a website, but the contact information is:

Forest Township  
PO Box 633  
Onaway, MI 49765-0633  
Phone: (989) 733-9929

The township hall is located at 9511 M-33/68, Tower.

### **Grant Township**

The northeastern corner of picturesque Grant Township is located in the Lake Huron Watershed, with the remainder situated in the Cheboygan River Watershed. The Township's most prominent water resource is the roughly 8.4 square miles of Black Lake located within its borders. It also includes the magnificent Twin Lakes, Lake Sixteen, and Mud Lake in addition to many smaller, unnamed ponds. Flowing waters include Cain Creek, headwaters of Little Mud Creek, most of Long Lake Creek, Mud Creek, a portion of Myers Creek, Owens Creek, Section Seven Creek, Twin Lakes Outlet, the headwaters of Upper Black River, and the mouth of Lower Black River.

The Grant Township website is located here:  
[www.granttp.com](http://www.granttp.com)



### **Hebron Township**

The southwestern tip of spectacular Hebron Township is located in the Cheboygan River Watershed. The rest of it is in the Lake Huron Watershed, with the northeastern corner of the Township touching the Lake Huron coastline. It also includes .3 square miles of the eastern shoreline of Paradise Lake within Township borders, which is otherwise located in Emmet County.

Other important water resources include Mud Creek, Mill Creek, Malony Lake, Mud Lake, Nolten Lake, and Penny Lake.

The Township does not have a website, but the contact information is:

Hebron Township  
13279 Douglas Rd.  
Cheboygan, MI 49721  
Phone: (231) 627-9142

The Township hall is located at 9022 Hebron Townhall Rd., Cheboygan.



### **Inverness Township**

The northwestern tip of the memorable Inverness Township falls within the Lake Huron Watershed. The rest is located in the Cheboygan River Watershed, including the eastern border which runs along the river, itself. Its southeastern corner border is a section of Mullett Lake, roughly three square miles in area. Other important water resources include Laberell Creek, the headwaters of Little Black River, Maxwell Gully, Tannery Gully and smaller unnamed creeks. Lakes and ponds include Mud Lake as well as six smaller unnamed ponds.

The Township does not have a website, but the contact information is:

Inverness Township  
5167 Riggsville Rd.  
Cheboygan, MI 49721-9038  
Phone: (231) 627-3337

The Township Hall is located at 734 VFW Rd., Cheboygan.

### **Koehler Township**

The northwestern border of striking Koehler Township is formed by the southeastern shoreline of Mullett Lake, and includes the location where the Pigeon River drains into the lake. The Township is entirely located within the Cheboygan River Watershed.

Other important waters include the Little Pigeon River, the mouth of Indian River, headwaters of Little Mud Creek, Crumley Creek, Kimberly Creek, Morrow Creek, Silver Creek, Cochran Lake, Roberts Lake, and Silver Lake.

The Township does not have a website, but their contact information is:

Koehler Township  
3539 Carter Rd. S  
Afton, MI 49705-9741  
Phone: (231) 238-9207

The Township Hall is located at 2227 Stoney Creek Rd., Afton.

### **Mackinaw Township**

Located entirely within the Lake Huron Watershed, glittering Mackinaw Township is shaped like a triangle. Its northeastern border is along the Straits of Mackinaw coastline of northern Lake Huron. The western border is Michigan Route 108, and the southern border is Hebron Township. In addition to Lake Huron, the other important water resource is Mill Creek.

The Township website can be found here: [www.mackinawtownship.com](http://www.mackinawtownship.com).

### **Mentor Township**

The Sturgeon River flows through the fabulous and verdant Mentor Township, which is located entirely within the Cheboygan River Watershed. Other important water resources include Berry Creek and Weber Lake.

The Township does not have a website, but the contact information is:

Mentor Township  
7650 S. Straits Hwy.  
Indian River, MI 49749-9336  
Phone: (231) 238-7897

The Township Hall is located at 8010 S. Straits Hwy., Indian River.

### **Mullett Township**

Mullett Township is largely defined by the impressive Mullett Lake, which bisects the Township's land area. Located entirely within the Cheboygan River Watershed, the other important water resource is Mullett Creek.

The Township website can be found here: [www.Mullettgov-clerk.org](http://www.Mullettgov-clerk.org).

### **Munro Township**

A significant part of Munro Township is covered by two fantastic lakes, Douglas Lake and Munro Lake. The Township actually straddles three different watersheds: Lake Huron, Cheboygan River, and the Maple River. Other important water resources include Beaver Tail Creek, Lancaster Lake, the mouth of the East Branch of the Maple River, the mouth of the Little Carp River, Mud Creek, Mullett Creek, and Vincent Lake.

The Township website can be found at: [www.munrotownship.com](http://www.munrotownship.com).

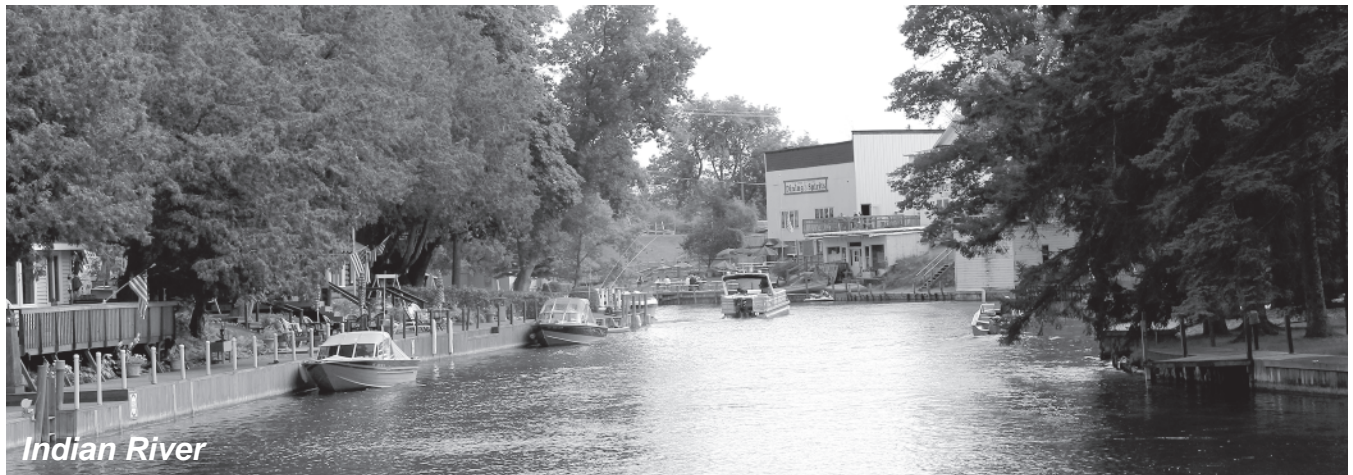
### **Nunda Township**

Forming part of the County's southern border, dramatic Nunda Township is located entirely within the Cheboygan River Watershed. The Village of Wolverine is almost entirely included in the Township borders. In addition to the magnificent Pigeon and Sturgeon Rivers, it includes some very special water resources: the Headwaters of the Little Sturgeon River, Headwaters of West Branch of the Sturgeon River, Corey Lake, Cornwall Creek, Cornwall Creek Flooding, Doe Lake, the southern extent of Dog Lake, Hackett Lake, Hemlock Lake, Lance Lake, MacAndrews Lake, downstream portions of McMasters Creek, Mud Lake, and Wildwood Lake.

The Township does not have a website, but the contact information is:

Nunda Township  
17364 Trowbridge Rd.  
Wolverine, MI 49799-9705  
Phone: (231) 525-8626

The Township hall is located at 12991 S. Straits Hwy., Wolverine



### **Tuscarora Township**

Tuscarora Township is located entirely in the Cheboygan River Watershed. It is one of two townships located on the shores of Burt Lake and includes the community of Indian River. Other important water resources for Tuscarora Township include: Berry Creek, Crumley Creek, Deer Creek, Indian River, Indian River Spreads, Lake Marina, Little Sturgeon River, and the Sturgeon River.

In addition to the Township Board, Tuscarora has a Planning Commission, Board of Review, Beautification Committee, Downtown Development Authority, Marina Park Board, Parks Commission, and a West Side Recreation Committee. It has a Master Plan in place, which is evaluated below.

The township website can be found here: [www.tuscaroratwp.com](http://www.tuscaroratwp.com)

#### **Master Plan Components**

POSSIBLE SCORE: 30

TOTAL SCORE: 21, STRONG

Tuscarora Township has a Master Plan that was updated in 2012. [http://www.tuscaroratwp.com/pdf/2012\\_tuscarora\\_township\\_master\\_plan.pdf](http://www.tuscaroratwp.com/pdf/2012_tuscarora_township_master_plan.pdf). It states that the “Township is located within the Cheboygan River watershed, which is a sub basin of (Lake Huron) watershed.” (Master Plan, 3-6) The major rivers and lakes located within the township are identified, and there is a Wetlands and Watershed map on page 3-4. One of the goals of the Master Plan is to “protect and preserve groundwater, surface water, woodlands, wetlands, open space, wildlife habitat and steep slopes.” (8-6)

The Township also has a goal within the Master Plan that seeks to “support the strengthening of groundwater protection and stormwater management regulations in the County’s zoning ordinance, while encouraging the continued natural use of wetlands as groundwater recharge, stormwater filtering and stormwater holding areas.” (8-6) Finally, the Master Plan points to the partnership between Tuscarora Township and Cheboygan County in addressing wildlife corridors, stating that the Township will work with Cheboygan County to create land use patterns that take wildlife corridors into account. (8-6)

#### **Master Plan Components: RECOMMENDATIONS**

**SUGGESTED ACTION:** Further updates to the Master Plan should consider including a statement on minimizing impervious surfaces in new construction and redevelopment projects, as a way to reduce stormwater runoff.

**SUGGESTED ACTION:** The Master Plan should address the importance of well-constructed and maintained road stream crossings on the quality of stream and water resources.

### **Walker Township**

Rustic Walker Township is located entirely within the Cheboygan River Watershed. In addition to the Pigeon River, its important water resources include: the Headwaters of Adair Creek, the northern half of Dog Lake, Gokee Creek, Lake Sixteen, Lewis Branch of Adair Creek, Lost Lake, Milligan Creek, Osmun Lake, Weed Creek, Wukes Creek.

The Township does not have a website, but the contact information is:

Walker Township  
6222 Montgomery Rd.  
Afton, MI 49705  
Phone: (231) 290-1149

The Township hall is located at 7021 Montgomery Rd., Afton.

### **Waverly Township**

The Black River flows through the forested and lovely Waverly Township, on its way to magnificent Black Lake, which also forms the northeast tip of the Township border. Other water resources include: the downstream reaches of Adair Creek, Fisher Creek, Kleber Lake, the Mouth of Little Mud Creek, the downstream reaches of Milligan Creek, Mud Lake, Stewart Creek, Stoney Creek, Stony Creek, and the mouth of Welch Creek.

The Township does not have a website, but the contact information is:

Waverly Township  
11133 Twin School Rd.  
Onaway, MI 49765-9562  
Phone: (989) 733-9661

The Township hall is located at 11133 Twin School Rd., Onaway.

### **Wilmot Township**

Beautiful Wilmot Township forms the southwestern corner of the County border and includes the West Branch of the Sturgeon River. A small part of the Village of Wolverine also crosses the Wilmot Township border. Other notable water resources include:] Allen Creek, Barhite Lake, Blackjack Creek, Fulmer Lake, Marl Creek, and Silver Lake.

The Township does not have a website, but the contact information is:

Wilmot Township  
7234 Silver Lake Rd.  
Wolverine, MI 49799  
Phone: (231) 525-6621

The Township hall is located at 14980 Old Sturgeon Rd., Wolverine.

## **Conclusion**

We applaud the water protection measures that exist in Cheboygan County. We also thank you for your time and attention in reading this chapter, and hope that our recommendations are helpful. However, if anything is unclear, please be sure to let us know. If you have any other questions related to this project, please contact Tip of the Mitt Watershed Council at (231) 347-1181.

## SECTION III: Analysis

### Chapter 2 Burt Township

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#### Introduction

Burt Township is a stunningly beautiful place, with its southern boundary formed by the northern half of Burt Lake. As noted in the Master Plan, Burt Township is technically one standard geographic township in area, but slightly more than half of the Township is water. As such, the lake is the centerpiece of the Township, and true inspiration for its citizens to work toward preservation and protection of water resources. This love of water is clearly communicated on the Township website, which features a prominent button that links to an impressive piece called, “Protecting the Water Quality in Burt Lake with Natural Vegetation along the Lake Shore.”

This chapter presents the results of the Local Ordinance Gaps Analysis project for Burt Township. It summarizes the evaluation scores, makes recommendations, and includes suggested actions. In accordance with the Literature Review, each Critical Element below is scored and ranked. The Project Evaluation and Analysis section of the Introduction to this book describes the scoring and ranking, and the entire completed checklist is available upon request.

#### Evaluation Scores and Summary: Burt Township

##### Master Plan Components

POSSIBLE SCORE: 30

TOTAL SCORE: 23, STRONG

Burt Township has a Master Plan that was last updated in 2009, and can be found here: <http://www.burttownship.org/pdf/MasterPlan.pdf>. It is recommended that Master Plans be updated every 5 years, so this one should be reviewed soon.

The Master Plan states that the Township “is located within the Cheboygan River watershed, which is a sub basin of (Lake Huron) watershed.” (Master Plan, p. 3-7) Burt Lake is identified as the major body of water, and a map of water resources is included (Figure 3-3, p.3-5).

The Natural Resources Goal states that the community will “protect and preserve groundwater, surface water, woodlands, wetlands, Open Space, wildlife habitat and steep slopes.” (p. 6-4) The Future Land Use Recommendations note that the “Conservation-Parkland category is the most extensive land use category recommended for the Township.” (p. 7-3) One of the purposes of adopting this category is to encourage “the establishment of contiguous reserve areas, river set backs, wetlands, quiet areas, scenic areas, and wildlife habitat.” (p. 7-3)

The Natural Resources goal also identifies stormwater management as a priority by stating the community will “support the strengthening of groundwater protection and stormwater management regulations in the Township’s Zoning Ordinance, while encouraging the continued natural use of wetlands as groundwater recharge, stormwater

filtering and stormwater holding areas.” (p. 6-4) Although this commitment to strengthening stormwater management is included, the Master Plan does not include a statement on minimizing impervious surfaces as a way to battle stormwater runoff.

Additionally, the Master Plan also identifies the protection of wildlife corridors and sensitive areas as a priority by making future land use plans that take into account “impacts to sensitive natural areas like wetlands, greenways and wildlife corridors.” (p. 6-4) The Master Plan does not identify road-stream crossings as a priority, to manage any erosion that delivers sediment to area waterways.

### Master Plan Components: RECOMMENDATIONS

We commend Burt Township on its Master Plan, and have only two suggestions for the next update.

**SUGGESTED ACTION:** The Township should consider adding a goal to minimize impervious surfaces, as a way to reduce stormwater runoff.

**SUGGESTED ACTION:** The Township should also consider identifying the importance of well-constructed and maintained road stream crossings, as a way to improve the quality of water resources.

### Basic Zoning Components

POSSIBLE SCORE: 54

TOTAL SCORE: 33, ADEQUATE

Burt Township’s general Zoning Ordinance seeks “To preserve natural resources, water quality and community scenic and recreational values.” (Article VI, 6.12) The Township utilizes a fee system that covers such things as zoning permits, ordinance interpretations, site plan reviews, and requests for PUDs, in order “to assist in defraying the costs of investigating, reviewing and administering zoning applications, appeals, rezoning requests from individual property owners, and other types of decisions which result in extra costs to the Township.” (Article IX, 9.05)

The Ordinance also notes, “Any person, partnership, limited liability company, corporation, association or other entity who creates or maintains a nuisance per se or who violates or fails to comply with this Ordinance or any permit issued pursuant to this Ordinance shall be responsible for a municipal civil infraction and shall be subject to a fine of not more than Five Hundred and 00/100 (\$500.00) Dollars.” (Article IX, 9.07) The Ordinance also allows the Township to seek “additional and/or equitable relief from any court to ensure compliance with the provisions of this ordinance.” Id.

The Zoning Ordinance is very clear when it comes to the coordination with other agency permits, stating that “a Zoning Permit shall not be issued until all other necessary permits required by statute have been obtained or waived.” [Article IX, 9.02(3)] Additionally, the Township identifies documents and drawings required for proposed land use developments, in order “to ensure that a proposed land use or development activity is in compliance with this ordinance, other local ordinances, and state and federal statutes and regulations.” (Article IV, 4.01)

The Township suggests pre-application meetings for site plan reviews and requires them for Planned Unit Developments [Article IV, 4.03(2), see also Article VII, 7.01 12(C)(1)]. As part of the site plan review, developers are required to identify “the location of existing environmental features, such as watercourses, wetlands, shorelines, man-made drains, mature specimen trees, wooded areas or any other unusual environmental features.” [Article IV, 4.03(3)(F)]

Additionally, the Site Plan Review requires statements relative to the impact of the proposed development on soil erosion, shoreline protection, wildlife habitat, air pollution, water pollution (ground and surface), noise and the scale of development in terms of the surrounding environment.” [Article IV, 4.03(3)(P)(3)] The Ordinance also requires that “all site plans shall comply with the terms of the Cheboygan County Soil Erosion Sedimentation and Stormwater Runoff Control Ordinance.” [Article IV, 4.03(3)(N)]

As indicated above, Burt Township utilizes Planned Unit Developments in their zoning. The standards for PUDs are found in the Supplemental Site Development Standards (Article VII, 7.01.12). The standards require that at least fifty (50) percent of the total land area be designated as dedicated Open Space [Article VII, 7.01 12(B)(d)]. The Ordinance does not specify requirements for the management of Open Space, but one of the goals of the PUD is “to promote the preservation of natural features. If animal or plant habitats of significant value exist on the site, the Planning Commission as a condition of approval may require that the Open Space development preserve these areas in a natural state and adequately protect them as nature preserves or limited access areas.” [Article VII, 7.01 12(B)(3)(b)] The site plan review process does not require developers to consult with the Michigan Department of Environmental Quality about threatened or endangered species in the area.

Further, in PUDs “the required Open Space shall be set aside by the developer in a conservation easement or deed restriction placed on the property, whereby the Open Space shall be developed according to an approved site plan. Said conveyance shall specify that the Open Space is an integral component in the overall development for the use and enjoyment of the residents within the Planned Unit Development.” [Article VII, 7.01 12(B)(d)]

### Basic Zoning Components: RECOMMENDATIONS

Burt Township has very strong water protection efforts included in its Zoning Ordinance, and we applaud these measures.

