RURAL WATER QUALITY PROTECTION

a planning & zoning guidebook for local officials

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MICHIGAN STATE UNIVERSITY | Land Policy Institute

Great Lakes RESTORATION

Acknowledgments

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RURAL WATER QUALITY PROTECTION:

A Planning & Zoning Guidebook for Local Officials

By:
John D. Warbach, Ph.D.
Mark A. Wyckoff
Mark D. Jones
Ryan P. Soucy
Jacqueline A. Spry

Planning & Zoning Center
Michigan State University
Manly Miles Building
1405 S. Harrison Road, Room 310
East Lansing, MI 48823
517.432.2222
517.432.3222 fax
www.pzcenter.msu.edu

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Chapter One: Introduction

Photo 1–1: Michigan and surrounding Great Lakes from space.

This guidebook seeks to provide local units of government in rural areas with information about how land development and other activities on the land affect water quality; to provide an overview of the many entities engaged in water quality protection (e.g., local, state, and federal government, individual property owners, and nonprofit organizations); to provide educational materials on best management practices that lower the impact of land use activities on our waterbodies; and to provide sample language for community Master Plans and Zoning Ordinances that helps ensure that future development and other land use activities occur with the lowest possible impact on the quality of the water we need for our communities. The guidebook also provides references to other useful resources on water quality protection.

BACKGROUND

Looking at our planet from space, one might wonder why it is not called "Water." There is so much water, but people can only live in large numbers on the land part, which is a good reason for calling it "Earth." Coming closer, one can see how water and the land are really intertwined, with rivers, lakes and wetlands nearly everywhere on the different continents and major islands.

In the Great Lakes region, there are many of each of those kinds of waterbodies, and we have become accustomed to living well on the land, because of our ready access to large amounts of water and technologies that allow us to transport some of it into homes, shops, schools, and institutions; drain some of it off the land so we can plant crops; and dump in some of it to dilute our waste. Unfortunately, these daily activities are having a substantial negative impact on the water in our Great Lakes region. We allow large amounts of soil containing fertilizers, pesticides, and herbicides along with vehicular lubricants to run off the land into drains, streams, and rivers that flow into the Great lakes. We don't make much effort to conserve our precious groundwater resources, and we often dilute our waste with pure water.

We are learning how to have a lower impact in the ways we use the land and water. Only a few generations ago, scientists started discovering that the ways we used water were not going to be sustainable for long, even though there is so much of it. Both groundwater, and lakes and streams, were being contaminated by chemicals and bacteria to the point of lasting danger to human health. New technology and new approaches to managing water use were developed that could reduce or eliminate continued damage to our waterbodies. However, those technologies and management approaches are not currently used everywhere, and as a result, we find the water we rely on to build families, businesses, and communities continues to receive a variety of contaminates.

In many areas, technology is not up to the task of dealing with the amount of pollution our waterbodies receive. In some places, water is too degraded to fully support economic

Photo 1–2: Many beaches have been found to be unsafe for human contact with the water.

and community health, and the clean-up is a significant drain on government resources. Making the choice to reduce or prevent future pollution protects our economy and our health from the burden of having to clean up, or abandon large areas of land and water in the future. It is largely the things we do on the land that degrades the water. And when we degrade land and/or water, there is less of both that has the capacity to support our communities and the planet's population.

RURAL FOCUS OF THE GUIDEBOOK

It has become apparent that we must find a way to reduce our impact on our water resources. We can do better! The solutions are numerous, but every group should work on those solutions within their range of control and partner with others to achieve common goals. There are numerous informational resources available for protecting water quality in urban settings; however, much of Michigan is rural, and rural communities and small towns require a different approach that takes into consideration the limited administrative capacity of rural communities to protect their water resources. This guidebook targets actions small rural communities can take to prevent water pollution. We use the Saginaw Bay Watershed as the area to pilot measures local governments can take to better protect water quality. This is a 23-county area in mid-Michigan, which drains 8,632.14 square miles into the Saginaw Bay.

PURPOSE OF THIS GUIDEBOOK

This guidebook seeks to provide local units of government in rural areas with information about how land development and other activities on the land affect water quality; to provide an overview of the many entities engaged in water quality protection (e.g., local, state, and federal government, individual property owners, and nonprofit organizations); to provide educational materials on best management practices that lower the impact of land use activities on our waterbodies; and to provide sample language for community Master Plans and Zoning Ordinances that helps ensure that future development and other land use activities occur with the lowest possible impact on the quality of the water we need for our communities. The guidebook also provides references to other useful resources on water quality protection.

PROTECTING WATER QUALITY IS EVERY COMMUNITY'S OBLIGATION

Nearly all of the activities that take place on the land (building, farming, mining and cutting trees, etc.) take place on private lands. When people build homes and stores, plow and fertilize fields, drill for oil and gas, or cut trees; unless done so carefully, sediment, nutrients, chemicals, and oil can be carried off in stormwater from nonpoint source pollution (which is different than the waste that is discharged as industrial or municipal waste through pipes, called point source pollution),

Photo 1–3: Children deserve healthy water for swimming.

adversely affecting the public health and values of nearby properties. Stormwater runoff and its eventual infiltration into the soil can bring those materials into our streams, lakes and groundwater, affecting whether we can swim in it, eat fish caught from it, establish viable tourism businesses, or even use it in our homes without expensive purification treatment. Governments at the federal, state and local levels have a shared responsibility to regulate many of those activities to protect our health and property.

For the purposes of this guidebook, local regulation is the most important level of regulation. It addresses site specific issues in ways that are appropriate to the problem and the

property. Generally, local government has the authority to regulate residential, commercial and industrial development. Farming in Michigan is generally exempt from that authority, provided it operates within the parameters of Generally Accepted Agricultural and Management Practices (GAAMPs), a minimum set of standards required by farmers to receive nuisance suit protection (SEMCOG, 2000). The MSU Extension, as well as the Michigan Farm Bureau and other organizations provide educational programs that help farmers comply with state and federal environmental regulations.

The treatment of waste at private residences is regulated by Health Departments, usually at the county level, under authority granted by the state. Typically, County Drain Commissioners (and to a lesser extent County Road Commissions) have the enormous responsibility of regulating activities that have the potential to produce sediment in streams from soil erosion.

Many voluntary and regulatory approaches have been developed to help protect land and water. To effectively use these approaches, it is important for citizens and officials to understand how the water cycle functions, above and below the surface of Earth, and how human activities on the land play a role in whether pollutants enter into that cycle. It is also important to learn about the structure and function of the land and water flow system, called a watershed, which is where people's actions determine the eventual quality of our water resource. These issues are addressed in Chapter 2.

We all share the same water. Every community is at some location within a watershed. Water flows downhill and almost everything that enters the water upstream ends out downstream. Thus, whether your community is in the headwaters or at the discharge point, its residents and businesses are either generating or receiving nonpoint source pollutants.

Rain in headwaters areas without stormwater management measures in place causes unsecured sediment, nutrients (fertilizer and animal waste), chemicals (like pesticides, fungicides, herbicides, etc.), and bacteria from human and animal waste to enter a stream or river. Unless consumed by plants or animals, or filtered out by various sediment traps, these pollutants are carried to the river's end; contaminating our waterways, creating human health problems, and leading to potential loss of recreational opportunities (fishing, boating, swimming, etc.). Over the last century, we have learned the hard way that healthy watersheds are vital for a healthy environment and economy. Healthy watersheds require each individual and each community to play a role in helping to protect water quality and prevent pollution. This guidebook focuses on the role that local governments can play in this process.

Federal and state governments have spent decades of attention on pollution reduction entering our waterways, and on the enactment of scores of regulations affecting agricultural and industrial operations. As a result, one would assume that there is no effective role for local planning and regulation of land to better protect water quality. However, that assumption is false. There are still some substantial gaps that can only be filled by local planning and local regulations. These were first documented in the Michigan Department of Environmental Quality publication entitled **"Filling the Gaps,"** now in its second edition (and available from the Michigan Association of Planning – **www.planningmi.org**).

These gaps are visible when various federal and state regulations are overlain and carefully examined. Sometimes the gaps are filled by county regulations, but most often, there remain issues that can only be addressed by local planning and regulation. This guidebook focuses on gaps associated with surface water and groundwater protection issues in general and stormwater management issues in particular. It uses a low impact development (LID), best management practices approach where LID is defined as follows:

> *Low Impact Development: An approach to land development that uses various land planning and design practices and technologies to simultaneously conserve*

and protect natural resource systems, water quality and reduce infrastructure costs. Consult ***Low Impact Development Manual for Michigan: A Design Guide for Implementers and Reviewers***:

http://www.mi.gov/deq/0,1607,7-135--207334--,00.html, or

http://www.semcog.org/lowimpactdevelopment.aspx.

The federal government identified major Areas of Concern (AOC) throughout the Great Lakes in the 1980's. A wide variety of impairments to beneficial uses were identified. Remedial Action Plans (RAP) were prepared to address problems in each of these AOC's. The Saginaw Bay Watershed is one of the designated AOCs for which a RAP has been prepared. Figure 1–1 shows the location of AOCs in Michigan, and the massive extent of sediment plumes into the Saginaw Bay following significant rain events in May 2011. *[see "Saginaw Bay Watershed and Area of Concern," August 2012,* ***http://www.epa.gov/glnpo/aoc/saginaw-river/index.html*** *for more background on this process and the wide variety of groups involved.]*

While Remedial Action Plans for Areas of Concern provide a broad framework for action, issues need to be identified and confronted at a smaller sub-area basis. Therefore, many sub-watersheds have local watershed protection plans that document the nature and type of pollutants that are of greatest local concern. These plans identify various goals, objectives and strategies for undertaking the highest priority issues in the watershed.

Most of these plans call for action by various stakeholder groups. However, until recently, the implementation process has been challenging due to the lack of financial resources and technical assistance to stakeholder groups and communities. This problem has been aggressively addressed since 2010, with funds from the federal U.S. Environmental Protection Agency (EPA) Great Lakes Restoration Initiative (GLRI). Competitive grants have funded measures to restore various types of contaminated sites, as well as to put in place new plans and regulations at the local level to prevent future pollution. This is critical to protecting the investment being made in restoration activities.

Figure 1–2 illustrates this flow of planning to action. Chapter 3 describes the wide range of roles that key organizations (including local governments) play in making it happen.

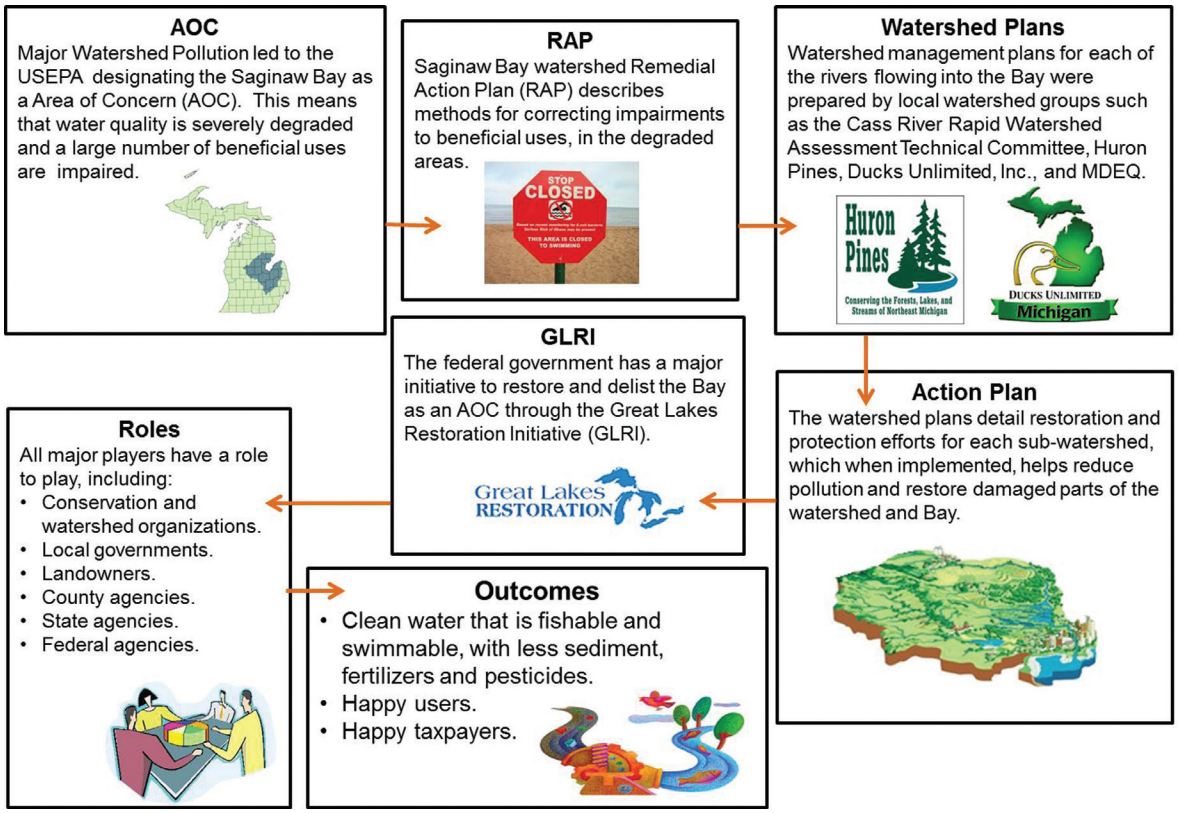
PURPOSE AND TARGET AUDIENCE

This guidebook presents simple, straightforward approaches for protecting water quality through local Master Plans and Zoning Ordinances *in very rural places*. It is targeted at Planning Commissioners, Zoning Administrators, and local elected officials in rural Michigan, and is applicable throughout the Midwest Great Lakes states. It is written from a practical

Figure 1–1: The Saginaw River/Bay Area of Concern

Source: U.S. Environmental Protection Agency.

Figure 1–2: Making the Connection



Source: Planning & Zoning Center, Land Policy Institute, Michigan State University.

perspective, and is unlikely to satisfy purists. It takes a pragmatic approach, because every community and landowner has an obligation to help protect water quality, but few rural communities have the staff capacity to do much. In these economic times full-time planners and Zoning Administrators are a rarity in rural areas, and most staff are wearing multiple hats (e.g., Zoning Administrator, Building Inspector, Code Enforcement Officer, Soil Erosion and Sedimentation Control Officer, etc.).

Other guidebooks present more comprehensive, and more complex approaches (see sidebar on page 1–12), that if properly implemented will likely do more to protect water quality. But there is one characteristic of the approaches in this guidebook that make them better suited to small rural communities in the Midwest—they do not require much in the way of staff to implement. Instead, they rely on the common sense of landowners that one person's actions can have a negative impact on others, and that if this is pointed out, more often than not, people will choose the less impactful action. This value of friendliness and respect of neighbors is one that the rural Midwest is built upon. As a result, the water quality protection regulations in this guidebook provide information, choices, and guidance to landowners, not merely restrictions. These are not common characteristics of guidebooks on local land use regulations.

In rural areas, many key regulations are implemented at the county level, and this is often the most cost-effective and customer-consistent place for such regulations to be implemented. Generally, there are more resources at the county level; providing greater capacity for well-trained staff and the opportunity to fairly and uniformly apply land use regulations over a larger area. However, counties do not always have the statutory authority to adopt water quality regulations outside of zoning and, in Michigan, of 83 counties, only 22 have zoning (and most are in northern Michigan). Additionally, in states like Michigan, townships, cities, and villages all have the power to plan and zone, and if they do, local regulations supersede county zoning. Therefore, if water quality is to be protected in large rural areas that are locally zoned, provisions need to be inserted into local Zoning Ordinances.