**SUGGESTED ACTION:** Consider a requirement that developers should consult with the Michigan Department of Environmental Quality about Threatened or Endangered Species on site.

### Shorelines

POSSIBLE SCORE: 60

TOTAL SCORE: 44, STRONG

Shoreline protection has been given priority status in Burt Township. The Ordinance states that in order “to preserve natural resources, water quality and community scenic and recreational values, a waterfront setback shall be established and maintained on all waterfront property. The setback area shall include all the land area located within seventy five (75) feet of the ordinary high water mark of a lake or a stream abutting or traversing the property in question.” (Article VI, 6.12)

Additionally, Burt Township sets a good example, in terms of Natural Vegetation Strips. In the County chapter, we discussed the need for the “suggested” vegetation strips to become a required element for County Zoning, in order to effectively protect water resources. The Burt Township ordinance states that “within twenty-five (25) feet of the ordinary high water mark, a natural vegetation strip **shall be** established or maintained on at least seventy percent (70%) of the lake or stream frontage for any new construction or any renovation that results in an increase of the structure footprint by five hundred (500) square feet or greater.” [Article 6.12(4)] (bold emphasis added)

This Natural Vegetation Strip provision does not explicitly prohibit the use of invasive and exotic species in the vegetation strip. However, it does state the following: “The use of pesticides, herbicides and fertilizers is prohibited in the natural vegetation strip (per item 4 above) or within twenty-five feet of ordinary high water mark for Burt Lake, except for the allowed limited use of herbicides for the eradication of poison ivy, poison sumac or

poison oak. Fertilizer used in the waterfront setback (75 feet), shall be zero phosphorus fertilizers.” [Article VI, 6.12 (5)]

The Township has worked to address shoreline density by regulating the number of docks per lot frontage. The ordinance allows “one boat dock per parcel shall be permitted on properties with up to 200 feet of lake frontage. For each additional 200 feet of lake frontage, the property owner shall be permitted one additional dock.” (Article VI, 6.11) The ordinance does not place restrictions on the number of motor crafts and rafts that are allowed per dock.

The Zoning Ordinance also specifically addresses private shared lake access, with an anti-funneling provision. The purpose of this section is as follows: “In order to restrict the number of users of lake frontage for the purpose of preserving the quality of Burt Lake, avoiding congestion and preserving the quality of the recreational use of Burt Lake, the owner of a waterfront lot abutting Burt Lake may provide legal access to the lake for nonwaterfront dwelling units only if all of the requirements of this section are met.” (Article VI, 6.10.3) Although dock size is not specifically regulated, the ordinance does state “Only one boat slip, mooring, boat hoist or any other means of anchorage shall be permitted for every approved nonwaterfront dwelling with lake access, and one for the waterfront lot.” [Article VI, 6.10.3(4)] Also: “No boat launch facilities shall be permitted on private shared access property.” [Article VI, 6.10.3 (6)]

### Shorelines: RECOMMENDATIONS

Burt Township has done a good job with shoreline protection measures. We have only two suggestions.

**SUGGESTED ACTION:** Require the use of native plant species in the Natural Vegetation Strip, and explicitly prohibit the use of invasive species.

**SUGGESTED ACTION:** There are currently no public marinas on Burt Lake or in the Township. The Township may want to require a special use permit for any newly constructed marinas. This will allow the Township to ensure that boat repair and maintenance activities in marinas are regulated to prevent contaminants and debris from falling into the water, and limit the spread of invasive species. This could also ensure that signs of leakage or spillage at fueling stations be investigated immediately, and cleanup is done in accordance with applicable Best Management Practices (BMPs).



## Impervious Surfaces

POSSIBLE SCORE: 33

TOTAL SCORE: 8, WEAK

The more a local government can do to reduce impacts from impervious surfaces, the better for water quality. Impervious surfaces include things like streets, roofs, sidewalks, etc. that generate much more stormwater runoff than natural land. These surfaces limit the ability for rainwater to naturally percolate into the soils, thus reducing the opportunity for contaminants to be removed from runoff before it flows into waters.

To reduce impervious surfaces, a community should increase the retention or restoration of native vegetation in riparian areas and in Open Spaces. Simple and effective solutions exist, ranging from rain barrels and rain gardens, to engineering approaches that treat stormwater before it discharges into the water. Additionally, the Zoning Ordinance should allow flexibility to reduce the number of parking spaces constructed, if warranted by the proposed development.

The Burt Township Schedule of Regulations dictates 20% maximum lot coverage in all residential zoning districts; 40% for commercial/industrial; and 2% for the Conservation-Recreation District (Article III, 3.09). However, in the Conservation-Recreation District “the Planning Commission may increase the lot coverage maximum to a total of five (5) percent, provided the Planning Commission finds the proposed project is for public benefit, located on public property.” (Article III, 3.09) There is no other mention of flexible lot coverage to decrease the amount of maximum coverage and encourage flexibility to limit impervious surfaces.

### Impervious Surfaces: RECOMMENDATIONS

**SUGGESTED ACTION:** Consider flexible lot coverage standards to allow creative approaches that limit impervious surfaces for both single lots and larger developments.

**SUGGESTED ACTION:** Consider reducing the parking space dimensions and setting them as a maximum. Also consider reducing the number of required parking spaces and setting the number as a maximum number, as opposed to a minimum.

**SUGGESTED ACTION:** Consider allowing for the reduction of parking requirements for shared parking. Also, require spillover parking areas to be pervious surfaces, or planted in grass. Consider requiring parking lot landscaping to be designed to help address pollutant removal from stormwater runoff (i.e. providing curb cuts to allow flow of stormwater into landscaped areas).

## Stormwater Management

POSSIBLE SCORE: 27

TOTAL SCORE: 27, STRONG

Burt Township does not have its own dedicated stormwater ordinance because it is covered by the strong Cheboygan County Stormwater Runoff Control Ordinance ([http://www.cheboygancounty.net/\\_\\_library/sessrc\\_ordinance.pdf](http://www.cheboygancounty.net/__library/sessrc_ordinance.pdf)). See Chapter 1 for details. We have no additional recommendations for this element.

## Soil Erosion and Sediment Control

POSSIBLE SCORE: 18

TOTAL SCORE: 18, STRONG

Like stormwater runoff, Burt Township does not have a stand-alone ordinance to address soil erosion and sediment control but instead defaults to County regulations ([http://www.cheboygancounty.net/\\_\\_library/sessrc\\_ordinance.pdf](http://www.cheboygancounty.net/__library/sessrc_ordinance.pdf)). Here again, the County Ordinance is strong; see Chapter 1. We have no additional suggestions.

### **Sewer/Septic**

POSSIBLE SCORE: 24

TOTAL SCORE: 15, ADEQUATE

Because “Burt Township does not have a public drinking water system or a public sewer disposal system” (Master Plan 5-1), it is not appropriate for the community to have a sewer service area. However, as the community does have septic systems within its jurisdictions, they have included protections to water resources regarding septic systems.

The ordinance states that septic systems may not be located within a waterfront setback, which is 75 feet. (Article VI, 6.12.6.) It also notes that the Master Plan states that “septic systems and wells are regulated by the Cheboygan County Health Department.” (Master Plan 5-1)

### **Septic/Sewer: RECOMMENDATIONS**

**SUGGESTED ACTION:** Educate residents about proper septic system management and encourage them to maintain septic systems on a regular basis.

**SUGGESTED ACTION:** Consider the benefits of enacting a county-wide “point of transfer” septic inspection ordinance, working in coordination with other local jurisdictions, the County, and the Health Department.

### **Wetlands**

POSSIBLE SCORE: 21

TOTAL SCORE: 0, MISSING

Wetlands are some of our most valuable water resources. They provide excellent wildlife habitat, help control flooding, and contribute to water quality protection. Wetlands are critical to the health of Burt Lake, and they are difficult to restore, once they are damaged or filled.

Although Michigan has a statewide wetland protection statute, not all wetlands are covered and not all activities that could impact wetlands are regulated. Local governments have the opportunity to supplement the state’s wetland protection program.

### **Wetlands: RECOMMENDATIONS**

**SUGGESTED ACTION:** Given the crucial role that wetlands play in overall water health, broadly educate citizens about the benefits of wetland protection.

**SUGGESTED ACTION:** Consider establishing a wetland setback of at least 25’, similar to shoreline setbacks. Couple this with the provision that state permits must be issued in regulated wetlands, before a Zoning permit is issued. Used this way, setbacks will help protect these valuable resources. Eventually, a local wetland ordinance could be enacted to fill in any gaps in state protection, if needed, to respond to future growth pressures.

## Groundwater and Wellhead Protection

POSSIBLE SCORE: 18

TOTAL SCORE: 8, ADEQUATE

Groundwater is the primary source of drinking water for nearly all Northern Michigan residents. Protecting groundwater resources from contamination is vitally important. Discharges to groundwater are regulated by the state under Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act (NREPA) 1994 PA 451, and Part 22 Rules. Any proposed discharges should be prohibited until required state permits are received by the applicant. Storage of hazardous material is also regulated under Part 5 Rules issued for Part 31. This includes Pollution Incident Prevention Plans, which can be efficiently coordinated with Local Emergency Planning Committee work.

Burt Township does not have municipal well fields. In order to ensure there are no unnecessary threats posed to groundwater by new or redevelopment proposals, the site plan review process may require an impact statement that includes “expected demands on community services, and how these services are to be provided, to specifically include: school classroom needs, volume of sewage for treatment, volume of water consumption related to ground water reserves or community system capacity.” [Article IV, 4.03 (3)(P)(2)]

### Groundwater and Wellhead Protection: RECOMMENDATIONS

**SUGGESTED ACTION:** Protect groundwater from potential contamination by requiring Pollution Incident Prevention Plans for storage of hazardous materials, in regular coordination with Local Emergency Planning Committee efforts, if not already in place.

**SUGGESTED ACTION:** If direct or indirect discharges to groundwater are proposed, use site plan review or some other ordinance provision to prohibit this until appropriate approvals or permits are obtained from the state.

## Other

POSSIBLE SCORE: 48

TOTAL SCORE: 24, ADEQUATE

Burt Township participates in the National Flood Insurance Program. The Township does not include any high risk erosion areas or critical dunes, as identified by the Department of Environmental Quality. We have no recommendations for this element.

## Conclusion

We applaud the water protection measures that exist in Burt Township. We also thank you for your time and attention in reading this chapter, and hope that our recommendations are helpful. However, if anything is unclear, please be sure to let us know. If you have any other questions related to this project, please contact Tip of the Mitt Watershed Council at (231) 347-1181.



*Cheboygan Lock System*

## SECTION III: Analysis

### Chapter 3 City of Cheboygan

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#### Introduction

The City of Cheboygan is an amazing location along the northern border of the County, on the shores of Lake Huron and the banks of the Cheboygan River. The community takes advantage of its magnificent surroundings and water resources. As noted on the Pure Michigan website, “Cheboygan is a year round community providing entertainment and activities for our visitors to participate in. We have cross-country skiing and snowmobile trails, area fishing opportunities, boating, beaches, a buffalo ranch, indoor ice pavilion, craft shows, concerts in the park, parade, a county museum, elk viewing, fall color tours, lighthouses along our Lake Huron shoreline and we are home of the Coast Guard Cutter Mackinaw which gives tours during the summer months.” (<http://www.michigan.org/city/cheboygan/>)

This chapter summarizes results of the Local Ordinance Gaps Analysis project for the City of Cheboygan and includes suggested actions. In accordance with the Literature Review, each Critical Element below is scored and ranked. The Project Evaluation and Analysis section of the Introduction to this book describes the scoring and ranking, and the entire completed checklist is available upon request.

#### Evaluation Scores and Summary: City of Cheboygan

##### Master Plan Components

POSSIBLE SCORE: 30

TOTAL SCORE: 15, ADEQUATE

The City of Cheboygan has a “strategic plan” that functions as a Master Plan, which was last updated in 2005 and can be found here: [http://www.nemcog.org/downloads/cheboygan\\_city\\_strat\\_plan\\_2005.pdf](http://www.nemcog.org/downloads/cheboygan_city_strat_plan_2005.pdf). Importantly, however, the City is currently in the early stages of updating this plan and has started taking community input. The website directs citizens in this way: “We are collecting citizen feedback about Cheboygan for the Master Plan. We have created topics for you to comment on. Add your comment to the map or see what your neighbors have said by clicking on the existing comments on the map below.” (<http://www.micommunityremarks.com/Cheboygan/#sthash.UrzmsTxH.dpuf>)

The strategic plan does not identify watersheds in which the community is located. One important strategic Objective included is this: “Improve water quality delivered by the City of Cheboygan Water Utility Service by implementing system improvement and operation recommendations based on sound thorough research.” (Strategic Plan, p. 8)

Additionally, another goal seeks to “provide a system of parks, open space and recreation opportunities.” (p. 9) Finally, this Objective was also included: “Conduct a planning process that includes all City infrastructure (streets, sidewalks, curbing, pathways) for both existing and proposed improvements.” (p. 6) Additional research indicates that much of this suggested planning has been done, so any results should be incorporated into the updated Master Plan. The results are not found on the website.

### Master Plan Components: RECOMMENDATIONS

Since the Master Plan update has now begun, this is a great opportunity to include some important water-related points.

**SUGGESTED ACTION:** Include a specific goal to protect water resources. Identify the fact that the City is located in two different watersheds: the Cheboygan River and Lake Huron.

**SUGGESTED ACTION:** The City should also identify stormwater management as a community goal, including minimizing the creation of new impervious surfaces and mitigating the effects of existing impervious surfaces in new construction and redevelopment projects.

**SUGGESTED ACTION:** The update should acknowledge the importance of well-constructed and maintained road-stream crossings, to prevent excessive sediment runoff from discharging into streams and lakes.

### Basic Zoning Components

POSSIBLE SCORE: 54

TOTAL SCORE: 37, STRONG

The general Zoning Ordinance for the City of Cheboygan is available at [http://www.amlegal.com/cheboygan\\_mi/](http://www.amlegal.com/cheboygan_mi/). The City utilizes a fee system to cover costs of zoning administration, which is detailed in Section 154.155. Although methods of enforcement are not explicitly laid out, the ordinance states that “The Zoning Administrator shall have the power to grant zoning compliance permits, to make inspections of buildings or premises necessary to carry out his or her duties in the enforcement of this chapter.” [154.150(B)]

There is also a Stormwater Flow Control ordinance that states “The issuance of a permit under this chapter does not relieve a property owner of the need to obtain other permits or approvals from federal, state, county and local agencies including soil erosion and sedimentation control under the applicable County Ordinance.” (156.05)

“A site plan review is required for any application for zoning compliance, with the exception of one-family development . . . and two-family development.” [154.045(B)] Site plans are required to identify “significant environmental features such as wetlands, shoreline, streams, wood lots, existing trees and vegetation.” [154.046(E)(14)] Additionally, site plans must include “a grading plan with topographic elevations of the area, showing a method of storm drainage in conformance with the Cheboygan County Soil and Sedimentation Ordinance.” [145.046(E)(11)]

Open Space is mentioned in required information for site plans as “all pedestrian walks, malls and open space,” [154.046(E)(7)] as well as “In order that building, open space and landscaping will be in harmony with other structures and improvements in the area...” [154.046(G)] Open Space is also noted in the Recreation Plan: “The goals relative to open spaces call for holding parks in perpetuity in order to provide open space as growth continues for the City of Cheboygan and the Cheboygan area.” And, “GOAL: Continue to hold parks as open spaces and keep in public hands in perpetuity. Continue to provide and improve public access to the Cheboygan River and Lake Huron. Enhance access and appreciation to coastal wetland area owned by the City of Cheboygan and maintain as a passive park and environmental area.” (City of Cheboygan Recreation Plan, Adopted March 13, 2012, Pages 5-6)

The City Ordinance also allows Planned Unit Developments (PUDs), 154.030, and its purpose includes: “encourage useful open space...” In the Subdivision Open Space Plan, the Open Space must be maintained so as “to provide a more desirable living environment by preserving the natural character of open fields, strands of trees, brooks, hills and similar natural assets.” [154.086(B)(1)] The Ordinance does not require Open Space to be protected by

conservation easements or other mechanisms, although the Recreation Plan calls for that, as noted in the prior paragraph.

There are flexible site design criteria and incentives available in One-Family Residential Districts, allowing the lot area to be reduced to an average of 6,000 square feet per lot, provided that the population density shall be no greater than if the land area to be subdivided were developed in the minimum square foot lot areas as required under R-1A Districts.” [154.086(A)(1)]

### Basic Zoning Components: RECOMMENDATIONS

**SUGGESTED ACTION:** The City should consider requiring Open Space areas to be protected by conservation easements or similar mechanisms, as called for in the Recreation Plan. Open Space should also be restricted to low impact uses.

**SUGGESTED ACTION:** The site plan review process should include a requirement to consult with the Michigan Department of Environmental Quality, to ensure that developments do not affect Threatened or Endangered Species.

### Shorelines

POSSIBLE SCORE: 60

TOTAL SCORE: 8, WEAK

There is very little included in the City’s Zoning Ordinance that refers to shoreline protection for either the Great Lake’s coastline or inland streams. This is something that should be addressed because the City has great potential to impact these water resources. Shorelines are vital areas to the health of water resources, as noted in the Literature Review.

The Zoning Ordinance does address marinas in section 154.070. This is the Waterfront-Marina District, which places limits on the types of land use and buildings that can be erected within such an area (154.070). This district is “designed to accommodate recreational boating along with activities and services related to harbor and waterway improvements, thereby facilitating navigation and providing safe and economical waterfront, recreational development.” (154.070) In addressing where boat repair and maintenance activities can take place, it requires engine and hull repair to take place in completely enclosed buildings, or enclosed with a six feet high masonry wall or 10 foot wide greenbelt [154.070(C)(1)]. It does not have strict requirements for fueling stations, in terms of spill containment, but all boat fuel stations must be located at least 200 feet from any residential district [154.0708(C)(2)].

### Shorelines: RECOMMENDATIONS

**SUGGESTED ACTION:** Require waterfront setbacks and Natural Vegetation Strips for waterfront properties on lakes and streams. Prohibit invasive species from being used in the vegetation strip.

**SUGGESTED ACTION:** Restrict boat repair and maintenance activities in marinas to clearly marked areas, to prevent contaminants and debris from falling into the water and limit the spread of invasive species. Also, require marina fueling stations to have spill containment equipment that is stored in a clearly marked location. Require a spill contingency plan and post emergency phone numbers in a prominent location. Finally, signs of leakage or spillage should be investigated immediately, and cleaned up in accordance with applicable Best Management Practices (BMPs).

## Impervious Surfaces

POSSIBLE SCORE: 33

TOTAL SCORE: 5, WEAK

The more a local government can do to reduce or limit new impervious surfaces, the better for water quality. Impervious surfaces (streets, roofs, sidewalks, etc.) generate much more stormwater runoff than natural, forested, or even agricultural land uses. They stop rainwater and snowmelt from naturally percolating into soils, reducing the opportunity for contaminants to be removed from the resulting stormwater runoff, before it flows into lakes, rivers, and wetlands.

Substances finding their way onto rooftops, driveways, streets, and sidewalks are likely to be washed into waters by rainfall and snowmelt. This includes things like bacteria from pet and animal wastes, fertilizer, oil and grease, sediment, heavy metals, salt, etc. Mitigating impacts from existing impervious surfaces and limiting new ones help to keep waters clean.

One low cost approach to doing so is to retain or restore native vegetation in riparian areas and in Open Spaces. Minimizing impervious surfaces can be also addressed in creative and cost-effective ways, ranging from using Low Impact Design (LID) techniques in development plans, to incentives for limiting impervious lot coverage. Lot design and general development provisions in Zoning Ordinances provide great opportunities to encourage alternatives to and reductions of impervious surfaces, such as shared driveways.

### Impervious Surfaces: RECOMMENDATIONS

**SUGGESTED ACTION:** The Zoning Ordinance should allow more flexibility to reduce the number of parking spaces constructed, if warranted by the proposed development. Further, it should also require some portion of proposed parking lots to be planted with vegetation within the parking lot paving. Finally, allow the location of bioretention, rain gardens, filter strips and swales in parking lots, required setback areas, and common areas, as appropriate.

**SUGGESTED ACTION:** Provide incentives for using LID techniques to mitigate the impacts of impervious surfaces.

## Stormwater Management

POSSIBLE SCORE: 27

TOTAL SCORE: 27, STRONG

The City of Cheboygan has a dedicated Stormwater Flow Control Ordinance, Section 156, which is supplemented by the County's Soil Erosion and Sedimentation Control Ordinance ([http://www.cheboygancounty.net/\\_library/sessrc\\_ordinance.pdf](http://www.cheboygancounty.net/_library/sessrc_ordinance.pdf)). Together these ordinances provide great protection to the water resources of the area. The City ordinance requires coordination with all other relevant agencies and governments, stating "the issuance of a permit under this chapter does not relieve a property owner of the need to obtain other permits or approvals from federal, state, county and local agencies including soil erosion and sedimentation control under the applicable County Ordinance." (156.05)

Stormwater management areas and facilities must be "designed to provide for non-erosive velocities of Stormwater flow." [156.07(C)] Further, "stormwater control facilities that discharge to a stream, lake or wetland, shall have an adequately designed discharge system to prevent scouring, flooding or pollution on-site or downstream." [156.07(F)(m)] Stormwater management systems must be designed by calculating the required volume "by comparing the undeveloped conditions from a two-year, 24-hour frequency storm event at 2.2 inches per 24 hours to the developed condition for a 25-year, 24-hour frequency storm event at 3.3 inches per 24 hours." [156.07(F)(1)(g)]

The ordinance states that “no direct or indirect discharge of Stormwater to receiving bodies of water, including lakes, streams or wetlands shall be allowed unless sediment and/or greases and/or other physical objects are trapped prior to discharge and stormwater flows are limited to non-erosive velocities.” [156.07(F)(2)(c)] Additionally, “construction of floor drains, storm drains, drainage wells, septic systems or other conduits by which stormwater or washwater containing oil, grease, toxic chemicals or other hazardous substances may be discharged are prohibited. This does not include occasional and non-deliberate fluid release from vehicles in parking lots.” [156.07(F)(2)(e)]

We have no additional recommendations for this element.



### Soil Erosion and Sediment Control

POSSIBLE SCORE: 18

TOTAL SCORE: 18, STRONG

The City does not have a standalone ordinance to address soil erosion and sediment control but instead defaults to County regulations ([http://www.cheboygancounty.net/\\_\\_library/sessrc\\_ordinance.pdf](http://www.cheboygancounty.net/__library/sessrc_ordinance.pdf)). Here again, the County ordinance is strong; see Chapter 1. We have no additional suggestions.

### Sewer/Septic

POSSIBLE SCORE: 24

TOTAL SCORE: 17, STRONG

The City has the following website, devoted to Water & Wastewater Departments: <http://www.cheboygan.org/water.php>. The site notes “The City of Cheboygan Water Department maintains approximately 49 miles of distribution piping, four production wells and one 500,000-gallon water storage tower. The average daily production is approximately 910,000 gallons. ... There are approximately 2,021 residential and commercial billing accounts. The Department also serves several customers outside of the city limits, per established intergovernmental agreements. The City's water is supplied via groundwater. ...” (More about the water supply can be found in the Groundwater Element below)

The City also addresses septic system safety. The Ordinance states “septic tanks shall be located at least 50 feet from any well, spring, pump, water service line, surface water, natural or artificial drain, or open joint subsurface ground water tile drain” [53.13(C)], and that “seepage pits, and sub-surface drainage fields shall be located at least 50 feet from any surface water, natural or artificial drain, or open joint subsurface ground water tile drain unless special design approval has been obtained from the City Health Officer.” [53.13(D)]

The ordinance gives the authority of inspection of septic systems to the City Health Office which “shall have authority to require that ample notice be given to the Health Officer to permit inspection of the installations prior to backfilling, to regulate the use, operation and maintenance of any and all septic tanks in said city, to order the tanks to be cleaned, repaired, or reconstructed or further use discontinued when, in his judgment, the use, operation or maintenance of any septic tank shall be unhealthful or harmful.” (53.12) Finally, the City ordinance also requires coordination with the County Health Department stating “no septic tanks shall be constructed or installed within the city unless the plans for the installation are approved by the City of Cheboygan Health Officer as conforming to the regulations.” 53.11.

We have no additional recommendations.

## Wetlands

POSSIBLE SCORE: 21

TOTAL SCORE: 0, MISSING

It is understandable that wetlands are not mentioned or addressed in City Zoning, because they are rare. However, they do exist in places, and should be protected and kept intact, where possible. The benefits of wetlands are numerous. They provide excellent wildlife and bird habitat, help control flooding, and protect water quality by absorbing stormwater runoff.

Although Michigan has a statewide wetland protection statute, not all wetlands are covered and not all activities that could impact wetlands are regulated. Local governments can support wetland protection through zoning and by requiring wetland permits from state and federal agencies, prior to granting local zoning permits.

### Wetlands: RECOMMENDATIONS

**SUGGESTED ACTION:** Given the important role that wetlands play in protecting water quality, providing habitat, and minimizing flooding, it is beneficial to educate citizens on the importance of protecting wetlands.

**SUGGESTED ACTION:** Make it clear that permits are required for any state or federally regulated wetlands in the City, before any permit on a wetland parcel is issued, regardless of the zoning district. An applicant should be required to demonstrate that disturbing the wetland does not require a state or federal permit.

**SUGGESTED ACTION:** Consider establishing a 25' wetland setback similar to shoreline setbacks, to help protect wetlands in the City.



## Groundwater and Wellhead Protection

POSSIBLE SCORE: 18

TOTAL SCORE: 9, ADEQUATE

The Michigan State Wellhead Protection Program helps local communities protect their water sources, if they use groundwater for their drinking water supply systems. There are two types of plans that can be submitted for approval. The first is a Source Water Protection Area, which designates plans that are done for community well fields that do not test positive for tritium, a radioactive isotope of hydrogen. If the tritium test is positive, a Wellhead Protection Area plan is done, which is a more extensive process. The City of Cheboygan is a Source Water Protection Area.

Additionally, groundwater is the primary source of drinking water for nearly all Northern Michigan residents. Protecting groundwater resources from contamination is vitally important. Discharges to groundwater are regulated by the state under Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act (NREPA) 1994 PA 451, and Part 22 Rules. Any proposed discharges should be prohibited until required state permits are received by the applicant. Storage of hazardous material is also regulated under Part 5 Rules issued for Part 31. This includes Pollution Incident Prevention Plans, which can be efficiently coordinated with Local Emergency Planning Committee work.

### Groundwater and Wellhead Protection: RECOMMENDATIONS

**SUGGESTED ACTION:** If not already done, protect groundwater from potential contamination by requiring Pollution Incident Prevention Plans for storage of hazardous materials, in regular coordination with Local Emergency Planning Committee efforts.

## Other

POSSIBLE SCORE: 48

TOTAL SCORE: 36, STRONG

The City of Cheboygan participates in the National Flood Insurance Program (NFIP). The County provides help to jurisdictions that enroll in NFIP by doing building code enforcement, in addition to offering Soil Erosion and Sediment Control services and GIS for help with mapping, etc. We have no additional recommendations on this element, which also includes High Risk Erosion Areas and Critical Dunes. Neither of those is present in Cheboygan County.

## Conclusion

We applaud the water protection measures that exist in the City of Cheboygan. We also thank you for your time and attention in reading this chapter, and hope that our recommendations are helpful. However, if anything is unclear, please be sure to let us know. If you have any other questions related to this project, please contact Tip of the Mitt Watershed Council at (231) 347-1181.



*Lake Huron*

## SECTION III: Analysis

### Chapter 4 Village of Mackinaw City

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#### Introduction

The breathtaking Village of Mackinaw City has an unusual geographic location that straddles two counties. As noted in the Master Plan: “The Village encompasses 3.2 square miles, and the land area is divided between two geographic townships. The eastern portion is 0.6 square miles in size and consists of Sections 7 and 18 of T39N-R3W (Mackinaw Township in Cheboygan County). The western portion is 2.6 square miles in size and is made up of Sections 11, 12, 13 and 14 of T39N-R4W (Wawatam Township in Emmet County).” [Village of Mackinaw City, Mich., Master Plan, Ch. 1, Location and History, at 1-1 (2011), <http://www.mackinawcity.org/plans-and-reports-40/>]

“The Village of Mackinaw City is a resort community located on the shores of the Straits of Mackinac at the tip of Michigan’s Lower Peninsula. Mackinaw City is a great place to live, work, and visit with beautiful scenic views of the Great Lakes, Mackinac Bridge, and countryside. The Village is host to over 1.2 million visitors each year who enjoy the Village’s scenic beauty, 100+ retail shops, exciting attractions, marinas, great restaurants, hotels, bed and breakfasts, and campgrounds.” (Village of Mackinaw City website, <http://www.mackinawcity.org/index.php>)

This chapter summarizes results of the Local Ordinance Gaps Analysis project for the Village. It summarizes the evaluation scores, makes recommendations and includes suggested actions. In accordance with the Literature Review, each Critical Element below is scored and ranked. The Project Evaluation and Analysis section of the Introduction to this book describes the scoring and ranking, and the entire completed checklist is available upon request.

#### Evaluation Scores and Summary: Village of Mackinaw City

##### Master Plan Components

POSSIBLE SCORE: 30

TOTAL SCORE: 21, STRONG

The Village of Mackinaw City has a Master Plan, approved in 2011. It states that “[t]he Village is located within the Great Lakes’ watershed. The major surface water resources in Mackinaw City are Lake Michigan and Lake Huron.” [Village of Mackinaw City, Mich., Master Plan, Ch. 3, Water Resources, at 3-3 (2011), <http://www.mackinawcity.org/plans-and-reports-40/>]

Chapter three states that “[t]he major surface water resources in Mackinaw City are Lake Michigan and Lake Huron. Within the Village there are 2.3 miles of Lake Michigan shoreline, and 1.8 miles of Lake Huron shoreline. There are no inland lakes or rivers within the Village limits, however there are three ponds in the east and central portion of the Village... Both groundwater and surface water are vital resources within the Village of Mackinaw City.” *Id.*

The first goal of the Natural Resources section of the Master Plan is: “Protect sensitive natural resources from inappropriate development. [Its objective is to] [r]equire natural feature inventories for new developments near sensitive natural resource areas; Establish setbacks from natural features including wetlands; Limit density of development permitted with environmentally sensitive areas; Consider potential for groundwater contamination as part of rezoning and special use decisions.” (Master Plan, Ch. 11, at 11-5)

The second goal is: “Enhance future development through incorporation of natural features. [The objective is to] [l]ink natural features and open spaces to create a greenway system; Encourage development that preserves open space and lake views; Establish landscape standards that encourage the use of vegetation that compliments existing natural areas.” Id.

The third goal is: “Preserve open spaces, viewshed, natural beauty and critical environmental areas. [Its objectives are to] [i]dentify sensitive environmental areas and viewsheds and target them for public purchase or establishment of private conservation easements; Establish standards that minimize disruption of natural site topography and drainage; Incorporate incentives for open space and viewshed preservation into zoning and subdivision control requirements.” Id.

The final goal is: “Increase public awareness of environmental impacts of development. [The objective is to] [e]ducate landowners on techniques for reducing nutrient run-off and erosion from everyday activities and on appropriate landscaping in areas adjacent to the lakeshore and other environmentally sensitive areas.” Id. This is a very good recommendation.

### Master Plan Components: RECOMMENDATIONS

**SUGGESTED ACTION:** In the next update of the Master Plan, the Village should consider calling for minimizing impervious surfaces in new construction and redevelopment projects, to reduce stormwater runoff and improve infiltration.

#### Basic Zoning Components

POSSIBLE SCORE: 54

TOTAL SCORE: 37, STRONG

The Village’s Zoning Ordinance includes major components needed for strong water protections. For example, it has a fee system to cover costs to the community for review of proposal applications or appeals, including any professional reviews. The Zoning Ordinance states that “[f]ees shall be charged for the issuing of such zoning permits... listed on the Permit and Application Fee Schedule held by the Village Clerk and Zoning Administrator or Community Development Director.” [Mackinaw City, Mich., Zoning Ordinances, art. XXIV, § 24-109(H), at 113, <http://www.mackinawcity.org/ordinances-39/>]

It also has methods in place for enforcement. Article XXIV states that “[b]uildings or structures erected, altered, razed, or converted, or uses carried on in violation of any provision of this Ordinance are declared to be a nuisance per se... any and every violation of the provisions of this ordinance; the responsible parties of the land/building shall be guilty of a misdemeanor...” [Mackinaw City, Mich., Zoning Ordinances, art. XXIV, § 24-102(A)-(B), at 107-108, <http://www.mackinawcity.org/ordinances-39/>]

The Zoning Ordinance also requires a pre-application or pre-construction meeting for new development or redevelopment proposals. Article XXIII states that “[p]reapplication Conference with Planning Commission for Concept Review. Prior to formal application submission for a special use permit for a proposed planned development, the developer/applicant shall be required to make a presentation to the Planning Commission in order to discuss initial design concepts and the application of said concepts to the land in question.” [Mackinaw City, Mich., Zoning Ordinances, art. XXIII, § 23-102(Q), at 93, <http://www.mackinawcity.org/ordinances-39/>]

The Village proposal review process is also coordinated with the receipt of other applicable County, State, and/or Federal permits. For example, required coordination on septic systems is cited below, as is the effort to coordinate on wetland permits. Also: “The site plan shall be reviewed by the Planning Commission and other appropriate bodies as heretofore designated with a recommendation for its approval or disapproval and any conditions the Planning Commission or other appropriate bodies feel should be imposed.” [Mackinaw City, Mich., Zoning Ordinances, art. IV, § 4-117(F), at 47, <http://www.mackinawcity.org/ordinances-39/>]

Site Plan Review, Article IV, requires the plan to include “Significant environmental features such as wetlands, shoreline, streams, wood lots, existing trees and vegetation.” Additionally, “In order that building, open space and landscaping will be in harmony with other structures and improvements in the area: ... Recreation and open space areas shall be provided in all multiple family residential developments.” [Mackinaw City, Mich., Zoning Ordinances, art. IV, § 4-117(D)(15), at 46; § 4-117(E)(3), at 47, <http://www.mackinawcity.org/ordinances-39/>] The site plan review process does not require developers to consult with the Michigan Department of Environmental Quality about threatened or endangered species on site.

The Village Zoning Ordinance also includes Planned Unit Development (PUD) provisions, which require inclusion of a minimum Open Space threshold. Article XXIII states that “[a] minimum of twenty five (25) percent of the land developed in any planned unit development project shall be reserved for common greenspace and recreational facilities for the residents or users of the area being developed.” [Mackinaw City, Mich., Zoning Ordinances, art. XXIII, § 23-102(I)(1), at 91, <http://www.mackinawcity.org/ordinances-39/>] Allowable uses in the open space are not restricted to low impact uses.

Finally, flexible site design criteria or incentives are available to encourage developers to include open space or cluster design provisions. See Mackinaw City, Mich., Zoning Ordinances, art. XXIII, § 23-102(E), at 90, <http://www.mackinawcity.org/ordinances-39/>.

### Basic Zoning Components: RECOMMENDATIONS

**SUGGESTED ACTION:** The Site Plan Review process should require developers to consult with the Michigan Department of Environmental Quality about threatened or endangered species on site.

**SUGGESTED ACTION:** Allowable uses in the Open Space should be restricted to low impact uses.



**Shorelines**

POSSIBLE SCORE: 60

TOTAL SCORE: 21, ADEQUATE

Two of the most effective ways for a local government to protect water quality through zoning is to require setbacks from the water's edge, and require a shoreline protection strip. Both of these measures also protect shoreline habitat. The shoreline protection strip, also called a vegetative buffer zone, requires native vegetation between the water and the upland land use.

The only shorelines in the Village of Mackinaw City are along the coasts of Lake Huron and Lake Michigan. The Zoning Ordinance addresses setbacks this way: Article XXII states that “[r]ear yard setback of all waterfront parcels within the B2 District between Barbara Street and the Village limits shall be forty (40) feet from the ordinary high water mark (579.8 International Great Lakes Datum) as established by P.A. 247 of 1955.” [Mackinaw City, Mich., Zoning Ordinances, art. XXII, § 22-102(K), at 87, <http://www.mackinawcity.org/ordinances-39/>]

There is not a requirement in the Ordinance, however, for a shoreline protection strip of native plant species.

The Emmet County portion of the Village is covered by the County’s *Phragmites* Control Ordinance for the Lake Michigan shoreline. Emmet County passed an “[o]rdinance to Control and eradicate *Phragmites* along the Lake Michigan shoreline in accordance with Sec 10 of 1941 PA 359, as amended, by providing for the appointment of a *Phragmites* administrator, inspection and reports; by providing for the designation of *Phragmites* eradication zones for *Phragmites* treatment, using procedures intended to comply with Federal and State due process requirements before including private property in such zones; by providing for the required permit application for such treatment; and by providing for payment of permit fees and other costs.” [Emmet County, Mich., Zoning Ordinance, no. 10-2 (2010), <http://www.emmetcounty.org/uploads/Phragmites.pdf>]

The Village minimally regulates marinas using the Marina Commercial District. See Mackinaw City, Mich., Zoning Ordinances, art. XIX, §§ 19.01-.03 at 81, <http://www.mackinawcity.org/ordinances-39/>.