Michigan has over 1,850 local units of government (cities, villages, townships, and counties). Approximately 350 have a population of over 5,000 persons. The overwhelming bulk of local governments in Michigan have 1,000 or less persons and levy a mil or less in taxes. The result is inadequate resources for full-time zoning and building administration; but at the same time, in most cases there is not sufficient demand for those services to warrant full-time staffing. *As a result, in order to induce local governments in rural areas to take measures to better protect water quality there must be simple, common sense, choice-based, property owner–implemented measures without a lot of administrative complexity.* We have attempted to provide these kinds of provisions in this guidebook.

Basic information about the purpose, value and benefit of each regulation, as well as the targeted application of various approaches to those circumstances where they are likely to have the greatest impact is also essential. This guidebook is structured to provide this information.

CHAPTER ORGANIZATION

This guidebook is divided into the following chapters:

1. Introduction.
2. Understanding Watersheds.
3. The Umbrella of Protection for the Watershed.
4. Best Management Practices in Rural Areas.

Appendices:

1. Master Plan and Zoning Ordinance Sample Language.
2. Local Planning and Zoning Assessment Tool.

Chapter 4 and Appendix A comprise the bulk of this guidebook. They are organized as follows:

- Description of major low impact development category.
  - Description of the category.
  - List of best management practices addressed within the category.
  - "Good," "Better," "Best" Table for that category.

For each best management practice in that category.

- Description of issue.
  - Problem being addressed.
  - Gap left for local regulation.
  - Explanation of key terms.
- Proposed approach in the Master Plan.
  - Description.
  - Explanation of key terms.
  - Key Master Plan language.
- Proposed approach in the Zoning Ordinance.
  - Description.
  - Explanation of key terms.
  - Key Zoning Ordinance language.

There are two appendices:

- Master Plan and Zoning Ordinance Sample Language; and
- Local Planning and Zoning Assessment Tool.

GOOD, BETTER, BEST APPROACHES

In order to provide communities (and in some cases property owners) with choices that best suits their administrative capacity and view on the role of government relative to regulation of private property, each of the best management practices presented in Chapter 4 is presented with three options: "Good," "Better" and "Best." In many cases, the "Good" level is largely to provide educational information to land owners. In other cases, the "Good" level is intended to provide a modicum of guided practice, compared to doing nothing (the base condition in most local plans and Zoning Ordinances examined in the pilot project). At the "Better" and "Best" levels, the community is expected to become involved in Site Plan Review, and to set and administer progressively higher standards. The "Better" level requires some staff administrative capacity and usually more effort/cost on the part of landowners than the "Good" level. The "Best"

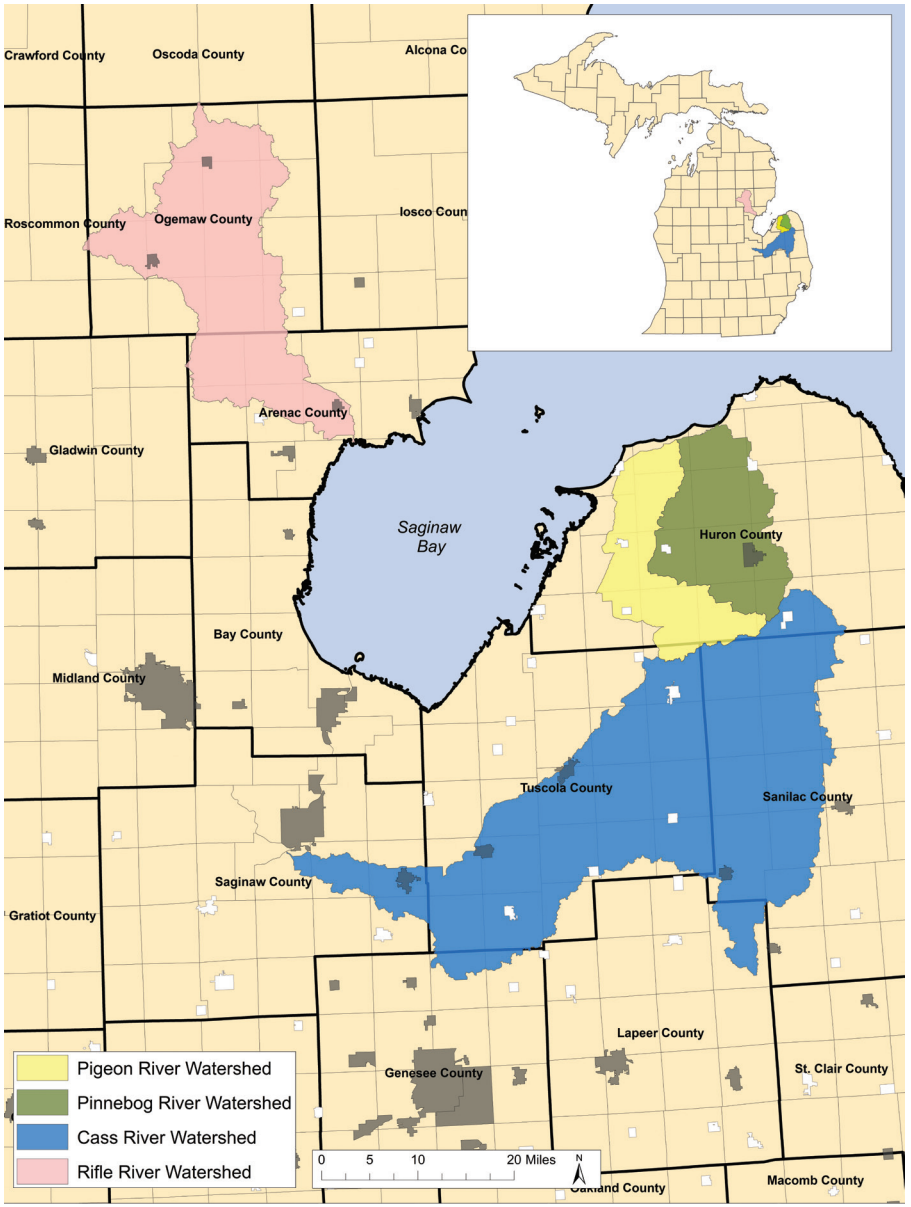
category is reserved for those rural communities that have full-time staff, and at least a Planning Commission that is supportive of the approach presented (and even better if it has the full support of the governing body).

THANKS TO PILOT COMMUNITIES

This guidebook was prepared as a result of working with approximately 100 rural jurisdictions in four sub-watersheds of the Saginaw Basin in Michigan (see Figure 1–3): The Pigeon and Pinnebog River watersheds are largely in Huron County; the Cass River watershed is largely in Sanilac, Tuscola, and Saginaw counties; and the Rifle River watershed is largely in Ogemaw and Arenac counties. The County Planning Commissions in Huron and Ogemaw county are not only responsible for preparation and maintenance of the county Master Plans, but also for county zoning. Both counties embraced the "Better" and "Best" approaches, because they have professional staff that are adequately trained to implement the more expansive approaches. There are 22 jurisdictions covered by these county ordinances (the rest of the townships in those counties have their own zoning).

In contrast, within the four pilot sub-watershed, there are 58 townships, nine cities, and eight villages without the benefit of county zoning. Few municipalities have trained staff capable of administering most zoning-based water quality provisions (and some already were doing so before this project came along).

Figure 1–3: Pilot Communities Location



Source: Michigan Geographic Data Library, Michigan Department of Technology, Management & Budget.

As a result, only 26 communities engaged with staff of the Planning & Zoning Center (PZC) at Michigan State University (MSU) to incorporate water quality protection provisions in the Master Plan and Zoning Ordinance by December 2012. It is hoped that over time, more local governments in these sub-watersheds will include the "Good," "Better," or "Best" provisions advocated in this guidebook into the local Master Plan or Zoning Ordinance.

We are very grateful for the willingness of the rural communities that participated to pilot the provisions in this guidebook. We hope to learn from the challenges they face over the next couple of years. As a result, we will post updates to the guidebook on **www.pzcenter.msu.edu** website, if necessary.

PROCESS FOLLOWED IN WORKING WITH THE PILOT COMMUNITIES

Basic Training

Engagement with communities in the four pilot sub-watersheds began with educational sessions on the issues surrounding local protection of water quality and the value and benefit of local action. Many of the materials presented in those workshops are included in various parts of this guidebook.