**Shorelines: RECOMMENDATIONS**

**SUGGESTED ACTION:** Maintaining native vegetation along the shoreline is critical to preserving water quality and providing wildlife habitat. Shoreline protection strip provisions should be required in all shoreline districts in the Village, with some exception. In the exception areas, however, low cost and effective methods can and should be used to mitigate the impacts of polluted stormwater runoff directly into the city lakes and streams.

**SUGGESTED ACTION:** Encourage a minimum depth of 25 feet for all Shoreline Protection Strips. Require the maintenance and re-establishment of native vegetation and prohibit the use of invasive species.

**SUGGESTED ACTION:** Restrict boat repair and maintenance activities in marinas to clearly marked areas to prevent debris from falling into the water and prevent the spread of invasive species.

**SUGGESTED ACTION:** Require marina fueling stations to have spill containment equipment that is stored in a clearly marked location. Also require a spill contingency plan, and post emergency phone numbers in a prominent location. Finally, signs of leakage or spillage should be investigated immediately, and undertake cleanup in accordance with applicable Best Management Practices (BMPs).

## Impervious Surfaces

POSSIBLE SCORE: 33

TOTAL SCORE: 7, WEAK

Impervious surfaces prevent infiltration of stormwater, and that significantly alters the quantity, quality and rate of stormwater entering surface waters. Conversely, pervious surfaces, such as unpaved ground, slow the movement of stormwater, allowing sediments, nutrients and other contaminants to infiltrate rather than flow directly into the receiving water body.

The Master Plan includes this positive note: “[T]he Village may incorporate [Leadership in Energy and Environmental Design] recommended site improvement standards such as pervious surfaces and other low-impact design features to reduce stormwater run-off.” [Village of Mackinaw City, Mich., Master Plan, ch. 9, Building Design and Rehabilitation, at 9-2 (2011), <http://www.mackinawcity.org/plans-and-reports-40/>]

The Zoning Ordinance does partially address these concerns, using Open Space. Article IV states that “[d]evelopment occurring within the RM, B1, B2, MR, MRS, BC, MC, and CR Districts shall require a minimum of twenty-five (25) percent of parcel to be landscaped open space, also called greenspace.” [Mackinaw City, Mich., Zoning Ordinances, art. IV, § 4-114, at 40, <http://www.mackinawcity.org/ordinances-39/>]

### Impervious Surfaces: RECOMMENDATIONS

**SUGGESTED ACTION:** The Zoning Ordinance should allow more flexibility to reduce the number of parking spaces constructed, if warranted by the proposed development. Further, it should also require some portion of proposed parking lots to be planted with trees/vegetation within the parking lot paving. Finally, it should allow the location of bioretention, rain gardens, filter strips and swales in parking lots, required setback areas, and common areas, as appropriate.

**SUGGESTED ACTION:** Provide incentives for using LID techniques to mitigate the impacts of impervious surfaces.

## Stormwater Management

POSSIBLE SCORE: 27

TOTAL SCORE: 27, STRONG

Closely related to impervious surfaces is the topic of stormwater runoff and management. Local governments can do much to reduce polluted stormwater runoff as part of their zoning ordinance, and they should. Stormwater runoff from buildings, driveways, parking lots, streets, and other impervious surfaces is a major source of pollutants to Northern Michigan’s waterways.

The Village of Mackinaw City does address stormwater runoff. As noted in the Master Plan, “The Village has a stormwater collection and drainage system for many of the Village streets as shown in Figure 4-4. There are 16 outfall points, with four to Lake Michigan and 12 to Lake Huron. The outfall sizes range from 12" diameter to 30" diameter, and there are also two box culverts that empty to Lake Huron. The Village has also utilized leaching basins in lieu of storm sewer for portions of the northeast residential streets. The majority of the storm drainage system is controlled by the Village, however, Michigan Department of Transportation (MDOT) has jurisdiction on I-75 drainage and a portion of the most recently constructed discharge point is private, serving the Mackinaw Crossings. One discharge point handles the overflow from Dry-dock Lake.” [Village of Mackinaw City, Mich., Master Plan, Ch. 4, Community Services, Facilities, and Organizations, at 4-6 (2011), <http://www.mackinawcity.org/plans-and-reports-40/>].

Also, the Village General Ordinance states that “[n]o unauthorized person shall uncover, make any connection with or opening into, use, alter or disturb any storm sewer or appurtenance thereof without first obtaining a written permit from the Village Superintendent. All costs and expense incident to the installation and connection to the storm drain shall be borne by the property owner. Plans for all connections to the storm drain shall be submitted to the Village Superintendent before construction is undertaken.” [Mackinaw City, Mich., General Ordinances, part. 23, Ch. 25.210, § 10, (1)-(3), <http://www.mackinawcity.org/ordinances-39/>]

Additionally, “All permits for operations in or affecting watercourses or wetlands shall be referred to the Village engineer who shall report back to the Council as to what effect the proposed operation may have on the subject property, adjacent properties, other properties in the watershed or any public properties, including streets, sewers, parks, drains, etc. He shall also evaluate whether adequate provision has been made for flooding and spring melt-offs.” [Mackinaw City, Mich., General Ordinances, part. 35, Ch. 35.358, § 8, <http://www.mackinawcity.org/ordinances-39/>]

The Village of Mackinaw City is also covered by the strong Cheboygan County Stormwater Runoff Control Ordinance ([http://www.cheboygancounty.net/\\_\\_library/sessrc\\_ordinance.pdf](http://www.cheboygancounty.net/__library/sessrc_ordinance.pdf)). See Chapter 1 for details. We have no additional recommendations for this element.

### Soil Erosion and Sediment Control

POSSIBLE SCORE: 18

TOTAL SCORE: 18, STRONG

The Village of Mackinaw City requires a permit or site plan approval prior to earth changing actions adjacent to water features, wetlands, or storm drains. The General Ordinance Part 35 notes a permit is needed “to regulate and control changes in the man-made or natural terrain including those which affect watercourses, wetlands or drains.” [Mackinaw City, Mich., General Ordinances, part. 35, Ch. 35.350, <http://www.mackinawcity.org/ordinances-39/>. See also Mackinaw City, Mich., General Ordinances, part. 35, Ch. 35.364, § 14, <http://www.mackinawcity.org/ordinances-39/>]



*Straits of Mackinac*

All properties that are located near streams, wetlands, or drainage ways have the potential to erode and cause sedimentation to nearby waters. At the state level, Part 91 of the Natural Resources and Environmental Protection Act 1994 PA 451, as amended, addresses Soil Erosion and Sedimentation Control (SESC). From Part 91, a state program was implemented to regulate the pollution of Michigan waters, due to improper construction site management practices, including improper stormwater runoff.

Counties are mandated to administer and enforce Part 91, and Cheboygan County has two state-recognized agencies that do so: The Soil Erosion Control Officer and the County Road Commission. If any project is within 500 feet of a lake or stream, or if a project disturbs more than one acre of earth, applicants are required to contact the County's Soil Erosion Control Officer for a permit.

We have no recommendations for this element.

**Sewer/Septic**

POSSIBLE SCORE: 24

TOTAL SCORE: 9, ADEQUATE

The Village has a delineated Sewer Service Area that has been mapped. Additionally, it is expected that residences and businesses with septic systems address siting and permitting issues with the Health Departments of either Emmet or Cheboygan County, depending on the septic location. Chapter four of the Master Plan states that “[t]he existing water and sewer distribution system is mapped in Figure 4-2 and 4-3. Currently, outlying areas not served by the existing municipal water and sewer systems must rely on individual wells and private on-site septic systems. Appropriate location and permitting of these systems is handled by the appropriate District Health Department.” [Village of Mackinaw City, Mich., Master Plan, Ch. 4, Water and Sewer Systems, at 4-2, 4-3 (2011), <http://www.mackinawcity.org/plans-and-reports-40/>]

Additionally, the General Ordinance states, “Where a public sanitary sewer or combined sewer is not available under Section 2, Subsection 4, the building sewer shall be connected to a private sewage disposal system as approved by the District Public Health Department.” [Mackinaw City, Mich., General Ordinances, part. 25, Ch. 25.203, § 3(1), <http://www.mackinawcity.org/ordinances-39/>]

**Sewer/Septic: RECOMMENDATIONS**

**SUGGESTED ACTION:** Educate residents about proper septic system management and encourage them to maintain septic systems on a regular basis.

**SUGGESTED ACTION:** Consider the benefits of enacting a “point of transfer” septic inspection ordinance, working in coordination with the County, other municipalities, and the Health Department.

**Wetlands**

POSSIBLE SCORE: 21

TOTAL SCORE: 8, ADEQUATE

As noted in the Village Master Plan, the benefits of wetlands are numerous. “Residents of Michigan are becoming more aware of the value of wetlands. Beyond their aesthetic value, wetlands improve water quality of lakes and streams by filtering polluting nutrients, organic chemicals and toxic heavy metals. Wetlands are closely related to high groundwater tables and serve to discharge or recharge aquifers. Additionally, wetlands support wildlife, and wetland vegetation protects shorelines from erosion.” [Village of Mackinaw City, Mich., Master Plan, Ch. 3, Water Resources, at 3-7 (2011), <http://www.mackinawcity.org/plans-and-reports-40/>]

There is no general setback requirement for development near wetlands but Article XXIII, the Zoning Ordinance requirements for PUDs, includes: “All sensitive natural features such as drainageways, streams, wetlands, lands with 100 yr flood plains, land on slopes of 12% or > and stream / river banks shall remain unencumbered by residential building structures.” [Mackinaw City, Mich., Zoning Ordinances, art. XXIII, § 23-102(J)(4), at 46, <http://www.mackinawcity.org/ordinances-39/>]

Mackinaw City is very specific about requiring state and federal wetland permits, where appropriate. For example, the Master Plan notes, “Existing wetlands areas are found primarily in the undeveloped portions of the Village, most notably in areas immediately west of I-75. Wetlands which meet statute criteria under Michigan’s Wetland Protection Act are regulated by the State and require a permit before draining, filling, dredging or construction.” [Village of Mackinaw City, Mich., Master Plan, Ch. 3, Water Resources, at 3-7 (2011), <http://www.mackinawcity.org/plans-and-reports-40/>]

Additionally, in order to prevent the creation of unbuildable lot splits that consist of mostly wetlands, the General Ordinance states that “[u]nless a division creates a parcel which is acknowledged and declared to be ‘not buildable’ under Section 8 [17.058] of this Ordinance, all divisions shall result in ‘buildable’ parcels containing sufficient ‘buildable’ area outside of unbuildable wetlands, flood plains and other areas where buildings are prohibited there from, and with sufficient area to comply with all required setback provisions, minimum floor area, off-street parking spaces, on-site sewage disposal and water well locations (where public water and sewer service is not available), and maximum allowed area coverage of buildings and structures on the site.” [Mackinaw City, Mich., General Ordinances, part. 17, Ch. 17.055, § 5(H), <http://www.mackinawcity.org/ordinances-39/>]

### **Wetlands: RECOMMENDATIONS**

**SUGGESTED ACTION:** Given the important role that wetlands play in protecting water quality, providing habitat, and minimizing flooding, it is beneficial to educate citizens on the importance of protecting wetlands.

**SUGGESTED ACTION:** Per the Village Master Plan recommendations, consider establishing a wetland setback of 25’ to help protect wetlands in Mackinaw City.

### **Groundwater and Wellhead Protection**

POSSIBLE SCORE: 18

TOTAL SCORE: 15, STRONG

As noted earlier in this book, the Michigan State Wellhead Protection Program assists local communities to protect their water sources, if they use ground water for their drinking water supply systems. There are two types of plans that can be submitted for approval. The first is a Source Water Protection Area, which designates plans that are done for community well fields that do not test positive for tritium, a radioactive isotope of hydrogen. If the tritium test is positive, a Wellhead Protection Area plan is done, which is a more extensive process. The Village of Mackinaw City is one of nine communities in Emmet County that have taken part in this program.

“Our water comes from four groundwater wells. These wells are located throughout the village... In 2004 the state approved the Village of Mackinaw City’s ‘Wellhead Protection Plan’. The 4 production wells... obtain ground water from an aquifer that would be characterized as moderately high susceptibility to contamination. The State performed an assessment of our source water in 2003.” [Annual Drinking Water Quality Report, Village of Mackinaw City, January 1, 2011 through December 31, 2011; <http://www.mackinawcity.org/water-quality-reports-88/>]

The General Ordinance states that “[i]t shall be the duty of the Mackinaw City Water Department to cause inspections to be made of all properties served by the public water supply where cross connection with the public water supply is deemed possible. The frequency of inspections and re-inspections based on potential health hazards involved shall be as established by the Water Department and as approved by the Michigan Department of Environmental Quality.” [Mackinaw City, Mich., General Ordinances, part. 25, Ch. 25.152, § 2, <http://www.mackinawcity.org/ordinances-39/>]

We have no additional recommendations for this element.

## Other

POSSIBLE SCORE: 48

TOTAL SCORE: 24, ADEQUATE

The Village participates in the National Flood Insurance Program (Federal Emergency Management Agency Community Status Book Report Michigan, Communities Participating in the National Flood Program, CID No. 260675, <http://www.fema.gov/cis/MI.pdf>).

Also noted above was Ordinance language regarding development of floodplain by PUDs [Mackinaw City, Mich., Zoning Ordinances, art. XXIII, § 23-102(J)(4), at 46, <http://www.mackinawcity.org/ordinances-39/>].

We have no further recommendations for this element.

## Conclusion

We applaud the strong water protection measures that exist in the Village of Mackinaw City. We also thank you for your time and attention in reading this chapter, and hope that our recommendations are helpful. However, if anything is unclear, please be sure to let us know. If you have any questions related to this project, please contact Tip of the Mitt Watershed Council at (231) 347-1181.



Photo Credit: Wikipedia/Royalbroil



*Sturgeon River*

## SECTION III: Analysis

### Chapter 5 Village of Wolverine

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#### Introduction

The charming Village of Wolverine is located in the southwestern portion of Cheboygan County, straddling both Wilmot and Nunda Townships. It is nestled along the spectacular Sturgeon River. Other notable water resources include the West Branch of the Sturgeon River, and nearby Silver Lake and Wildwood Lake.

This chapter presents the results of the Local Ordinance Gaps Analysis project for the Village of Wolverine. It summarizes the evaluation scores, makes recommendations, and includes suggested actions. In accordance with the Literature Review, each Critical Element below is scored and ranked. The Project Evaluation and Analysis section of the Introduction to this book describes the scoring and ranking, and the entire completed checklist is available upon request.

#### Evaluation Scores and Summary: Village of Wolverine

##### Master Plan Components

POSSIBLE SCORE: 30

TOTAL SCORE: 0, MISSING

The Village of Wolverine does not currently have a Master Plan, which can pose some challenges for local officials. An up to date Master Plan creates a foundation upon which to make informed decisions. It provides consistency, strives to preserve the character of a community, encourages wise use of resources, and fosters positive economic development.

The Michigan Legislature adopted P.A. 33 of 2008, the Michigan Planning Enabling Act (MPEA), which replaced three existing planning enabling acts: the Municipal Planning Act, County Planning Act, and Township Planning Act. Any master plan adopted after September 1, 2008 must be consistent with the MPEA. "It is recommended that a new master plan be prepared and adopted if 10 or more years have elapsed since the adoption of any existing plan. ... The MPEA requires master plans to be reviewed at least every five years to determine if they need to be amended, replaced by a new master plan or if no change is needed." (<http://www.cuppad.org/MasterPlans.html>)

##### Master Plan Components: RECOMMENDATIONS

**SUGGESTED ACTION:** Create a Master Plan for the Village, and include strong water protections.

**Basic Zoning Components**

POSSIBLE SCORE: 54

TOTAL SCORE: 38, STRONG

The Village of Wolverine's Zoning Ordinance includes major components needed for strong water protections. For example, in Article 1, Section 1.2 "The purpose of this Ordinance is to promote and safeguard the public health, safety, morals and general welfare of the people of the Village of Wolverine. The provisions herein are intended to encourage the use of lands, waters and other natural resources ....., to limit the improper use of land and natural resources, .....to avoid overcrowding of land and water resources,..." Additionally, "The provisions of this ordinance shall be administered and enforced by the Zoning Administrator" and specific duties are listed (Article 13, Sec 13.2).

Planned Unit Developments (PUDs) are allowed in the Village. Any development of 2 acres or more in the Natural Rivers Protection District and all Planned Unit Developments require Site Plan Review. (Article 12, Sec 12.2.4) Additionally, "Prior to the submittal of a PUD special land use permit application, the applicant may informally meet with the Zoning Administrator to inform him of his general intentions and to give the applicant detailed information on the required procedures for such a permit application. At this pre-application conference, the applicant is encouraged to provide the Zoning Administrator with 2 copies of a concept plan for the proposed PUD." (Article 11, Sec 11.3.1)

PUDs must coordinate efforts with the need to secure other permits. "The Zoning Administrator shall present all material submitted by the applicant to the Village Council at their regular public meeting. The Village Council shall then have 30 days from the date of the public meeting at which said application and preliminary plan are submitted, to solicit the recommendations from the County Soil Conservation District, the Township in which the PUD is proposed, the District Health Department, and the Cheboygan County Road Commission." [Article 11, Sec 11.3.2(C)]

"In an effort to preserve and enhance open space and to provide adequate recreational areas for residential developments, the designated common open space shall comprise at least 30% of the total developable area of the PUD." [Article 11, Sec 11.3.5 (D)] "Since the Planned Unit Development concept is designed to encourage flexible and innovative building patterns, density requirements shall be based on the number of dwelling units per acre rather than the traditional minimum lot size requirements which would normally be applicable to the zoning district in which the PUD is located." The density formula is described. [Article 11, Sec 11.3.5 (E)] Finally, the Open Space is protected: ".....up to 10% of the required open space may be composed of open space on privately owned properties dedicated by easement to assure that the open space will be permanent."

**Basic Zoning Components: RECOMMENDATIONS**

The Village Ordinance includes strong basic components to protect water quality. We have only two suggestions.

**SUGGESTED ACTION:** The Site Plan Review process should require developers to consult with the Michigan Department of Environmental Quality about Threatened or Endangered Species on site.