These sessions also revealed a tremendous need for basic training on local planning and zoning. As a result, staff of the MSU Michigan Citizen Planner Program were secured to conduct two workshops in three locations in the four pilot sub-watersheds. It had been many years since these rural communities had received this type of training on the basic elements of local planning and zoning based on Michigan statutes. With the turnover on local Planning Commissions, it is important that such training be available on regular intervals of at least every two to three years. These sessions were well-appreciated by participants.

Assessment Tool

For the purpose of evaluating the effectiveness of water quality protection strategies by local governments within the four pilot sub-watersheds, the project team developed the Local Planning and Zoning Assessment Tool (see Appendix B, on page A–17). The assessment tool addresses the following information:

A. **Introduction:** Purpose, Method, Organization and Content, How to Use Assessment, Defined Terms, and Notes;

B. **Community Assessment Tool:** Background, General Questions, Provisions, and Supplementary Information; Master Plan, and Zoning Ordinance; and

C. **Attachment (Sample Gridsheet):** Includes instructions for determining the number of acres in each land use and land cover category.

The project team completed a 17-page assessment for 66 jurisdictions and shared the results with them. The results revealed a large number of Master Plans and Zoning Ordinances that were old and not in compliance with basic statutory requirements. In addition, most of the plans and ordinances had few, if any, provisions related to water quality protection. Instead, they were largely land use focused with simple structures for regulating land into residential and agricultural districts, and in some cases commercial, industrial, or special districts. Table 1–1 presents a summary of the results of the assessments across all communities within the four pilot sub-watersheds (Cass River, Rifle River, and Pigeon/Pinnebog Rivers) that chose to submit Master Plans and Zoning Ordinances for review.

The assessments pointed out opportunities for strengthening language in the Master Plan and Zoning Ordinance to better protect water quality. These assessments were shared at sub-area meetings where communities could easily hear the relative status of their own plans and Zoning Ordinances compared to nearby communities. In some cases this motivated communities to act.

Each community was given a brief summary of "Good," "Better," "Best" management practices, and asked to identify which approach they wanted the project team to use when drafting specific language to amend the local Master Plan and Zoning Ordinance.

Table 1–1: Assessment Results from the Four Pilot Sub-Watersheds of the Saginaw Basin

	Municipalities	Counties
Essential Elements		
Low impact development	0	0
Environmental inventory	33	1
Goals and objectives for water quality	23	2
Coordinated permitting	19	2
Coordinated Site Plan Review	14	1
Earth change activity as regulated under the Soil Erosion and Sedimentation Control Act	24	1
Accumulation and disposal of waste and other materials	21	1
Best Management Practices		
Parcel splits for buildable area	10	1
Land division alternatives	27	1
Stormwater management (plan)	8	1
Stormwater management (ordinance)	4	0
Stormwater management: Buffer strips Site Plan Review standards	8	2
Stormwater management: Other Site Plan Reviews standards	7	1
Impervious surface reduction (plan)	4	0
Impervious surface reduction (ordinance)	3	0
Natural feature and drain setbacks	4	0
Groundwater protection	3	0

Note: This table continues on the next page.

Specific Local Recommendations

The project team prepared a set of specific recommendations for each community based on the response it received. One-on-one meetings were set up with local planning and zoning officials to review all the recommendations, and to give each community the opportunity to ask questions. These meetings were held in groups of nearby jurisdictions. In addition to the amendment language, information on Master Plan and Zoning Ordinance amendment procedures were also provided to each jurisdiction. The project team also responded to email and phone questions, and checked back with each jurisdiction after a few months, to ensure they were still on track to adopt the proposed amendments. Some communities acted faster than others and some decided to take an opportunistic approach, deciding to wait until an upcoming Master Plan or Zoning Ordinance amendment process was started.

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The guidebook was prepared using funds from the EPA Great Lake Restoration Initiative. We are grateful for this support and the opportunity to demonstrate pragmatic approaches to protecting water quality in rural areas. A special thank you is extended to Senator Debbie Stabenow who pushed very hard in Congress for the passage of the Great Lakes Restoration Initiative and to ensure its continued funding. Without her efforts, this project, and hundreds more, would not have been possible. See http://www.stabenow.senate.gov/.

Table 1–1: Assessment Results from the Four Pilot Sub-Watersheds of the Saginaw Basin (cont.)

	Municipalities	Counties
Resource Protection		
Resource Protection Overlay Districts (plan)	2	1
Resource Protection Overlay Districts (ordinance)	6	1
Floodplains	7	0
Woodland protection and reforestation (plan)	8	0
Woodland protection and reforestation (ordinance)	9	1
Wetland protection/restoration/creation	16	1
Conservation easements	2	0
Public Education		
Agricultural best management practices	0	0
Open space preservation	0	0
Water quality monitoring	1	0
Drain clearing	0	0
Road and bridge repair, and stream crossings	0	0

Resources to Assist Local Governments with Water Quality Protection

1. *Low Impact Development (LID) Manual for Michigan: A Design Guide for Implementers and Reviewers*
What: A free guidebook for the state of Michigan. Funding for the project was made available by the Michigan Department of Environmental Quality (MDEQ) and developed by Southeast Michigan Council of Governments (SEMCOG).
Where: http://www.semcog.org/lowimpactdevelopmentreference.aspx
Description: "This manual provides communities, agencies, builders, developers, and the public with guidance on how to apply LID to new, existing, and redevelopment sites. The manual provides information on integrating LID from the community level down to the site level. It not only outlines technical details of best management practices, but also provides a larger scope of managing stormwater through policy decision, including ordinances, Master Plans, and watershed plans."

2. *Handbook for Developing Watershed Plans to Restore and Protect Our Waters*
What: A free handbook published by the U.S. Environmental Protection Agency (EPA).
Where: http://water.epa.gov/polwaste/nps/handbook_index.cfm
Description: "This handbook is intended to help communities, watershed organizations, and state, local, tribal and federal environmental agencies develop and implement watershed plans to meet water quality standards and protect water resources. It was designed to help any organization undertaking a watershed planning effort, and it should be particularly useful to persons working with impaired or threatened waters. The EPA intends for this handbook to supplement existing watershed planning guides that have already been developed by agencies, universities, and other nonprofit organizations. The handbook is generally more specific than other guides with respect to guidance on quantifying existing pollutant loads, developing estimates of the load reductions required to meet water quality standards, developing effective management measures, and tracking progress once the plan is implemented."

3. *Low Impact Development: An Integrated Design Approach*
What: Prince George's County, Maryland's handbook on low impact development. The handbook serves as both a case study and a guide for implementing local LID strategies; from planning stages to implementation and upkeep.
Where: http://www.epa.gov/owow/NPS/lid/lidnatl.pdf
Description: "The LID [low impact development] principles outlined in these pages were developed over the last three years specifically to address run-off issues associated with new residential, commercial, and industrial suburban development. Prince George's County, which borders Washington, DC, is rich with natural streams, many of which support game fish. Preserving these attributes in the face of increasing development pressure was the challenge, which led to the development of LID techniques."

Resources to Assist Local Governments with Water Quality Protection (cont.)

4. *Filling the Gaps: Environmental Protection Options for Local Governments*
What: A free guidebook provided by MDEQ.
Where: http://www.michigan.gov/deq/0,1607,7-135-3313_3677_3696-73358--,00.html
Description: "The goal of this book is to equip you, the local official, with the right information to gather and examine when making local land use plans, adopting new environmentally focused regulations, or reviewing proposed development to make decisions that are right for your community now and in years to come. By working in cooperation with other local governments and state agencies, we can assure the lasting value of Michigan's environment."

5. *Nonpoint Education for Municipal Officials (NEMO)*
What: A national network for municipal officials focusing on natural resource protection through local land use planning. Provides training, educational tools, case studies, and access to a wealth of practical regulations already in use.
Where: http://nemo.uconn.edu/index.htm
Description: "This website focuses on the site planning concepts presented in Connecticut's own Stormwater Quality Manual. The Planning for Stormwater website also provides site specific review considerations for LID in both residential and commercial settings. The website is organized by low impact development and site design elements. The LID elements are property level stormwater treatment practices that mimic natural hydrologic function. Site design elements are typical parts of the built landscape, such as roads and roofs. Vendor information and links to Connecticut case studies can also be found throughout this site. For more examples of CT LID practices, see the LID inventory on the CLEAR website."

6. *Center for Watershed Protection*
What: A research and educationally oriented website offering information on a variety of watershed-related topics, including the fundamentals of watershed science, contemporary studies, sample watershed plans, and more.
Where: http://www.cwp.org/
Description: "At the Center for Watershed Protection, we want everybody to know that an integrated watershed approach is the key to ensuring a future of fresh, clean water, healthy natural resources, and ultimately, life on earth. Since 1992, the Center for Watershed Protection has been working in numerous communities to provide the solutions for clean water and healthy natural resources. Our work is based on sound scientific research and guided by a passion for advancing the state-of-the art, ensuring practitioners have the right tools, and promoting the widespread implementation of the most effective watershed management techniques."

Resources to Assist Local Governments with Water Quality Protection (cont.)

7. *Using Smart Growth Techniques as Stormwater Best Management Practices*
What: A free guidebook provided by the U.S. EPA.
Where: http://www.epa.gov/dced/stormwater.htm
Description: "The goal of this document is to help communities that have adopted smart growth policies and plans recognize the water benefits of those smart growth techniques and suggest ways to integrate those policies into stormwater planning and compliance. Taking credit for the work a community is already doing can be a low-cost and practical approach to meeting water quality goals and regulatory commitments."

8. *Michigan Citizen Planner Program Training*
What: An in-class or online certificate program for educating local elected and appointed officials on a variety of planning topics, from the fundamentals to more advanced and specific subjects, such as wind energy systems and complete streets.
Where: http://citizenplanner.msu.edu/
Description: "The Michigan Citizen Planner program at Michigan State University (MSU) offers land use education and training to locally appointed and elected planning officials throughout the state. Michigan Citizen Planner is a non-credit course series leading to a certificate of completion awarded by Michigan State University Extension (MSUE). Advanced training to earn the Master Citizen Planner (MCP) credential is also available. This program is offered through MSU Extension offices in a classroom setting and online. Along with the core series, Michigan Citizen Planner also provides education and training through specialty and regional workshops."

9. *Michigan Department of Environmental Quality Environmental Permit Information Checklist*
What: The MDEQ's checklist of most commonly required environmental permits with links to permit information (last updated 8/19/2008).
Where: http://www.michigan.gov/deq/0,1607,7-135-6830-89034--,00.html
Description: "The Michigan Department of Environmental Quality has prepared a list of key questions to help identify what departmental permits, licenses, or approvals of a permit-like nature may be needed for a project. By contacting the appropriate offices, you will help reduce the possibility that your project or activity will be delayed due to the untimely discovery of additional permitting requirements later in the process. While this list covers the existence of permits and approvals required from the MDEQ, it is not a comprehensive list of all legal responsibilities (i.e., planning requirements and chemical storage regulations may apply)."

10. *Water: Grants and Funding*
What: A U.S. EPA-operated webpage providing a consolidated list of available funding options for water resource related projects.
Where: http://water.epa.gov/grants_funding/

Chapter Two: Understanding Watersheds

Photo 2–1: Good water quality supports a diverse and abundant wildlife population, such as these Redheads at the Saginaw Bay.

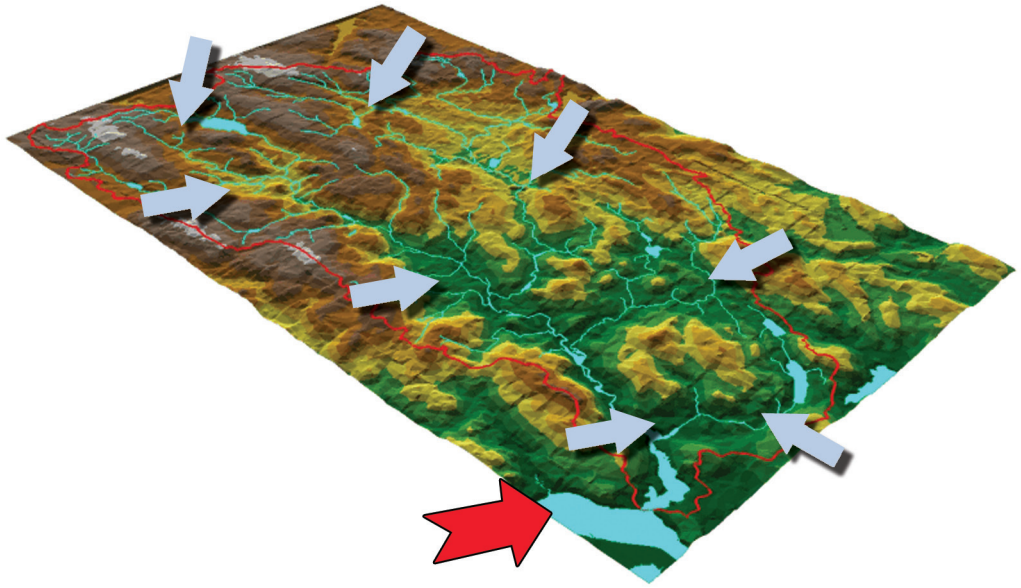
A watershed is an area of land in which all surface waters drain to a common outlet, similar to a household funnel (See Figure 2–1). All of Michigan's watersheds drain into the Great Lakes surrounding the state. Watersheds vary in size, depending upon the terrain, and whether one is working with sub-watersheds within larger watersheds.

WATERSHED DEFINITION

A watershed is an area of land in which all surface waters drain to a common outlet, similar to a household funnel (See Figure 2–1). All of Michigan's watersheds drain into the Great Lakes surrounding the state. Watersheds vary in size, depending upon the terrain, and whether one is working with sub-watersheds within larger watersheds.

It is important to understand the configuration and functions of local sub-watersheds when thinking about water quality. This is because as water flows across the land of a watershed and the buildings, streets and parking lots we build there, it picks up and carries contaminants, and concentrates them at the point of outflow, often at high and unhealthy levels.

Figure 2-1: Diagram of a Watershed, Draining to a Single Outlet



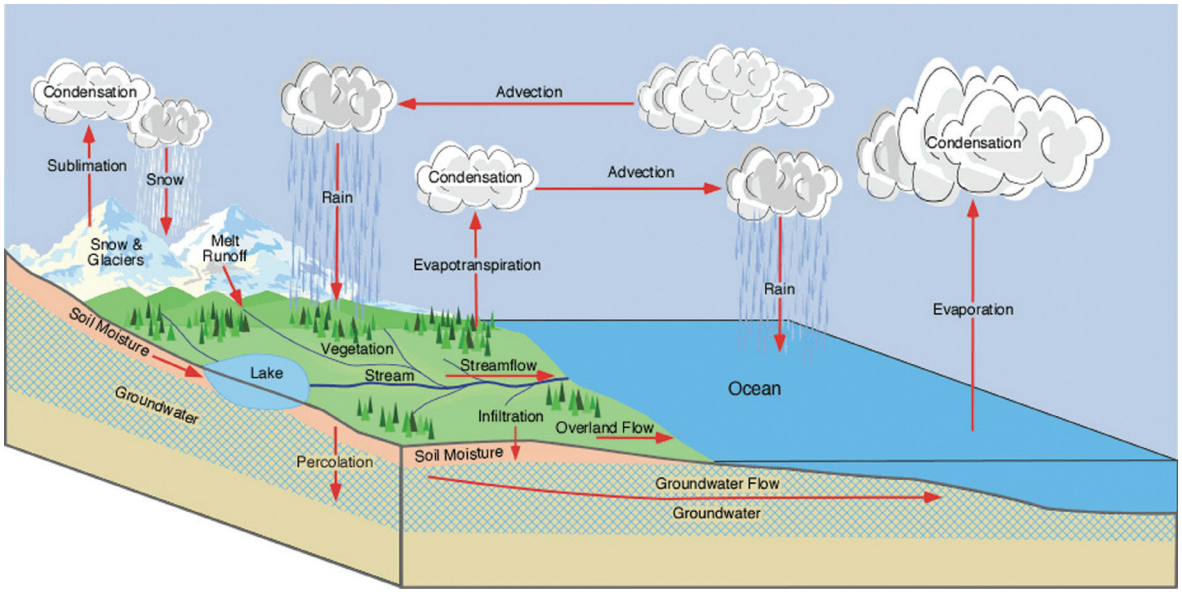
Source: Nonpoint Education for Municipal Officials (NEMO) Program, University of Connecticut.