**SUGGESTED ACTION:** Allowable uses in the Open Space should be restricted to low impact uses.

## Shorelines

POSSIBLE SCORE: 60

TOTAL SCORE: 42, STRONG

In terms of water protection, the most striking thing about the Village Zoning Ordinance is the strong steps taken to protect the shorelines of the Sturgeon River and the West Branch of the Sturgeon River. The Village created a Rivers Protection District (Article 8). This “District includes an area 500 feet deep on each side of and parallel to all channels of the mainstream of the Sturgeon River and West Branch of the Sturgeon River. This distance is measured from the waters' edge, determined by the ordinary high water mark of the river or tributary.” Keep in mind that the Village is a small area, just 0.89 square miles, and very importantly, this district captures the critical surface water features. (<http://www.city-data.com/city/Wolverine-Michigan.html>)

In terms of Residential Uses in this district, “Single family dwellings are permitted within the district with the following conditions: 1. Building setbacks for new structures or appurtenances shall be 200 feet from the waters' edge. 2. Building lots and new subdivisions shall provide minimum lot widths of 150' feet on the Rivers.” (Article 8, Sec 8.3)

Additionally, the Village provides strong language regarding a Natural Vegetation Strip: “1. Trees, shrubs and other vegetation native to the Sturgeon River and West Branch of the Sturgeon River shall be maintained and enhanced on each side of the rivers to retain the rivers' natural values. Maintenance of the natural vegetation strip is required to help stabilize the river banks, minimize erosion, provide shading, help protect water quality by absorbing nutrients from surface water runoff, provide screening of man-made elements, protect fisheries and wildlife habitat, and maintain the aesthetic quality of the river. The zoning administrator shall notify each applicant for a building permit of the purpose of the natural vegetation strip and of the provisions of this section. 2. A vegetation strip shall be maintained on each side of the rivers to a distance of 50· feet.” (Article 8 Sec 8.5)

Article 8 also specifies the vegetation that can be removed: “b. Dead, diseased, unsafe or fallen trees, shrubs and noxious plants, including poison ivy, poison sumac, and poison oak, and other plants regarded as common nuisance in Section 2, Public Act 357 of 1941, as amended, may be removed. c. Trees and shrubs may be pruned for a filtered view of the river. d. Upon approval of the local zoning administrator, trees and shrubs may be selectively removed to achieve a filtered view of the river from the principal structure, and for reasonable private access to the structure, and for reasonable private access to the river.” [Sec 8.5 NATURAL VEGETATION STRIP (2)]

Additionally, “e. Planting of native species is encouraged in the vegetation strip to enhance and protect the river's edge. The Department of Natural Resources or the Soil Conservation Service may be consulted for selection of native plant species.” Id. It does not explicitly prohibit invasives species.

Finally, docks are regulated this way: “The construction of docks along the rivers is strongly discouraged. However, if necessary to provide safe and ecologically sound access for the riparian landowner, “log-sod covered docks” may be constructed of natural materials. Docks must be constructed in accordance with the rules of Act 346, P.A. 1972. Upon request of the property owner, the Department of Natural Resources will assist in the siting and location of a dock so as to blend in with the natural surroundings and best meet the objectives of river protection.” (Article 8 GENERAL PROVISIONS, SECTION 8 .9. 1. DOCKS)

### Shorelines: RECOMMENDATIONS

The Village of Wolverine has taken strong steps to protect its treasured rivers. We applaud this effort and have only one suggestion.

**SUGGESTED ACTION:** Require the use of native plant species in the Natural Vegetation Strip, and explicitly prohibit the use of invasive species.

## Impervious Surfaces

POSSIBLE SCORE: 33

TOTAL SCORE: 5, WEAK

The more a local government can do to reduce or limit new impervious surfaces, the better for water quality. Impervious surfaces (streets, roofs, sidewalks, etc.) generate much more stormwater runoff than natural, forested, or even agricultural land uses. They stop rainwater and snowmelt from naturally percolating into soils, reducing the opportunity for contaminants to be removed from the resulting stormwater runoff, before it flows into lakes, rivers, and wetlands.

Substances finding their way onto rooftops, driveways, streets, and sidewalks are likely to be washed into waters by rainfall and snowmelt. This includes things like bacteria from pet and animal wastes, fertilizer, oil and grease, sediment, heavy metals, salt, etc. Mitigating impacts from existing impervious surfaces and limiting new ones help to keep waters clean.

One low cost approach to doing so is to retain or restore native vegetation in riparian areas and in Open Spaces. Minimizing impervious surfaces can be also addressed in creative and cost-effective ways, ranging from using Low Impact Design (LID) techniques in development plans, to incentives for limiting impervious lot coverage. Lot design and general development provisions in Zoning Ordinances provide great opportunities to encourage alternatives to and reductions of impervious surfaces, such as shared driveways.

The Village does require the following, in Article 11, Planned Unit Development, Section 11.3.5 Design Requirements, G. Parking Standards: “3. Parking areas shall be screened from adjacent roads, structures, and traffic arteries with hedges, dense planting, earth berms, changes in grade or walls; 4. No more than 12 parking spaces shall be permitted in a continuous row without being interrupted by landscaping.”

### Impervious Surfaces: RECOMMENDATIONS

**SUGGESTED ACTION:** The Zoning Ordinance should allow more flexibility to reduce the number of parking spaces constructed, if warranted by the proposed development. Further, it should also require some portion of proposed parking lots to be planted with vegetation within the parking lot paving. Finally, allow the location of bioretention, rain gardens, filter strips and swales in parking lots, required setback areas, and common areas, as appropriate.

**SUGGESTED ACTION:** Provide incentives for using LID techniques to mitigate the impacts of impervious surfaces.

## Stormwater Management

POSSIBLE SCORE: 27

TOTAL SCORE: 27, STRONG

The Village of Wolverine does not have its own dedicated stormwater ordinance because it is covered by the strong Cheboygan County Stormwater Runoff Control Ordinance ([http://www.cheboygancounty.net/\\_\\_library/sessrc\\_ordinance.pdf](http://www.cheboygancounty.net/__library/sessrc_ordinance.pdf)). See Chapter 1 for details. We have no additional recommendations for this element.

## Soil Erosion and Sediment Control

POSSIBLE SCORE: 18

TOTAL SCORE: 18, STRONG

Like stormwater runoff, the Village of Wolverine does not have a standalone ordinance to address soil erosion and sediment control but instead defaults to County regulations ([http://www.cheboygancounty.net/\\_\\_library/sessrc\\_ordinance.pdf](http://www.cheboygancounty.net/__library/sessrc_ordinance.pdf)). Here again, the County ordinance is strong; see Chapter 1. We have no additional suggestions.

## Sewer/Septic

POSSIBLE SCORE: 24

TOTAL SCORE: 16, ADEQUATE

As noted in earlier chapters, most of Cheboygan County uses wells for drinking water and septic systems for waste, and this includes the Village of Wolverine. The Ordinance reflects an appreciation for how important it is to maintain septic systems for water quality. Article 8, Section 8.6.1 describes requirements for on-site sanitation systems. This section includes the following: “a. The setback for septic tanks and absorption fields shall be a minimum of 150 feet from the ordinary high water mark. b. The bottom of the absorption field shall be at least four feet above the known high ground water table. c. No absorption field shall be closer than 50 feet from any permanent surface or subsurface drainage system. d. Variances from these standards may be allowed by the district health departments where existing lots of record cannot conform because of their size” and “2. The bottom of an earth privy shall be not less than six feet above the known high ground water table. Where this is not feasible, a water tight vault shall be installed.”

Finally, Article 8 Sec 8.3 Residential Uses, 5: “All habitations shall be provided with sanitary waste disposal facilities approved by the District Health Department. New septic systems shall meet the standards in SECTION 8 .6.”

### Sewer/Septic: RECOMMENDATIONS

**SUGGESTED ACTION:** Educate residents about proper septic system management and encourage them to maintain septic systems on a regular basis.

**SUGGESTED ACTION:** Consider the benefits of enacting a county “point of transfer” septic inspection ordinance, working in coordination with local municipalities and the Health Department.

## Wetlands

POSSIBLE SCORE: 21

TOTAL SCORE: 15, STRONG

Wetlands are some of our most valuable water resources. They provide excellent wildlife habitat, help control flooding, and contribute to water quality protection. Wetlands are critical to the health of rivers and streams, and they are difficult to restore, once they are damaged or filled. Although Michigan has a statewide wetland protection statute, not all wetlands are covered and not all activities that could impact wetlands are regulated. Local governments have the opportunity to supplement the state’s wetland protection program.

The Village is a small area, with the Sturgeon River and the West Branch of the Sturgeon River being critical to its character. The Village shoreline protection efforts along the banks of these two rivers act to protect wetlands, as

well. The setback of 200' coupled with the requirement to maintain natural vegetation strips provide good protections for wetlands, which make up the transition zone between open water and dry land. Additionally, the Ordinance requires that "Building lots and new subdivisions shall provide minimum lot widths of 150' feet on the Rivers." (Article 8, Sec 8.3.2) This ensures that unbuildable lots that consist of mostly wetlands are not created.

We applaud these measures and have only two recommendations for this element.

### **Wetlands: RECOMMENDATIONS**

**SUGGESTED ACTION:** Given the important role that wetlands play in protecting water quality, providing habitat, and minimizing flooding, it is beneficial to educate citizens on the importance of protecting wetlands.

**SUGGESTED ACTION:** Make it clear that permits are required for any State or Federally regulated wetlands in the Village, before any permit on a wetland parcel is issued, regardless of the zoning district. An applicant should be required to demonstrate that disturbing the wetland does not require a state or federal permit.



## Groundwater and Wellhead Protection

POSSIBLE SCORE: 18

TOTAL SCORE: 13, STRONG

Groundwater is the primary source of drinking water for nearly all Northern Michigan residents. Protecting groundwater resources from contamination is vitally important. Discharges to groundwater are regulated by the State under Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act (NREPA) 1994 PA 451, and Part 22 Rules. Any proposed discharges should be prohibited until required State permits are received by the applicant. Storage of hazardous material is also regulated under Part 5 Rules issued for Part 31. This includes Pollution Incident Prevention Plans, which can be efficiently coordinated with Local Emergency Planning Committee work.

The Village of Wolverine seeks to protect its groundwater using some key points in the Zoning Ordinance. For PUDs, the Village Council may request additional information on "...the development's impact on soils, surface and groundwaters, existing vegetation, wildlife and other natural features of the site." (Article 11, Sec 11.3.2) Additionally, Article 3, Section 3.5.1 includes this: "Dumping or disposal shall not negatively affect the water table or cause pollution of stagnant or running water in any area of the Village so as to create health or safety problems to the natural environment and the inhabitants or the Village." Finally, the Ordinance also includes this protection: "New development, exploration or production of gas, oil, salt brine, sand and gravel or other minerals except ground water are not permitted within 300 feet of the rivers or tributaries included in the Natural Rivers Protection District." (Article 8, Sec 8.9.2)

### Groundwater and Wellhead Protection: RECOMMENDATIONS

**SUGGESTED ACTION:** If not already done, protect groundwater from potential contamination by requiring Pollution Incident Prevention Plans for storage of hazardous materials, in regular coordination with Local Emergency Planning Committee efforts.

## Other

POSSIBLE SCORE: 48

TOTAL SCORE: 26, ADEQUATE

The Village of Wolverine participates in the National Flood Insurance Program. It does not include any high risk erosion areas or critical dunes, as identified by the Department of Environmental Quality. We have no recommendations for this element.

## Conclusion

We applaud the strong water protection measures that exist in the Village of Wolverine. We also thank you for your time and attention in reading this chapter, and hope that our recommendations are helpful. However, if anything is unclear, please be sure to let us know. If you have any other questions related to this project, please contact Tip of the Mitt Watershed Council at (231) 347-1181.



*Long Lake*



## DOCUMENT REVIEW CHECKLIST for LOCAL ORDINANCE GAPS ANALYSIS

### CATEGORIES:

Master Plan  
Basic Zoning  
Shorelines  
Impervious Surfaces  
Stormwater  
Soil Erosion and Sediment Control  
Sewer/Septic  
Wetlands  
Groundwater and Wellhead Protection  
Other Relevant Elements

### SCORING:

For each "yes" answer, score 3 points.

If the answer is "yes, partially" score 2 points and explain in Comments section.

If the answer is "yes, minimally" score 1 point and explain in Comments section.

If the answer is "no" award 0 points.

Each section allows for Additional Remarks that support the scoring or the awarding of *+ bonus points*, or penalties taken using *- bonus points*. The Bonus Points system is included to enable relevant adjustments. This is to allow for unexpected circumstances, such as the suggested ordinance language does not apply, or is inappropriate for some reason. The intent is to recognize that every jurisdiction does not necessarily need every ordinance section included here, for a variety of reasons. It exists to ensure jurisdictions are not unfairly ranked or perceived in these kinds of circumstances.

If the Bonus Points system is used because that resource protection effort does not apply in the jurisdiction due to geography, only points from the "adequate" range can be used; there is no assumption of the value of imagined language, just an avoidance of penalizing the jurisdiction in this survey for something that does not apply. Using the Bonus Points system for anything else is flexible, since it is designed to allow for the unexpected; the only requirement is to use the existing scoring options and justify the addition or subtraction of points using the narrative space.

**DISCLAIMER:** *This research is not intended as legal advice. All local governments are encouraged to consult legal counsel before adopting any resolution or ordinance.*

*Additionally, many jurisdictions have been reviewed here, but this is a snapshot in time using ordinances adopted as of February 2014. We caution you to be sure the current plans and ordinances have not changed since this review was completed.*

V.2-10-14

Name of Jurisdiction: \_\_\_\_\_

Date Completed: \_\_\_\_\_

Name of Reviewer: \_\_\_\_\_

<b>I. Master Plan</b> <b>3 = Yes; 2 = Yes, partially with Comments; 1 = Yes, minimally with comments; 0 = missing; N/A= not applicable</b>		
<b>Criteria</b> <b>NOTE: ANSWER EITHER QUESTION #1 OR #2, NOT BOTH.</b>	<b>Citation and Comments</b> note any comments and citation	<b>Points</b>
1. Does Master Plan exist? <i>(If yes, note when scheduled for review again in Comments section)</i> <b>OR</b>		
2. If no Master Plan, is one currently being drafted? <i>(If yes, note relevant deadlines in Comments section)</i>		
3. Does the Master Plan specifically identify the <b>watershed(s)</b> in which the community is located?		
4. Does the Master Plan have a complete <b>inventory</b> of <b>lakes, rivers, and wetlands</b> , with maps of their locations? Does it identify and map <b>groundwater recharge</b> areas?		
5. Does the jurisdiction's Master Plan have a specific and focused <b>goal</b> or statement of intent to <b>protect water</b> resources? If yes, note it in Comments section.		
6. Does the Master Plan include goals for community acquisition or conservation of <b>Open Space</b> to protect <b>surface water, ground water, and wetlands</b> ?		
7. Does the Master Plan identify <b>stormwater management</b> as an important community policy? <sup>1</sup>		
8. Does the Master Plan call for minimizing <b>impervious surfaces</b> in new construction and redevelopment projects to reduce stormwater runoff and improve infiltration? <sup>2</sup>		
9. Does the Master Plan include identification and protection of <b>Wildlife corridors</b> ?		
10. Does the Master Plan identify and call for preservation of undisturbed <b>Natural Areas</b> and/or <b>Natural River designations</b> for surface water and ground water?		
11. Does the plan acknowledge the importance of well-constructed and maintained <b>road stream crossings</b> on the quality of stream and water resources?		
<b>ADDITIONAL REMARKS, INCLUDING BONUS POINTS (+ OR -)</b> <i>N/A ITEMS SHOULD BE ACCOUNTED FOR BY:</i>		
<b>BONUS POINTS (+ OR -)</b>		
<b>TOTAL POINTS SECTION I</b>		
(QUESTIONS 1 & 2 COUNT AS ONE - ANSWER IS ONE OR THE OTHER) <b>TOTAL POINTS POSSIBLE</b>		<b>30</b>
<b>30-21=strong 20-11=adequate 10-0=weak</b>		

<b>II. Basic Zoning Elements</b> <b>3 = Yes; 2 = Yes, partially with Comments; 1 = Yes, minimally with comments; 0 = missing; N/A= not applicable</b>		
Criteria	Citation and Comments note any comments and citation	Points
<b>Zoning Ordinance: Administrative</b>		
1. Does Zoning Ordinance have a statement of <b>purpose</b> or intent that includes protection of water and/or natural resources?		
2. Does it include a <b>fee system</b> to cover costs to the community for review of proposal applications or appeals, including any professional reviews? <sup>3</sup>		
3. Does Zoning Ordinance have methods in place for <b>enforcement</b> , including a clearly defined process for inspections and correction of violations? <sup>4</sup>		
4. Is Zoning Ordinance proposal review process <b>coordinated</b> with the receipt of other applicable County, State, and/or Federal <b>permits</b> ?		
5. Does it require a <b>pre-application or pre-construction meeting</b> for new development or redevelopment proposals?		
6. Does the Zoning Ordinance include requirements for <b>environmental assessment</b> , at the expense of the applicant, for proposals that include a land area of five acres or more, or building over 50,000 sq ft? <sup>5</sup>		
<b>Zoning Ordinance: Site Plan Review</b>		
7. Does the Zoning Ordinance require Site Plan Review?		
8. Is the Site Plan required to indicate all existing <b>natural features</b> ?		
9. Does the Site Plan Review process require a <b>Soil Erosion and Sedimentation Control Plan</b> , or coordination with County regulations?		
10. Does Site Plan Review process include <b>open space</b> provisions? <sup>6</sup>		
11. Does the site plan review process require developers to consult with the Michigan Department of Environmental Quality about <b>Threatened or Endangered Species</b> on site? <sup>7</sup>		
<b>Zoning Ordinance: PUD</b>		
12. Does ordinance include Planned Unit Development ( <b>PUD</b> ) provisions? <sup>8</sup>		
13. Do PUDs require inclusion of a <b>minimum open space</b> threshold?		
<b>Zoning Ordinance: Open Space</b>		
14. Are <b>flexible site design criteria</b> or <b>incentives</b> available to encourage developers to include <b>open space</b> or cluster design provisions? <sup>9</sup>		
15. Does the open space have to be <b>managed</b> in a <b>natural condition</b> ? <sup>10</sup>		

16. Are allowable uses in the open space restricted to <b>low impact uses</b> ? <sup>11</sup>		
17. Is open space required to be protected through a <b>conservation easement</b> or other similar mechanism? <sup>12</sup>		
<b>Zoning Ordinance: Special Districts</b> 18. Does Zoning Ordinance include sensitive area protections, such as <b>Natural River</b> designations where appropriate? <sup>13</sup>		
<b>ADDITIONAL REMARKS, INCLUDING BONUS POINTS (+ OR -)</b> <b>N/A ITEMS SHOULD BE ACCOUNTED FOR BY:</b>		
<b>BONUS POINTS (+ OR -)</b>		
<b>TOTAL POINTS SECTION II</b>		
<b>TOTAL POINTS POSSIBLE</b>		<b>54</b>
<b>54-37=strong; 36-19=adequate; 18-0=weak</b>		

<b>III. Shorelines</b> <b>3 = Yes; 2 = Yes, partially with Comments; 1 = Yes, minimally with comments; 0 = missing; N/A = not applicable</b>		
Criteria	Citation and Comments note any comments and citation	Points
<b>Shorelines: Setbacks</b> <i>Great Lakes Shoreline</i> 1. If the community has a Great Lakes Shoreline, does it use an <b>Overlay District</b> , or <b>other tools</b> , to protect the shoreline with <b>setbacks</b> ? <i>SCORE: 3 points 100'; 2 points 75-99'; 1 point less than 75'</i>		
2. Does the <b>Overlay District</b> use a <b>resource-based variable boundary approach</b> , mapping all important shoreline resources, and establishing a boundary line of at least 200 feet? <b>OR</b> Does it use a <b>fixed-distance boundary line approach</b> , drawn parallel to the shoreline or ordinary high water mark, at a fixed-distance of 500 feet? <sup>14</sup>		
3. For a Great Lakes Shoreline, does the Zoning Ordinance delineate a separate minimum <b>setback</b> and/or other protection measures for <b>dunes</b> and <b>high risk erosion</b> areas? <sup>15</sup>		
4. If so, are <b>key definitions included</b> for: the Ordinary High Water Mark, foredune crests, steep bluffs, mature forested vegetation, and principle shoreline structures? <sup>16</sup>		
<i>Inland Lakes and Streams</i> 5. Does the Zoning Ordinance require a <b>minimum</b> shoreline <b>setback</b> of <b>25'</b> for <b>inland lakes and streams</b> , specifically to minimize harmful runoff and erosion? <sup>17</sup> <i>[NOTE: Establishing the width of a setback so it is effective depends on the type and sensitivity of the natural feature and the expected impacts of surrounding land uses. In general, the wider the setback, the more protection it provides.]</i> <sup>18</sup> <i>SCORE: 3 points 75'; 2 points 50-74'; 1 point 25-49'</i>		
<b>Shorelines: Protection Strips</b> 6. Does Zoning Ordinance require <b>riparian buffers</b> , a minimum of 25' deep, on <b>Inland Lakes and Streams</b> ? <sup>19</sup> <i>NOTE: Site-specific conditions allow for variances in buffer dimensions while retaining effectiveness. The Watershed Council prefers a minimum of 30'; generally, for our region.</i>		
7. Does Zoning Ordinance specify the <b>degree of vegetation which may be removed</b> in the riparian buffer zone, to be more effective in curbing runoff pollution, providing for wildlife habitat, and preserving natural scenic beauty? <sup>20</sup>		
8. Does it specify the use of <b>native plant species</b> in the riparian buffer zone? <sup>21</sup>		

9. Are <b>invasive</b> and <b>exotic</b> plants <b>prohibited</b> from being used? <sup>22</sup>		
10. Does the community provide for treatment to control and manage <b>Phragmites</b> on the Great Lakes shoreline, as well as where it appears on other riparian shorelines and community lands?		
<b>Shorelines: Density</b> 11. Does Zoning Ordinance regulate <b>dock lot minimum frontage</b> , including allowances for legal nonconforming structures? <sup>23 24</sup>		
12. Does Zoning Ordinance regulate the size of <b>docks</b> allowed on inland lakes or streams or rivers, so as not to interfere with the <b>rights of other waterfront owners</b> or <b>negatively affect</b> the character of the <b>natural shoreline</b> ? <sup>25</sup>		
13. Does it regulate the number of <b>motor crafts</b> and <b>rafts allowed</b> per dock, using specific dimensions? <sup>26</sup>		
14. Does Zoning Ordinance regulate the <b>types of structures</b> or <b>dwelling units</b> that are <b>allowed</b> per every 100' of <b>waterfront</b> access to inland lakes or streams or rivers?		
<b>Shorelines: Keyhole/Funneling</b> 15. Does the Zoning Ordinance include keyhole prevention provisions by placing restrictions on the size and type of multi-boat launch and docking sites? <sup>27</sup>		
<b>Shorelines: Road Ends</b> 16. Does the Zoning Ordinance regulate Road Ends terminating at the edge of navigable waters, to ensure the right of public access does <b>not include</b> : the ability to install private docks or boat hoists for the overnight mooring of boats, or the right to use public road ends for lounging, sunbathing or picnicking? <sup>28</sup>		
<b>Shorelines: Marinas</b> 17. Does the community regulate marinas using <b>special land use</b> provisions or other tools? <sup>29</sup>		
18. If yes, does it ensure marinas do not <b>obstruct navigation</b> or otherwise interfere with <b>public rights</b> in navigable waters? <sup>30</sup>		
19. Does it restrict <b>boat repair and maintenance</b> activities to clearly mark areas to prevent debris from falling into the water and <b>prevent invasive species</b> ? <sup>31</sup>		
20. Does it require <b>fueling stations</b> to have <b>spill</b> containment equipment that is stored in a clearly marked location? Does it require a spill contingency plan, and posting <b>emergency</b> phone numbers in a prominent location? Are signs of leakage or spillage required to be <b>investigated</b> immediately, and undertake cleanup in accordance with applicable <b>best management practices</b> ? <sup>32</sup>		
ADDITIONAL REMARKS, INCLUDING BONUS POINTS (+ OR -) N/A ITEMS SHOULD BE ACCOUNTED FOR BY:		
<b>BONUS POINTS (+ OR -)</b>		
<b>TOTAL POINTS SECTION III</b>		
<b>TOTAL POINTS POSSIBLE</b>		<b>60</b>
<b>60-41=strong; 40-21=adequate; 20-0=weak</b>		

IV. Impervious Surface Reduction		
3 = Yes; 2 = Yes, partially with Comments; 1 = Yes, minimally with comments; 0 = missing; N/A= not applicable		
Criteria	Citation and Comments note any comments and citation	Points
<b>Impervious Surface Reduction: Lot Coverage</b>		
1. If rural, low density area, does Zoning Ordinance limit <b>impervious lot coverage (15% maximum)</b> includes all impervious surfaces not just the house)? <sup>33</sup>		
2. Are there <b>limits</b> on the extent of <b>lawn area</b> for residential lots in rural areas? <sup>34</sup>		
3. Does Zoning Ordinance allow <b>flexible lot coverage standards</b> to allow creative approaches that limit impervious surfaces (for both single lots and larger developments; rural or urban)? <sup>35</sup>		
4. Does Zoning Ordinance allow for relaxation of front yard setbacks to <b>reduce driveway lengths</b> (and overall site imperviousness)? <sup>36</sup>		
5. Does Zoning Ordinance allow location of bioretention, rain gardens, filter strips and swales in <b>required setback areas</b> and <b>common areas</b> ? <sup>37</sup>		
<b>Impervious Surface Reduction: Parking Lots</b>		
6. Does Zoning Ordinance allow flexibility to reduce the number of <b>parking spaces</b> constructed, if warranted by the proposed development? <sup>38</sup>		
7. Does Zoning Ordinance require some portion of proposed <b>parking lots</b> to be planted with <b>trees/vegetation within</b> the parking lot <b>paving</b> ? <sup>39</sup>		
<b>Impervious Surface Reduction: Roads</b>		
If community has jurisdiction over roads or allows private roads: <sup>40</sup>		
8. Are streets to be designed with the <b>minimum</b> required pavement width needed to support travel lanes, emergency, maintenance and service vehicles ( <b>18-22' for low traffic roads</b> )?		
9. Are <b>right-of-way</b> widths <b>minimized</b> to avoid mass clearing and grading ( <b>less than 45'</b> )?		
10. <b>CUL-DE-SACS:</b> Do cul-de-sacs require the inclusion of a landscaped area? Are the minimum radii of cul-de-sacs no more than 35'? Are hammerheads allowed instead of cul-de-sacs, to encourage more creative solutions to drainage?		
11. <b>CURB AND GUTTER:</b> If curb and gutter is used, are perforated curbs (allows water to flow into swales) or invisible curbs (flush with road surface) required? Are the use of open swales allowed instead of curb and gutter?		
<b>ADDITIONAL REMARKS, INCLUDING BONUS POINTS (+ OR -)</b>		
N/A ITEMS SHOULD BE ACCOUNTED FOR BY:		
<b>BONUS POINTS (+ OR -)</b>		
<b>TOTAL POINTS SECTION IV</b>		
<b>TOTAL POINTS POSSIBLE</b>		<b>33</b>
<b>33-23=strong; 22-12=adequate; 11-0=weak</b>		

V. Stormwater Management <sup>41 42</sup>		
3 = Yes; 2 = Yes, partially with Comments; 1 = Yes, minimally with comments; 0 = missing; N/A= not applicable		
Criteria	Citation and Comments note any comments and citation	Points
<b>Stormwater: Construction and Redevelopment</b>		
1. Does the community <b>regulate stormwater</b> , either as part of the Zoning Ordinance or separately?		
2. Does the stormwater ordinance require <b>review by the county</b> drain commissioner and county soil and sedimentation program? <sup>43</sup>		
3. Are <b>stormwater management areas and facilities</b> , whether on-site or off-site, required to be designed, constructed, and maintained to <b>prevent flooding</b> and <b>protect surface and ground water quality</b> ? <sup>44 45</sup>		
4. Is the <b>design</b> of any stormwater management system required to be <b>based</b> upon a <b>25-year frequency, 24-hour duration</b> storm event? <sup>46</sup>		
5. Does the stormwater ordinance require <b>runoff</b> leaving the site to be <b>controlled</b> to a <b>non-erosive velocity</b> , both during and after construction? <sup>47</sup>		
6. Does it <b>prohibit direct discharge</b> of stormwater into natural watercourses, including lakes, ponds, rivers, streams and wetlands? <sup>48</sup>		
7. Does it prohibit stormwater from exiting the property after <b>exposure to harmful sources</b> ? <sup>49</sup>		
8. Does the Zoning Ordinance <b>limit land disturbance</b> and <b>grading</b> ? <sup>50</sup>		
9. Does ordinance require that all stormwater management systems be regularly <b>evaluated</b> and <b>maintained</b> ? <sup>51</sup>		
<b>ADDITIONAL REMARKS, INCLUDING BONUS POINTS (+ OR -)</b> N/A ITEMS SHOULD BE ACCOUNTED FOR BY:		
<b>BONUS POINTS (+ OR -)</b>		
<b>TOTAL POINTS SECTION V</b>		
<b>TOTAL POINTS POSSIBLE</b>		<b>27</b>

27-19=strong; 18-10=adequate; 9-0=weak

[illegible]

<b>VII. Sewer/Septic <sup>61</sup></b> <b>3 = Yes; 2 = Yes, partially with Comments; 1 = Yes, minimally with comments; 0 = missing; N/A= not applicable</b>		
Criteria	Citation and Comments note any comments and citation	Points
<b>Sewer: Master Plan</b>		
1. Is it appropriate for this community to have a delineated Sewer Service Area? <sup>62</sup>		
2. Has the Sewer Service Area been mapped, including sewers that currently exist, areas that will be sewerred in the future, and areas that will not be sewerred? <sup>63</sup>		
3. Is existing infrastructure inventoried for age and condition? Is a maintenance and replacement schedule provided in the Master Plan? <sup>64</sup>		
4. Does the Master Plan require the community to have a program to identify sanitary sewer or septic systems that are seeping into the storm water system, surface waters or groundwater? <sup>65</sup>		
<b>Sewer: Ordinance</b>		
5. Is the Sewer Service Area map used in zoning decisions? <sup>66</sup>		
<b>Septic Systems</b>		
6. Does the Zoning Ordinance require that a septic system be located at least 100' from a wetland or open water feature, and specify a minimum isolation distance from all nearby wells? <sup>67</sup>		
7. Does the Zoning Ordinance require periodic inspection of septic tanks by an authorized inspector? Is there a point of sale inspection requirement?		
8. Are regulations that pertain to septic systems coordinated with the County Health Department regulations?		
<b>ADDITIONAL REMARKS, INCLUDING BONUS POINTS (+ OR -)</b>  <i>N/A ITEMS SHOULD BE ACCOUNTED FOR BY:</i>		
<b>BONUS POINTS (+ OR -)</b>		
<b>TOTAL POINTS SECTION VII</b>		
<b>TOTAL POINTS POSSIBLE</b>		<b>24</b>
<b>24-17=strong; 16-9=adequate; 8-0=weak</b>		

VIII. Wetlands <sup>68</sup>		
3 = Yes; 2 = Yes, partially with Comments; 1 = Yes, minimally with comments; 0 = missing; N/A= not applicable		
Criteria	Citation and Comments note any comments and citation	Points
<b>Wetlands Protection: Zoning/Local Ordinance</b>		
1. Has the community adopted a local wetland ordinance that protects <b>isolated wetlands less than five acres</b> in size? Has <b>DEQ been notified</b> about this ordinance, as required by state law?		
2. Does the local wetland ordinance also cover isolated wetlands <b>under two acres</b> in size, and if so, does it include the special conditions required by state law?		
3. Does the Zoning Ordinance require a building <b>setback requirement from wetland</b> areas (at least 20-30')? <sup>69</sup>		
4. Does the Zoning Ordinance require a <b>naturally vegetated buffer area</b> adjacent to wetlands? <sup>70</sup>		
5. Does the local wetland ordinance require <b>mitigation</b> within the <b>same watershed</b> that <b>replaces the functions and values lost</b> by the wetlands lost by development? <sup>71</sup>		
6. Are there sufficient <b>penalties</b> (minimum and maximum fine amounts) for <b>violations</b> of the wetlands ordinance, and are <b>enforcement</b> methods in place?		
7. In order to <b>prevent</b> the creation of <b>unbuildable lots</b> consisting of mostly wetlands, is the minimum shoreline lot frontage <b>at least 65'</b> for <b>sewered</b> lots, and at least <b>100'</b> for <b>unsewered</b> lots? <sup>72</sup>		
<b>ADDITIONAL REMARKS, INCLUDING BONUS POINTS (+ OR -)</b> <i>N/A ITEMS SHOULD BE ACCOUNTED FOR BY:</i>		
<b>BONUS POINTS (+ OR -)</b>		
<b>TOTAL POINTS SECTION VIII</b>		
<b>TOTAL POINTS POSSIBLE</b>		<b>21</b>
<b>21-15=strong; 14-8=adequate; 7-0=weak</b>		

IX. Groundwater <sup>73 74</sup> and Wellhead <sup>75</sup> Protection		
3 = Yes; 2 = Yes, partially with Comments; 1 = Yes, minimally with comments; 0 = missing; N/A= not applicable		
Criteria	Citation and Comments note any comments and citation	Points
<b>Groundwater Protection</b>		
1. Is <b>Site Plan Review required</b> to ensure there are no unnecessary threats posed to groundwater by new or redevelopment proposals? Are there additional requirements for site plan submittals in <b>groundwater recharge areas</b> ? <sup>76</sup>		
2. Does the Zoning Ordinance <b>prohibit</b> both direct and indirect <b>discharge of hazardous substances</b> to groundwater without appropriate approvals/permits? <sup>77</sup>		
3. Are groundwater protection requirements for <b>mining</b> operations included in the Zoning Ordinance?		
<b>Wellhead Protection</b>		
If the community has <b>municipal well fields</b> , have they done the following:		
4. Developed a wellhead protection program or plan, required that it be <b>implemented</b> , and require <b>periodic updates</b> ?		
5. <b>Restricted high-risk land use</b> activities in wellhead protection areas, or use an <b>overlay district</b> to add additional development standards for wellheads in those areas?		
6. Completed and maintain a comprehensive <b>inventory of potential threats</b> to groundwater?		
<b>ADDITIONAL REMARKS, INCLUDING BONUS POINTS (+ OR -)</b>		
<b>BONUS POINTS (+ OR -)</b>		
<b>TOTAL POINTS SECTION IX</b>		
<b>TOTAL POINTS POSSIBLE</b>		<b>18</b>
<b>18-13=strong; 12-7=adequate; 6-0=weak</b>		

<b>X. Other Relevant Elements</b> <b>3 = Yes; 2 = Yes, partially with Comments; 1 = Yes, minimally with comments; 0 = missing; N/A= not applicable</b>		
Criteria	Citation and Comments note any comments and citation	Points
<b>FLOODPLAINS</b> 1. Does the community participate in the National Flood Insurance Program?  <i>[Communities participate in NFIP by adopting and enforcing floodplain management ordinances to reduce future flood damage. In exchange, the NFIP makes federally-backed flood insurance available to homeowners, renters, and business owners in these communities. Community participation is voluntary.<sup>78</sup>]</i>		
2. If yes, is there ordinance language that regulates floodplain development?		
3. Does the community coordinate their efforts to protect the floodplain with adjoining communities and the County?		
4. Do the community's floodplain regulations provide for assessing the impacts of flood management projects on water quality?		
5. Do the floodplain regulations provide for adding BMPs to existing projects?		
6. Is there a variable width, naturally vegetated buffer that encompasses the 100 year floodplain area?		
<b>HIGH RISK EROSION AREAS, STEEP SLOPES<sup>79</sup></b> 7A. Does the community have high risk erosion areas and/or steep slopes, protected by a DEQ approved HREA, an overlay zone, or other ordinance?  7B. If yes, are all structures required to be set back at least 75 feet from the top of the bluff or the erosion area?  3 POINTS FOR 75'; 2 POINTS 74-50'; 1 POINT UNDER 50'		
8. Is the ordinance language to regulate high risk erosion areas based on structure setbacks from the bluffline? OR Is the ordinance language based on structure setbacks from the erosion hazard line? <sup>80</sup>		
9. Are the required and unique HREA definitions included in the ordinance, and sufficiently integrated to ensure that there is no conflict between them and other ordinance definitions?		
10. If no HREA overlay district or ordinance in place, does the zoning ordinance include performance standards designed to minimize soil and vegetative disruptions in HREA or steep slope areas?		
11. Is all HREA development subject to special use permits or site plan review?		