THE WATERSHED IS A SYSTEM

Hydrologic Cycle

The continuous flow of water, from the sky to earth and vice versa is called the hydrologic cycle (See Figure 2–2). Water rises into the clouds when it evaporates from oceans, from lakes, and from plant leaves, parking lots, and building surfaces on warm or windy days. Rain falls when water vapor in the clouds cools, collecting into drops that are heavy enough to fall to the ground. Rain and melted snow seeps into the ground or flows across the surface. Some of the water that seeps into the ground is absorbed by plant roots, while the remainder moves deeper in the ground. Water that flows across the ground, and into rivers and lakes, and eventually on to the ocean is surface water. The water that seeps into the ground moves downward through the soil due to gravity and the suction of the tiny pores of the soil. It becomes groundwater.

Figure 2-2: The Hydrologic Cycle



Source: The Encyclopedia of Earth.

The amount of water that seeps into the ground depends upon how much pore space is in the soil, and how connected the pores are to allow the water in. Sandy soil is more porous than clay soil for example, and water can move more quickly through a sandy soil. However, a clay soil may hold water for a longer period, giving the soil more opportunity to filter out pollutants. In the upper layer of soil, some of the pores contain water, and some contain air. Deeper in the ground all the soil pores may fill with water, creating a zone of groundwater from which we can get well water. When there is enough water to supply a well, the zone of groundwater is called an aquifer. The top of the groundwater is called the water table. The water table may be near the surface, or it may be hundreds of feet underground. If you stand on a long sloping hill, groundwater may be below you in a zone that is roughly parallel to the slope on which you are standing. It is likely flowing slowly downhill through pores in the soil or through cracks in rock. It may seep out of the ground many months or years later at some lower point, such as a spring, stream, or lake. The groundwater may be under pressure from the weight of the rocks and earth above it. If a well is dug into such an aquifer, an artesian well results, with the water flowing out, because it is under pressure.

Now imagine looking at the heavy rain falling on a road. If it is raining hard enough, there can be a layer of water flowing across the surface, perhaps as much as an inch deep. This surface flow is called stormwater runoff. Runoff finds the most direct path downhill. The most direct path may be over pavement and into a drain, or it may be across a lawn or a field. On bare ground, the water may concentrate in a depression, where it starts cutting a gully that finds a path into a stream. Nearly all the rain that falls on pavement collects on the surface, and then runs off. This is because it is an impermeable surface. Much less water is running off a lawn, because as much as half is soaking into the ground. Now look into the woods. Almost no water is flowing on the surface, because nearly all of it is soaking into the ground. In the woods, tree roots and an undisturbed and uncompacted soil allow more water to infiltrate. The more water infiltrates the less there will be surface runoff. The less surface runoff, the less flooding and pollution of lakes and streams will occur.

Water Storage

Water is stored in the watershed. Some of it is released slowly, such as groundwater that continues to flow long after a rain has soaked the ground, replenishing streams and lakes through much of the year. Snow is a form of storage, but the water is released over a short period of time when it melts in the spring, filling streams and lakes to overflowing, and flooding low areas. Streams, rivers and lakes also store water. Water remains in lakes and streams in

the watershed depending upon how fast the water flows through them. The water in a lake may flow in as surface runoff and groundwater flow, but have no streams through which it flows out again. Water would only leave through evaporation and groundwater flow, and it would take several years for the water in the lake to change completely. If the lake has several large streams flowing both in and out then the water could change in less than a year.

Because groundwater moves so slowly, it chemically interacts with the minerals or other substances in the ground. This changes the composition of the water, and will affect its chemical content and taste. Surface water runoff can carry impurities in the form of sediments, oils, grease, gasoline, pesticides, herbicides, and other pollutants.

Groundwater and surface (streams and lakes) water are interconnected. Lake levels are often nearly the same as the level of the water table in the surrounding land. When a gravel pit is excavated in an area with a high water table, the pit quickly fills with water. When there has been little rain, groundwater keeps a stream flowing until the water table drops below the bed of the stream. When this happens, lake levels can also drop, and shallow wells can start to go dry.

An isolated lake is fed by only runoff and groundwater. It is affected entirely by how the land is used in the immediate watershed.

A riverine lake has tributary streams or rivers supplying it with water, and one or more rivers or streams flowing out. Nutrients and other chemicals that enter a river system will eventually be carried into the lakes down the system, affecting water quality.

The formation of lakes and streams by glaciers, and the action of subsequent erosion provides large shallow areas in lakes and floodplains along rivers. Plants adapted to grow above the water, but with their roots in the water or wet soil establish in these places, called wetlands. Wetlands are found along lakeshores, along rivers and streams, in former lake and stream beds, and in valley bottoms. There may also be wetlands in land depressions. They play an important role in the hydrologic cycle of the watershed, because they moderate the effect of floods, filter sediments, and provide wildlife habitat.

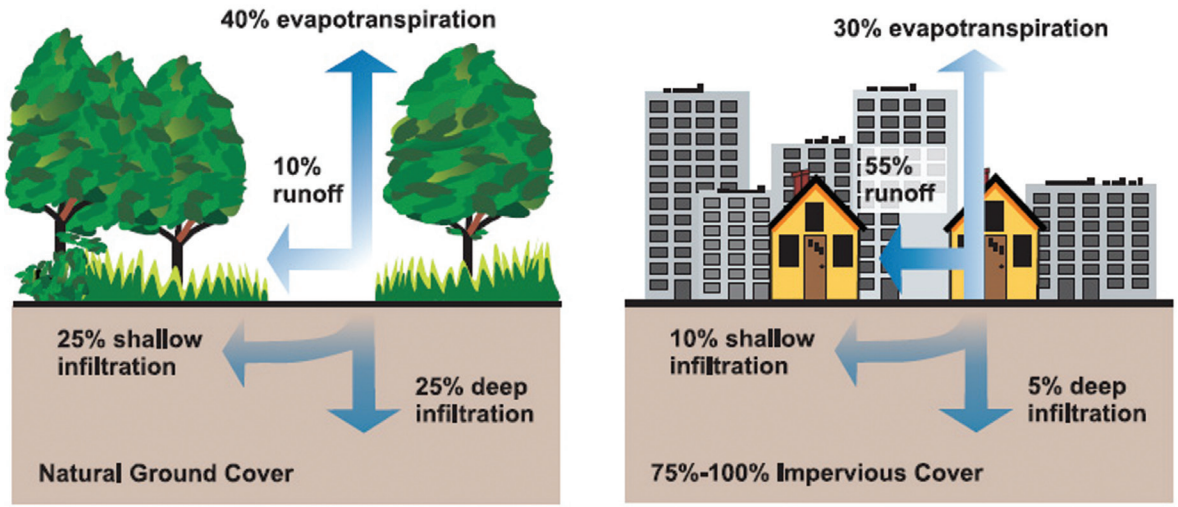
IMPERVIOUSNESS

Variable Imperviousness of Different Land Cover Types

When rain falls on the land, or when snow melts, part of the water soaks (infiltrates) into the ground, part evaporates, and part runs off into drains, streams, and lakes. The relative amount of water that runs off, soaks in, or evaporates depends on what is covering the ground and other factors, such as temperature, humidity, and wind. The more the land cover is impervious to infiltration, the more water that is likely to run off and the less is likely to soak in (See Figure 2–3). Evaporation is largely dependent on how much of the water is subject to wind and sunshine and the growth processes of plants. If there are a lot of plants on the landscape, especially trees, large amounts of water are likely to evaporate from leaf surfaces. Also, plants transpire water vapor, which moves water from the ground, through the plant roots, stems and leaves into the air. Paved surfaces and building rooftops (impervious surfaces) generally prevent water from soaking into the ground, and force it to run off (See Photo 2–2). The larger the amount of impervious surface, the more water runs off, and the larger the drainage system needs to be to handle larger volumes and speeds of runoff. There is a measure of how much water runs off a landscape compared to soaking in; it is called the coefficient of runoff. Engineers use

Photo 2–2: Water flowing off paved surfaces can carry oils, chemicals, bacteria, and sediment.

Figure 2-3: Variable Rates of Infiltration Depending on Impervious Cover



Source: U.S. EPA, "Protecting Water Quality from Urban Runoff," Doc # EPA 841-F-03-003. Imperviousness and Water Quality.

this coefficient to calculate the size of drains, stormwater pipes, and catchment basins needed to manage stormwater runoff.

Imperviousness and Water Quality

The quality of water in streams and lakes is affected by the amount and type of impervious surfaces in the watershed. Where there is a larger proportion of impervious surface than vegetated surface, stormwater that flows into streams and lakes tends to be much warmer, have a greater velocity, and to carry sediment and chemical pollutants. Warmed stormwater changes the temperature of streams and lakes, with a resulting change in the plants and animals that can live there. Streams experiencing the high velocities of stormwater are called "flashy." This means that the stream beds and banks tend to erode, and the amount of water in the stream has extremes of high and low levels. The chemicals that originate from impervious surfaces can include oils, pesticides, herbicides, and nutrients. Some chemicals and the nutrient Phosphorus attach to soil particles, and travel with eroded soil or dust that collects on roads and rooftops, where they then can be carried into streams and lakes by stormwater runoff (See Figure 2–4). Stream, river, and lake water quality has been shown to change in its visual character and capacity to sustain plant and fish species that exist there when imperviousness reaches as little as 15 percent of the watershed and to suffer major degradation and a significant change of fish and other organisms living in them when imperviousness reaches as little as 25 percent of the watershed (See Figure 2–4).

VALUE OF WATERSHEDS

Understanding of Ecosystem, Human, and Economic Health Relationship

Quality-of-Life Assets

The quality of water in streams, rivers, and lakes affects both the perception of quality of life for people living in, or visiting those regions, and quality of life in real terms.

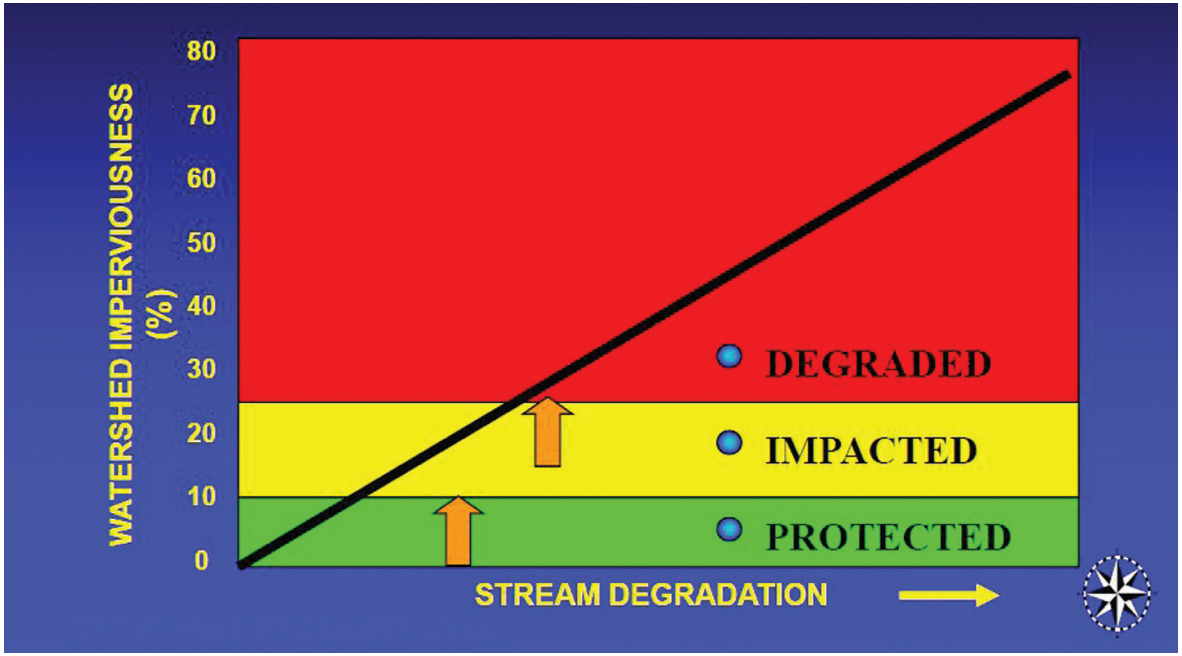
Water Purity is Important

Water purity affects both the human health and economic health of communities. Water with contaminates, such as bacteria or nitrates, can be a health hazard to people. The more contaminants in water, the more expensive it is to make it safe for people and livestock to drink or to swim in.

Water as Scenic Amenity

Streams, rivers, and lakes that are clear, and with natural shorelines tend to be considered more attractive than those with murky water or seawalls on the banks.

Figure 2-4: Waterway Health and Imperviousness



Note: This figure shows the correlation between an increase in water quality degradation and the percentage of imperviousness. It also illustrates that once the imperviousness is greater than 10 percent, water quality is impacted and at more than 25 percent imperviousness, water quality is degraded.
Source: Adapted from Schueler et al., 1992.

Wildlife Habitat

A greater number of species of fish, birds, other animals, and the organisms they feed on can live in clean water. A rich variety of species tends to have enough predators and prey to keep a relative balance.

Nearby Recreation

People who have water resources they can utilize for swimming, fishing, boating, bird watching, and other forms of water-related recreation enjoy a greater quality of life, and greater attachment to their communities. This often contributes to greater efforts to protect these resources.

Economic Assets

Scenic Attraction

Scenery is an economic asset, and water is one of the most powerful visual attractions. Communities with cleaner water are more likely to have sustained prosperity.

Active and Passive Recreation and Eco-Tourism

Clean water is important to the recreational desires of residents, and a reputation for clean water and diverse water-related wildlife boosts the opportunities for economic development around tourists interested in exploring diverse and productive ecosystems.

Water for Residential, Commercial and Industrial Use

Residential, commercial, and industrial land uses require water, with some uses requiring large amounts. Clean water is less expensive to treat for such uses, especially for residential use. Keeping it clean ensures a sustainable supply.

CASE STUDY: THE SAGINAW BAY WATERSHED AND SUB-WATERSHEDS

The Great Lakes form a portion of the international boundary between the United States and Canada, and both countries have jurisdiction over their protection and restoration. The Great

Photo 2–3: Good quality water nearby provides more chances for the young to learn to appreciate our natural resources.

Lakes Water Quality Agreement (GLWQA) between the United States and Canada was developed in 1972, and established objectives and criteria for the protection, restoration, and enhancement of water quality in the Great Lakes system. A revised GLWQA was signed in 1978, recognizing the need to understand and effectively reduce toxic substance loads to the Great Lakes. The newest agreement was signed in 2012. New provisions address the nearshore environment, aquatic invasive species, habitat degradation, and the effects of climate change. It also supports continued work on existing threats to people's health and the environment in the Great Lakes basin, such as harmful algae, toxic chemicals, and discharges from vessels (EPA, 2012[1]).

The 1978 Great Lakes Water Quality Agreement adopted general and specific objectives and outlined programs and practices necessary to reduce pollutant discharges to the Great Lakes system. Under Annex 2 of the 1987 Protocol Amending the 1978 GLWQA, the United States and Canadian governments identified 43 areas on the Great Lakes that had serious water quality problems known to cause beneficial use impairment of the shared aquatic resources. These areas have been formally designated by the two governments as Areas of Concern. Michigan has 14 Areas of Concern (AOCs) (See Figure 1–1 in Chapter 1). Water quality impairments are linked to activities in the watershed, with Figure 2–5 showing the Saginaw Bay watershed, and Figure 2–6 a close-up view.