<b>CRITICAL DUNES<sup>81</sup></b> 12. Does the community have critical dunes? If so, has the local government assumed administration of Part 353, with DEQ approval, to protect them?		
13. If no assumption of Part 353, does the community require setbacks from the crest of the foredune?		
14. If no assumption of Part 353, does an overlay district exist on the Great Lakes coastal shoreline to add land use considerations to increase protection for critical dunes?		
15. If no assumption of Part 353, does the community have land division guidelines and/or subdivision control in place to protect the critical dunes?		
16. Does site plan review limit impervious surfaces, allow for raised structures, and prohibit vegetation removal in critical dune areas?		
<b>ADDITIONAL REMARKS, INCLUDING BONUS POINTS (+ OR -)</b> <i>N/A ITEMS SHOULD BE ACCOUNTED FOR BY:</i>		
<b>BONUS POINTS (+ OR -)</b>		
<b>TOTAL POINTS SECTION X</b>		
<b>TOTAL POINTS POSSIBLE</b>		<b>48</b>
<b>48-33=strong; 32-17=adequate; 16-0=weak</b>		

## RESULTS WORKSHEET

CATEGORY	POSSIBLE SCORE	TOTAL SCORE	COMMENTS
I. Master Plan <b>30-21=strong</b> <b>20-11=adequate</b> <b>10-0=weak</b>	30		
II. Basic Zoning Elements <b>54-37=strong</b> <b>36-19=adequate</b> <b>18-0=weak</b>	54		
III. Shorelines <b>60-41=strong</b> <b>40-21=adequate</b> <b>20-0=weak</b>	60		
IV. Impervious Surface Reduction <b>33-23=strong</b> <b>22-12=adequate</b> <b>11-0=weak</b>	33		
V. Stormwater Management <b>27-19=strong</b> <b>18-10=adequate</b> <b>9-0=weak</b>	27		
VI. Soil Erosion and Sediment Control <b>18-13=strong</b> <b>12-7=adequate</b> <b>6-0=weak</b>	18		
VII. Sewer/Septic <b>24-17=strong;</b> <b>16-9=adequate;</b> <b>8-0=weak</b>	24		
VIII. Wetlands <b>21-15=strong</b> <b>14-8=adequate</b> <b>7-0=weak</b>	21		
IX. Groundwater and Wellhead Protection <b>18-13=strong</b> <b>12-7=adequate</b> <b>6-0=weak</b>	18		
X. Other Relevant Elements <b>48-33=strong</b> <b>32-17=adequate</b> <b>16-0=weak</b>	48		

### Notes

- <sup>1</sup> SEMCOG, the Southeast Michigan Council of Governments, 2002. "Storm Water Management," 1. *Opportunities for Water Resource Protection in Local Plans, Ordinances, and Programs*
- <sup>2</sup> SEMCOG, 2002. "Impervious Surface Reduction," 6.
- <sup>3</sup> Planning and Zoning Center Inc., 2003. "Appendix Q: Fee Collection Information". Ardizzone, Katherine A. and Wyckoff, Mark A. 2003. *Filling the Gaps: Environmental Protection Options for Local Governments*.
- <sup>4</sup> SEMCOG, 2002. "Development Review Process, Construction," 57.
- <sup>5</sup> Planning and Zoning Center Inc., 2003. "Appendix P: Environmental Assessment Requirements". Ardizzone, Katherine A. and Wyckoff, Mark A. 2003. *Filling the Gaps: Environmental Protection Options for Local Governments*.
- <sup>6</sup> Planning and Zoning Center Inc., 2003. "Appendix U: Groundwater Protection". Ardizzone, Katherine A. and Wyckoff, Mark A. 2003. *Filling the Gaps: Environmental Protection Options for Local Governments*.
- <sup>7</sup> Van Buren County, MI. *Document Review for Water Resource Protection*, 7. Retrieved from: [http://www.vbco.org/downloads/mp\\_zo\\_review\\_checklist.pdf](http://www.vbco.org/downloads/mp_zo_review_checklist.pdf)
- <sup>8</sup> Planning and Zoning Center Inc. (Benzie County, MI), 2003. "Appendix T: Cluster Development and Planned Unit Development Examples". Ardizzone, Katherine A. and Wyckoff, Mark A. 2003. *Filling the Gaps: Environmental Protection Options for Local Governments*.
- <sup>9</sup> Van Buren County, MI. *Document Review*, 5.
- <sup>10</sup> Ibid.
- <sup>11</sup> Ibid.
- <sup>12</sup> Ibid.
- <sup>13</sup> Tip of the Mitt Watershed Council, 1997. "Appendix R: Sensitive Areas Protection". Ardizzone, Katherine A. and Wyckoff, Mark A. 2003. *Filling the Gaps: Environmental Protection Options for Local Governments*.
- <sup>14</sup> Michigan Land Use Institute, 2001. "Appendix S: Shoreline Protection". Ardizzone, Katherine A. and Wyckoff, Mark A. 2003. *Filling the Gaps: Environmental Protection Options for Local Governments*.
- <sup>15</sup> Ibid.
- <sup>16</sup> Ibid.
- <sup>17</sup> County of Macomb, Michigan, 2008. "VI: Natural Feature Setback pp 6.4-6.9". *Model Environmental Ordinances*, 6.2. Retrieved from: [http://www.macombcountymi.gov/planning/PDF\\_Files/Model%20Ord.%20Chapters/06-Setback%20Ordinance%201-14-04.pdf](http://www.macombcountymi.gov/planning/PDF_Files/Model%20Ord.%20Chapters/06-Setback%20Ordinance%201-14-04.pdf)
- <sup>18</sup> Ibid.
- <sup>19</sup> Michigan State University Extension, Home\*A\*Syst chapter 6, "Managing Shoreline Property to Protect Water Quality." Retrieved 2009 from: <http://www.uwex.edu/farmasyst/states/mishore.html>

- <sup>20</sup> University of Wisconsin Extension Lakes, University of Wisconsin Stevens Point (UWSP) College of Natural Resources. Lake Classification Fact Sheet Series, #5 "Shoreline Buffer Zones and Setbacks". Retrieved 2009 from [http://www.uwsp.edu/cnr/uwexplakes/factsheets/fs\\_5.pdf](http://www.uwsp.edu/cnr/uwexplakes/factsheets/fs_5.pdf)
- <sup>21</sup> Van Buren County, MI. *Document Review*, 7.
- <sup>22</sup> Ibid.
- <sup>23</sup> Whittier T.R., Paulsen S.G., Larsen D.P., Peterson S.A., Herlihy A.T., and Kauffman P.R. 2002. Indicators of ecological stress and their extent in the population of Northeastern lakes: a regional scale assessment. *Bioscience* 52(3): 235-247.
- <sup>24</sup> Standing, B. H., Bernthal, T. W., and S. A. Jones. 1997. *Shoreland Zoning Resource Guide: An Annotated Model Shoreland Zoning Ordinance*. Wisconsin Department of Natural Resources.
- <sup>25</sup> University of Wisconsin Extension Lakes, University of Wisconsin Stevens Point (UWSP) College of Natural Resources. Shoreland Management and Lake Classification Fact Sheet Series, #11 "Managing Piers and Wharves". Retrieved 2009 from: [http://www.uwsp.edu/cnr/uwexplakes/factsheets/fs\\_11.pdf](http://www.uwsp.edu/cnr/uwexplakes/factsheets/fs_11.pdf)
- <sup>26</sup> Standing, et al.
- <sup>27</sup> Kohl, Secrest, Wardle, Lynch, Clark & Hampton, 1994. "Appendix I: Sample Keyhole Development Regulations", Ardizzone, Katherine A. and Wyckoff, Mark A. 2003. *Filling the Gaps: Environmental Protection Options for Local Governments*.
- <sup>28</sup> Stefan J. Scholl, Northern Michigan Real Estate Blog, 2006. "Public Road End Controversy." Retrieved 2009 from <http://buyersbroker.biz/blog/2006/04/public-road-end-controversy.html>
- <sup>29</sup> Planning and Zoning Center Inc., 2003. Ardizzone, Katherine A. and Wyckoff, Mark A. 2003. *Filling the Gaps: Environmental Protection Options for Local Governments*. Part III Local Planning and Zoning, Other Zoning Considerations: Special Land Uses, Part III-9. Accessed online: [http://www.michigan.gov/documents/deq/lwm-czm-ftg-part3\\_266084\\_7.pdf](http://www.michigan.gov/documents/deq/lwm-czm-ftg-part3_266084_7.pdf)
- <sup>30</sup> University of Wisconsin Extension Lakes, Fact Sheet #11 "Managing Piers and Wharves"
- <sup>31</sup> Genesee/Finger Lakes Regional Planning Council, City of Canandaigua Blank Assessment Form, [http://www.gflrpc.org/Publications/LocalLaws/Assessment/Blank\\_Assessment\\_Form.pdf](http://www.gflrpc.org/Publications/LocalLaws/Assessment/Blank_Assessment_Form.pdf)
- <sup>32</sup> Ibid.
- <sup>33</sup> Van Buren County, MI. *Document Review*, 3.
- <sup>34</sup> Ibid.
- <sup>35</sup> SEMCOG, 2002. "Impervious Surface Reduction," 8.
- <sup>36</sup> Van Buren County, MI. *Document Review*, 3.
- <sup>37</sup> Ibid.
- <sup>38</sup> SEMCOG, 2002. "Impervious Surface Reduction," 7.
- <sup>39</sup> Van Buren County, MI. *Document Review*, 2.

<sup>40</sup> Ibid., 2-3

<sup>41</sup> SEMCOG, the Southeast Michigan Council of Governments, 2009. "Appendix H: Model Ordinances". *Michigan Low Impact Development Manual* pp. 477-497. Retrieved from: [http://www.semco.org/uploadedfiles/Programs\\_and\\_Projects/Water/Stormwater/LID/LID\\_Manual\\_appendixH.pdf](http://www.semco.org/uploadedfiles/Programs_and_Projects/Water/Stormwater/LID/LID_Manual_appendixH.pdf)

<sup>42</sup> Tip of the Mitt Watershed Council, 1997. "Appendix H: Sample Stormwater Ordinance". Published in: Ardizzone, Katherine A. and Wyckoff, Mark A. 2003. *Filling the Gaps: Environmental Protection Options for Local Governments*.

<sup>43</sup> Planning and Zoning Center Inc., 2003. Appendix U, 3.

<sup>44</sup> Tip of the Mitt Watershed Council, 1997. Appendix H, 2.

<sup>45</sup> Planning and Zoning Center Inc., 2003. Appendix U, 5.

<sup>46</sup> Tip of the Mitt Watershed Council, 1997. Appendix H, 2.

<sup>47</sup> Ibid.

<sup>48</sup> Tip of the Mitt Watershed Council, 1997. Appendix H, 4.

<sup>49</sup> Planning and Zoning Center Inc., 2003. Appendix U, 5-6.

<sup>50</sup> SEMCOG, 2002. "Storm Water Management Standards," 2.

<sup>51</sup> Ibid.

<sup>52</sup> Environmental Protection Agency, 2007. "Erosion and Sediment Control: Model Ordinance Language". *Model Ordinances to Protect Local Resources*. Retrieved from: <http://www.epa.gov/owow/nps/ordinance/mol2.htm#ml2>

<sup>53</sup> Michigan Department of Environmental Quality, 2003. "Appendix G: Sample Soil Erosion and Sedimentation Control Ordinance". Ardizzone, Katherine A. and Wyckoff, Mark A. 2003. *Filling the Gaps: Environmental Protection Options for Local Governments*.

<sup>54</sup> SEMCOG, 2002. "Soil Erosion and Sedimentation Control (ESC)," 16.

<sup>55</sup> Ibid.

<sup>56</sup> Michigan Department of Environmental Quality, 2003. Appendix G.

<sup>57</sup> SEMCOG, 2002. "Soil Erosion and Sedimentation Control (ESC)," 16.

<sup>58</sup> SEMCOG, 2002. "Soil Erosion and Sedimentation Control (ESC)," 16.

<sup>59</sup> Ibid, 17.

<sup>60</sup> Van Buren County, MI. *Document Review*, 4.

- <sup>61</sup> Environmental Health Regulations for Benzie County Health Department Authority, Jurisdiction, Purpose and General Definition. Chapter 2; Articles I-IX. <http://www.bldhd.org/publications/benziecode.pdf>
- <sup>62</sup> SEMCOG, 2002. "Sanitary Sewer Planning and Infrastructure," 20.
- <sup>63</sup> Ibid.
- <sup>64</sup> Ibid.
- <sup>65</sup> Van Buren County, MI. *Document Review*, 12.
- <sup>66</sup> SEMCOG, 2002. "Sanitary Sewer Planning and Infrastructure," 20.
- <sup>67</sup> Van Buren County, MI. *Document Review*, 21.
- <sup>68</sup> Michigan Department of Environmental Quality and Huron River Watershed Initiative, 2003. "Appendix E: Sample DEQ Wetland Ordinance". Published in: Ardizzone, Katherine A. and Wyckoff, Mark A. 2003. *Filling the Gaps: Environmental Protection Options for Local Governments*.
- <sup>69</sup> Van Buren County, MI. *Document Review*, 6.
- <sup>70</sup> Ibid.
- <sup>71</sup> SEMCOG, 2002. "Wetland Preservation," 34.
- <sup>72</sup> University of Wisconsin Extension Lakes, University of Wisconsin Stevens Point (UWSP) College of Natural Resources. Shoreland Management and Lake Classification Fact Sheet Series, #13, "Guiding Lake shore Development Through Lot Size and Side Yard Standards." Retrieved 2009 from: [http://www.uwsp.edu/cnr/uwexplakes/factsheets/fs\\_13.pdf](http://www.uwsp.edu/cnr/uwexplakes/factsheets/fs_13.pdf)
- <sup>73</sup> Planning and Zoning Center Inc., 2003. Appendix U.
- <sup>74</sup> EPA, 2006. *Model Ordinances to Protect Local Resources: Groundwater Protection Overlay District Example Ordinance*. Retrieved from: <http://www.epa.gov/owow/nps/ordinance/mol7.htm>
- <sup>75</sup> The National Flood Insurance Program (NFIP) <http://fema.gov/plan/prevent/floodplain/index.shtm>
- <sup>76</sup> Planning and Zoning Center Inc., 2003. Appendix U, 5.
- <sup>77</sup> Ibid.
- <sup>78</sup> Federal Emergency Management Agency (FEMA) website, "The National Flood Insurance Program accessed 2.3.2010 <http://www.fema.gov/about/programs/nfip/index.shtm>
- <sup>79</sup> High Risk erosion areas (HREA) are shorelands of the Great Lakes and connecting waters where erosion has been occurring at a long-term average rate of one foot or more per year. Planning and Zoning Center Inc., 2003. Ardizzone, Katherine A. and Wyckoff, Mark A. 2003. *Filling the Gaps: Environmental Protection Options for Local Governments*, Part II-41.
- <sup>80</sup> Planning and Zoning Center Inc., 2003. "Appendix K: Sample High Risk Erosion Areas Ordinance." Ardizzone, Katherine A. and Wyckoff, Mark A. 2003. *Filling the Gaps: Environmental Protection Options for Local Governments*.

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<sup>81</sup> Michigan has 270 linear miles of sand dunes created by sand, wind, and Great Lake water level fluctuations. They are prone to movement and erosion more than other geographic areas because sand is not a stable soil type, and various types of development can disturb dunes. Precautionary measures (elevated boardwalks, adequate setbacks) help minimize dune destruction. Planning and Zoning Center Inc., 2003. Ardizzone, Katherine A. and Wyckoff, Mark A. 2003. *Filling the Gaps: Environmental Protection Options for Local Governments*, Part II-48 to 53.

# Additional Resources

## Master Planning & Basic Zoning

**Planning and Zoning Center (PZC)** at MSU, Online listing Michigan local governments with a master plan and/or zoning ordinance:

[www.pzcenter.msu.edu](http://www.pzcenter.msu.edu)

Link under “Resources”: over 200 plans and 200 zoning ordinances are listed including links to similar online lists in other states. The PZC also maintains online information resources, develops decision support systems and serves as an information/data clearinghouse to enhance city, village, township, county, regional and state planning efforts.

**Michigan Planning Guidebook: for Citizens and Local Officials**, MSU Planning & Zoning Center, 2008, by Wyckoff, Mark.

The guidebook describes the roles and responsibilities of the planning commission and legislative body under the new Michigan Planning Enabling Act, PA 33 of 2008, with clear direction on procedures and standards to guide decisions.

**Michigan Zoning Guidebook: for Citizens and Local Officials**, MSU Planning & Zoning Center, 2nd edition, 2008, by Wyckoff, Mark.

The guidebook describes the roles and responsibilities of all bodies under the Michigan Zoning Enabling Act, PA 110 of 2006, as amended by PA 12 of 2008, with clear direction on procedures and standards to guide decisions.

### Checklist 1F: What Should be in a Master Plan?

Michigan State University Extension, Land Use Series, May 2008, by Solomon, Dean. 17 pages.

Can be found on the web at:

<http://web5.msue.msu.edu/lu/pamphlet/Bclsam/pamphlet1F%20PlanContents.pdf>

**Sample Approach to Update a Zoning Ordinance to Comply With Michigan Zoning Enabling Act of 2006.** Michigan State University Extension, Land Use Series, May 2008, by Schindler, Kurt H. 16 pages.  
Can be found on the web at:  
<http://web5.msue.msu.edu/lu/pamphlet/Bclsam/pamphlet9SampleZoneAmdMiZoneEnabAct.pdf>

## Sample Ordinances from within the Grand Traverse Bay Watershed

### Sample Vegetated Riparian Buffer Ordinances

East Bay Township Zoning Ordinance: Article 4BR: Boardman River District Ordinance 406 Link:

<http://www.eastbaytwp.org>

Title: ARTICLE IV - DISTRICT STANDARDS - SECTION 406 BOARDMAN RIVER DISTRICT, BR (Similar language found in several other zoning ordinances within the area of the Boardman River designated as a Natural River)

East Bay Township Zoning Ordinance: Article 2: General Provisions; Mitchell and Baker Creeks Area Ordinance 219 Link:

<http://www.eastbaytwp.org>

Title: ARTICLE V - DIMENSIONAL REQUIREMENTS

Garfield Township Zoning Ordinance: Article 7: Section 7.5.7 Setback from Designated Wetlands Link:

[http://garfield-twp.com/downloads/sec7\\_5\\_5setbklakesrivers\\_streams.pdf](http://garfield-twp.com/downloads/sec7_5_5setbklakesrivers_streams.pdf)

(The section appears on this page of the zoning ordinance) [http://garfield-twp.com/downloads/sec7\\_5suppshorelandregs.pdf](http://garfield-twp.com/downloads/sec7_5suppshorelandregs.pdf)

### Sample Open Space/Cluster Development Ordinances

East Bay Township Zoning Ordinance: Article 2: General Provisions, Open Space Preservation Section 225 Link:

[http://www.eastbaytwp.org/downloads/article\\_2.pdf](http://www.eastbaytwp.org/downloads/article_2.pdf)

East Bay Township Zoning Ordinance: Article 2: General Provisions, Residential Cluster Subdivisions

Section 226 Link: [http://www.eastbaytwp.org/downloads/article\\_2.pdf](http://www.eastbaytwp.org/downloads/article_2.pdf)

Whitewater Township Zoning Ordinance:

Article 31: Planned Unit Development

See also: <http://www.whitewatertownship.org/> (Purpose is to preserve open space; minimum open space requirement of 50 percent of development)

### Sample Ground Water Protection and Septic System Maintenance Ordinances

East Bay Township Zoning Ordinance: Article 2: General Provisions, Ground Water Protection

Standards Section 220 Link: <http://www.eastbay-twp.org/> (Similar language found in several other local zoning ordinances)

Long Lake Township: Septic System  
Time of Transfer Ordinance  
Link: <http://www.longlaketownship.com/planning/tot-septic-ord-final-10-31-08.pdf>  
Title: Long Lake Township - Grand Traverse County Michigan - Ordinance 107 - INSPECTION OF ON-SITE SEWAGE DISPOSAL SYSTEMS AT THE TIME OF PROPERTY TRANSFER ORDINANCE

#### **Sample Private Roads Ordinance**

Whitewater Township Private Road Ordinance No. 32 Link: [http://www.whitewatertownship.org/downloads/private\\_road\\_ord.pdf](http://www.whitewatertownship.org/downloads/private_road_ord.pdf)

Whitewater Township Road Plan  
See also: <http://www.eastbaytwp.org/>

#### **Sample Off-Street Parking Ordinance**

Whitewater Township Zoning Ordinance: Article 34, Section 34.30, Parking Lot and Loading Area Requirements and Article 33, section 33.40, Off-Street Parking Areas Link: [www.whitewatertownship.org/downloads/article\\_xxxiv.pdf](http://www.whitewatertownship.org/downloads/article_xxxiv.pdf) and [www.whitewatertownship.org/](http://www.whitewatertownship.org/) (For stormwater management and landscaping requirements)

#### **Sample Tree Planting Ordinance**

Blair Township Zoning Ordinance: Article 16, Section 16.05.3b, General Site Landscaping Link: [www.blairtownship.org](http://www.blairtownship.org) (See page 67 of the ordinance)

#### **Sample Site Plan Review Ordinance**

Whitewater Township Zoning Ordinance:  
Article 25: Site Plan Review  
Link: [http://www.whitewatertownship.org/downloads/article\\_xxv\\_amend\\_55.pdf](http://www.whitewatertownship.org/downloads/article_xxv_amend_55.pdf)  
Filename: ARTICLEXXVAmend 55-whitewater-twp-site-plan-review.pdf (Includes language about stormwater management and preservation of natural vegetation)

#### **Sample Wetland Ordinance**

Forest Home Township Zoning Ordinance: Article 5: Wetlands Overlay District  
Link: [www.foresthometwp.com/zoning/Articles\\_04\\_through\\_06.htm](http://www.foresthometwp.com/zoning/Articles_04_through_06.htm)

#### **Sample Supporting Documents**

Long Lake Township Community Forestry Plan  
Link: <http://www.longlaketownship.com/forestry/longlaketwn.html> Link to Table of Contents: <http://www.longlaketownship.com/forestry/contents.html> Files in folder: LongLakeTwp-Community ForestryPlan (all are in HTML format) Long Lake Township Natural Features Inventory  
Link: <http://www.longlaketownship.com/planning/long-lake-nfi-final-report.pdf>

Whitewater Township Road Plan  
See also: <http://www.eastbaytwp.org> (Supporting information for township road ordinance)

### **Other Model Ordinance Resources**

#### **Tip of the Mitt Watershed Council**

The Watershed Council has numerous Model Ordinances available for your use on a variety of topics. These ordinances are featured by the Michigan DEQ in a variety of places, including the widely used book, Filling the Gaps: Environmental Protection Options for Local Governments. If you need help with a Model Ordinance, please contact us and we can send them to you electronically: (231) 347-1181

#### **Michigan DEQ – Local Wetland Ordinance webpage**

Link: [http://www.michigan.gov/deq/0,1607,7-135-3313\\_3687-24312--,00.html](http://www.michigan.gov/deq/0,1607,7-135-3313_3687-24312--,00.html)

#### **Macomb County Model Environmental Ordinances**

<http://www.macombcountymi.gov/>

#### **Michigan Township Association, Open Space Preservation Provisions**

Link: <http://michigantownships.org/zoning.asp>

#### **Land Information Access Association, Model Zoning Policies and Ordinances**

Includes floodplain standards, private road ordinance, resource protection overlay, steep slope development standards, stormwater management, tree preservation standards, and wetlands/natural features setbacks Link: <http://www.partnershipsforchange.cc/>

**Oakland County Planning & Economic Development Services, Environmental Stewardship Services, Planning Tools for Natural Resource Protection**

Includes sample and model ordinances for natural area protection; wetland, floodplain, and water-course protection; natural features setback/ buffer; woodland protection; native vegetation; stormwater protection; groundwater protection; surface water protection; erosion & sediment control; reduction of impervious surfaces; and reduction of phosphorous/fertilizers. Link: <http://www.oakgov.com/>

**Low Impact Development and Best Management Practice Resources**

A Natural Solution: An Introduction to Low Impact Development for Commercial and Residential Applications in the Grand Traverse Region  
Link: [http://www.gtbay.org/downloads/low\\_impact\\_development\\_guidebook\\_small\\_3.pdf](http://www.gtbay.org/downloads/low_impact_development_guidebook_small_3.pdf)

**Better Site Design: A Handbook for Changing Development Rules in Your Community**

Filename: ELC\_BSDpart1.pdf Link to Part 2: [http://www.cwp.org/Resource\\_Library/Center\\_Docs/BSD/ELC\\_BSDpart2.pdf](http://www.cwp.org/Resource_Library/Center_Docs/BSD/ELC_BSDpart2.pdf) Filename: ELC\_BSDpart2.pdf

**Michigan DEQ Best Management Practices Design Manuals webpage**

Link: [http://www.michigan.gov/deq/0,1607,7-135-3313\\_3682\\_3714-118554--,00.html](http://www.michigan.gov/deq/0,1607,7-135-3313_3682_3714-118554--,00.html)

**Guidebook of Best Management Practices for Michigan Watersheds (Introduction)** Link: [http://www.michigan.gov/documents/deq/deq-wb-nps-Intro\\_250601\\_7.pdf](http://www.michigan.gov/documents/deq/deq-wb-nps-Intro_250601_7.pdf)

**Guidebook of Best Management Practices for Michigan Watersheds (Entire)**

Link: [http://www.michigan.gov/documents/deq/deq-wb-nps-WholeGuidebook\\_250602\\_7.pdf](http://www.michigan.gov/documents/deq/deq-wb-nps-WholeGuidebook_250602_7.pdf)

**State of Michigan Environmental Protection Resources:**

**Michigan Department of Natural Resources and Environment (DNRE) website home page**

<http://www.michigan.gov/deq>

**Filling the Gaps: Environmental Protection Options for Local Governments**

Written by Katherine Ardizzone, NOAA Coastal Management Fellow for DEQ (2001-2003), and Mark Wyckoff, FAICP and President of Planning & Zoning Center, Inc. This book was created to equip local officials with important information to consider when making local land use plans, adopting new environmentally focused regulations, or reviewing proposed development. As of January 2011, it is in the process of being updated. It is in electronic form and can be downloaded at this website: [http://www.michigan.gov/deq/0,1607,7-135-3313\\_3677\\_3696-73358--,00.html](http://www.michigan.gov/deq/0,1607,7-135-3313_3677_3696-73358--,00.html)

**Michigan DNRE Forest, Land and Water Management website**

<http://www.michigan.gov/dnr/0,1607,7-153-30301---,00.html>

**Michigan's Waters website**

<http://www.michigan.gov/dnre> - Click the link on the left that says "Water": "DNRE Water Programs establish water quality standards, assess water quality, provide regulatory oversight for all public water supplies, issue permits to regulate the discharge of industrial and municipal wastewaters, monitor State Water resources for water quality, the quantity and quality of aquatic habitat, the health of aquatic communities, and compliance with state laws."

**Inland Lakes and Streams website**

<http://www.mi.gov/dnreinlandlakes>  
"The Inland Lakes and Streams Program is responsible for the protection of the natural resources and the public trust waters of the inland lakes and streams of the state. The program oversees activities including dredging, filling, constructing or placement of a structure on bottomlands, constructing or operating a marina, interfering with natural flow of water or connecting a ditch or canal to an inland lake or stream."

**Surface Water website**

[http://www.michigan.gov/deq/0,1607,7-135-3313\\_3682---,00.html](http://www.michigan.gov/deq/0,1607,7-135-3313_3682---,00.html) "DNRE is committed to protecting and preserving Michigan's water resources. There are several programs in place which support this goal. These include non-point source pollution, septage, storm water, and sanitary and combined sewer overflow."

**Nonpoint Source Pollution website**

[http://www.michigan.gov/deq/0,1607,7-135-3313\\_3682\\_3714---,00.html](http://www.michigan.gov/deq/0,1607,7-135-3313_3682_3714---,00.html)

“Michigan’s Nonpoint Source Program assists local units of government, non-profit entities, and numerous other state, federal, and local partners to reduce nonpoint source pollution statewide. The basis of our program is watershed management and our program works with stakeholders to develop and implement plans to protect the watersheds of the state. We look forward to working with you to protect and improve Michigan’s water resources.”

**Water Management website**

[http://www.michigan.gov/deq/0,1607,7-135-3313\\_3684---,00.html](http://www.michigan.gov/deq/0,1607,7-135-3313_3684---,00.html)

“Water Management Activities that may have potential impacts to the public trust, riparian rights, or may impair or destroy the waters or other natural resources of the state, including inland lakes and streams, the Great Lakes, wetlands, and groundwater, are regulated by DNRE. Information on the DNRE permit processes and water resource related databases and digital maps is provided.”

**Aquatic Invasive Species website**

[http://www.michigan.gov/deq/0,1607,7-135-3313\\_3677\\_8314---,00.html](http://www.michigan.gov/deq/0,1607,7-135-3313_3677_8314---,00.html)

**Coastal Management Program website**

[http://www.michigan.gov/deq/0,1607,7-135-3313\\_3677\\_3696---,00.html](http://www.michigan.gov/deq/0,1607,7-135-3313_3677_3696---,00.html)

“Michigan’s Coastal Management Program was developed under the federal Coastal Zone Management Act and approved in 1978. Since then, the Program has assisted organizations in protecting and enhancing their coastal areas, funded studies related to coastal management and helped to increase recreational opportunities in Michigan’s Great Lakes coastal area.”

**Drinking Water website**

[http://www.michigan.gov/deq/0,1607,7-135-3313\\_3675---,00.html](http://www.michigan.gov/deq/0,1607,7-135-3313_3675---,00.html)

“DNRE has primary enforcement authority in Michigan for the Federal Safe Drinking Water Act under the legislative authority of the Michigan Safe Drinking Water Act. As such, the division has regulatory oversight for all public water supplies, including approximately 1,500 community water supplies and 11,000 non-community water supplies. In addition the program regulates

drinking water well drilling. Michigan has more households served by private wells than any other state, with approximately 25,000 domestic wells drilled per year. DNRE also investigates drinking water well contamination, and oversees remedial activities at sites of groundwater contamination affecting drinking water wells.”

**Water Quality Monitoring website**

[http://www.michigan.gov/deq/0,1607,7-135-3313\\_3686---,00.html](http://www.michigan.gov/deq/0,1607,7-135-3313_3686---,00.html)

“DNRE has several water quality monitoring programs that assist in keeping all of Michigan’s water clean.” These include beach water and inland lakes monitoring.

**Wetlands Protection website**

[http://www.michigan.gov/deq/0,1607,7-135-3313\\_3687---,00.html](http://www.michigan.gov/deq/0,1607,7-135-3313_3687---,00.html)

“Michigan’s wetland statute, Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, defines a wetland as “land characterized by the presence of water at a frequency and duration sufficient to support, and that under normal circumstances does support, wetland vegetation or aquatic life, and is commonly referred to as a bog, swamp, or marsh.” The definition applies to public and private lands regardless of zoning or ownership.”

**Soil Erosion and Sedimentation Control Program website**

[http://www.michigan.gov/deq/0,1607,7-135-3311\\_4113---,00.html](http://www.michigan.gov/deq/0,1607,7-135-3311_4113---,00.html)

“Soil Erosion and Sedimentation Control Program was implemented to regulate the pollution of Michigan waters by improper construction site management practices. Special provisions for all development sites where there will be a disruption in the site land cover is required.”

**Clean Water Fund website**

[http://www.michigan.gov/deq/0,1607,7-135-3307\\_3515-93611--,00.html](http://www.michigan.gov/deq/0,1607,7-135-3307_3515-93611--,00.html)

“The purpose of the Clean Water Fund is to implement DNRE’s surface water quality monitoring plan and to implement water pollution controls.”

**Surface Water Quality Monitoring Projects**

“The legislation for the Clean Water Fund stated that the highest priority for the Fund would be the monitoring strategy; therefore, \$45 million of the \$90 million was set aside to implement the

monitoring strategy. Implementation of the monitoring strategy is being done using both grants and direct contracts to vendors.”

### **Water Pollution Control Projects**

“The other half of the Clean Water Fund is intended to implement water pollution control activities, which, under the Clean Water Fund administrative rules, were identified as the following:

- Providing state match to establish and implement the conservation reserve enhancement program (CREP) in Michigan. The administrative rules established a \$5 million limit on the CREP and that obligation has been met.
- Implementing water quality protection or improvement activities in approved watershed management plans that are required under a NPDES voluntary storm water permit.
- Implementing water quality protection or improvement recommendations in approved watershed plans that place a strong emphasis on protecting high quality waters.
- Implementing water quality recommendations in RAPs and LaMPs, other than those involving contaminated sediments.
- Implementing programs to identify and require the correction of illicit connections to storm sewer systems.
- Identifying failing on-site septic systems.
- Implementing corrective measures to correct failing on-site septic systems.
- Locating and plugging abandoned wells.”

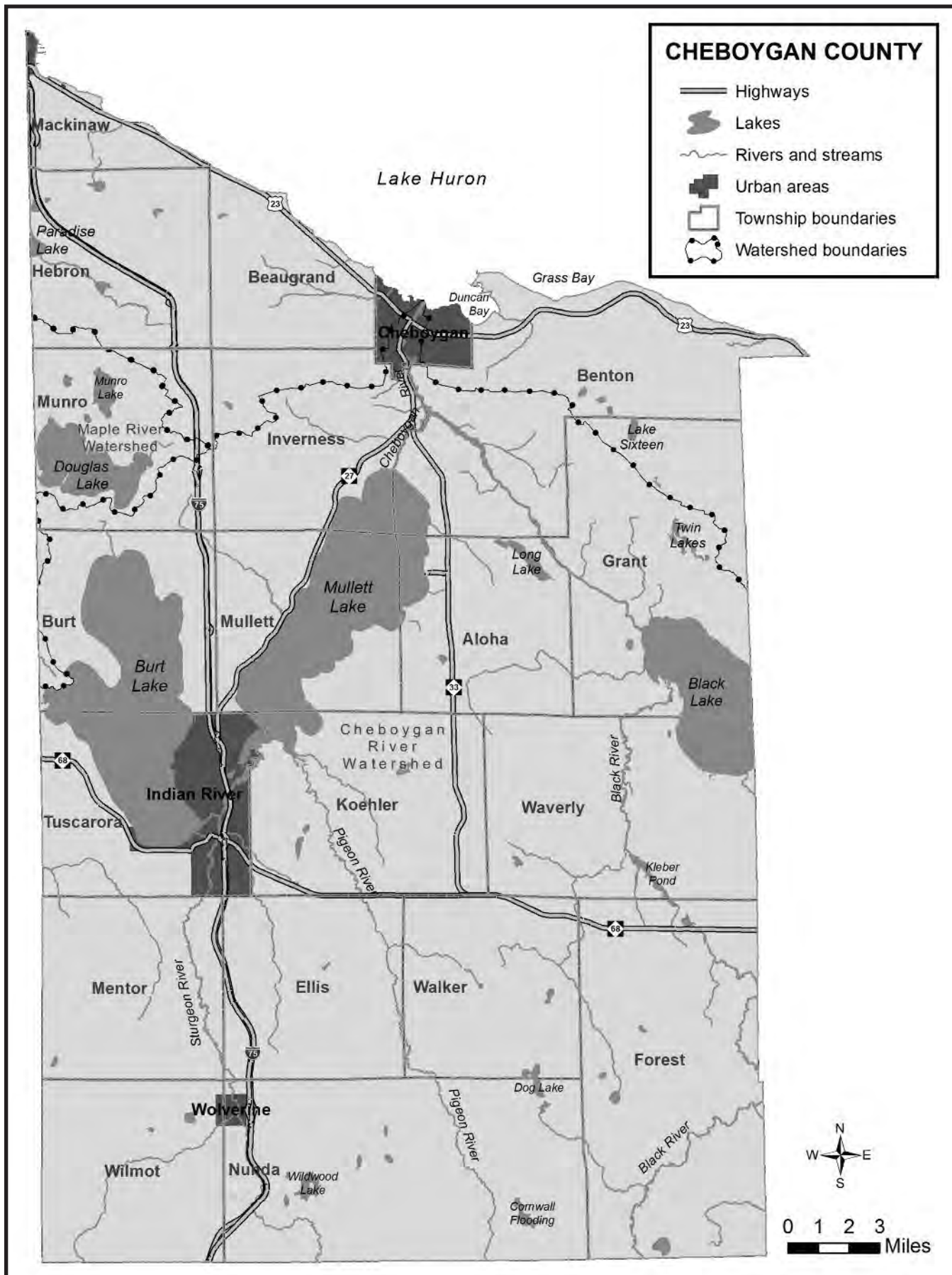
### **Natural Rivers Program website**

[http://www.michigan.gov/dnr/0,1607,7-153-30301\\_31431\\_31442---,00.html](http://www.michigan.gov/dnr/0,1607,7-153-30301_31431_31442---,00.html)

“Michigan citizens are fortunate to be surrounded by more than 36,500 miles of rivers and streams, 12,500 miles of which are classified as cold water trout streams. We are also fortunate that Michigan has many programs focused on the protection and enhancement of those river resources”.



**Burt Lake State Park**





**Financial support for this project  
was generously provided by:**

US Environmental Protection Agency

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The Watershed Center Grand Traverse Bay

Burt Lake Preservation Association

Elk-Skegemog Lakes Association

Lake Charlevoix Association

Pickereel-Crooked Lakes Association

Three Lakes Association

Michigan Environmental Council

Petoskey-Harbor Springs Area Community Foundation



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**[www.watershedcouncil.org](http://www.watershedcouncil.org)**