The Guidance for Delisting Michigan's Areas of Concern (Guidance) identifies the criteria used to determine when a Beneficial Use Impairment (BUI) is restored. The Michigan Department of Natural Resources and Environment, working with the local Public Advisory Councils (PACs) use this Guidance to remove BUIs that will lead to AOC delisting. The PAC serving the Saginaw Basin is the Partnership for the Saginaw Bay Watershed. The Guidance provides statewide criteria for 12 of 14 potential BUIs. Local PAC's could either accept the statewide criteria or develop local BUI removal targets. Locally developed targets, at a minimum, must be functionally equivalent to or exceed the criteria in the Guidance. The loss of fish and wildlife habitat, and the degradation of fish and wildlife populations BUIs tend to be highly site-specific. Because statewide criteria for these BUIs were not appropriate, the Guidance provided a criteria setting process developed in partnership with agency resource managers, locals, and PAC members that resulted in AOC-specific local restoration goals needed to remove these BUIs.

The 2010 Strategy for Delisting Michigan's Areas of Concern (Strategy) identifies actions needed to remove BUIs and delist AOCs, establishes Area of Concern Program priorities, and sets resource allocations in the AOC Program. The strategy addresses all identified BUIs within each AOC. This Strategy is a companion document to the Guidance. The AOC BUIs, and restoration actions needed, are compiled in a table provided in the "*Saginaw Bay Watershed and Area of Concern*," March 2012, prepared by Public Sector Consultants, as part of the same Great Lakes Restoration Initiative grant that supported this guidebook. Copies are available from the Planning & Zoning Center at MSU, from Public Sector Consultants, or may be downloaded at:

http://www.landpolicy.msu.edu/modules.php?name=Documents&op=viewlive&sp_id=2082.

Public Involvement

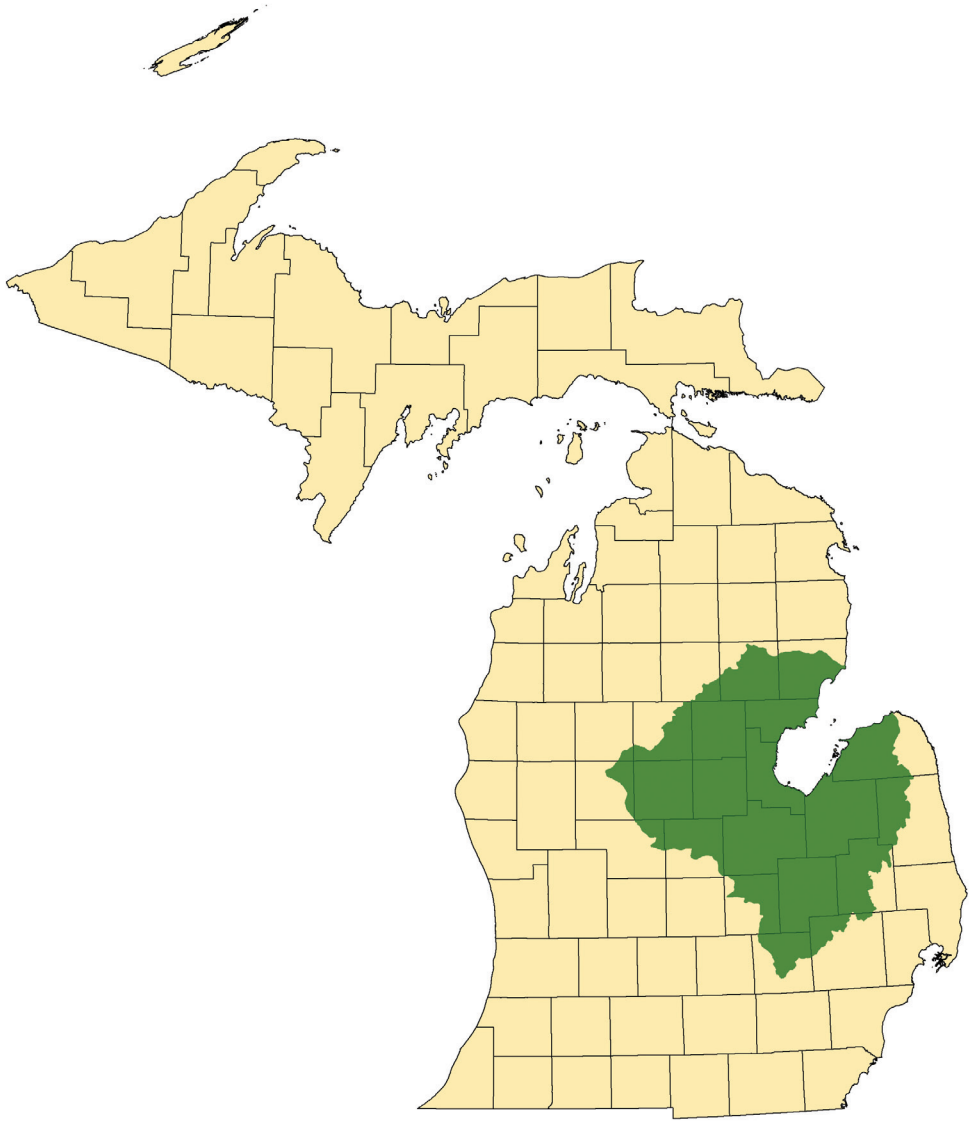
Public involvement is a key component of the Area of Concern Program in Michigan. Each Remedial Action Plan has had significant input from a Public Advisory Council, a group of stakeholders that participates in the Area of Concern activities. The Statewide Public Advisory Council consisting of members from each of Michigan's 14 Area's of Concern, also supports the Area of Concern Program. The Statewide Public Advisory Council promotes sharing of ideas across the state's AOCs. The Public Advisory Councils and Statewide Public Advisory Council provide local stakeholder perspective related to goals and objectives within AOCs. This relationship is integral to the implementation of the Area of Concern program.

Measuring Progress

Significant progress within each Area of Concern has occurred since the inception of Michigan's program and has been documented in the various Remedial Action Plans and

1. "Great Lakes Water Quality Agreement," U.S. Environmental Protection Agency: **http://www.epa.gov/glnpo/glwqa/**.

Figure 2-5: Watershed Draining into the Saginaw Bay



Source: Michigan Geographic Data Library, Michigan Department of Technology, Management & Budget.

Remedial Action Plan Updates. In 2006, in an effort to assess the status of individual Beneficial Use Impairments, direct restoration efforts, and develop benchmarks for measuring their success, the Michigan Department of Natural Resources and Environment developed the Guidance for Delisting Michigan's Areas of Concern. The purpose of this document is to: 1) provide guidance to AOC communities about the state's process for removing BUIs and delisting Areas of Concern; 2) identify specific quantitative or qualitative criteria, which the State will use to determine when BUIs have been removed.

Of the 14 Impairments criteria, the Saginaw River/Bay includes 10:

1. Restriction on fish and wildlife consumption.
2. Eutrophication or undesirable algae.
3. Degradation of fish and wildlife populations.
4. Beach closings.
5. Degradation of aesthetics.
6. Bird or animal deformities or reproduction problems.
7. Degradation of benthos lakebed ecosystem.
8. Degradation of phytoplankton and zooplankton populations.

Figure 2-6: Watershed Draining into the Saginaw Bay (Close Up)

Source: Michigan Geographic Data Library, Michigan Department of Technology, Management & Budget.

9. Restriction of dredging activities.
10. Loss of fish and wildlife habitat.

Many different local, State, and federal resources are being applied to tackle the problems in the Saginaw Bay Area of Concern. These include government agencies, universities, nonprofit groups, and individuals. Some of these actions have been going on for a number of years. One of the important actions has been continual monitoring, especially the sanitary conditions at public beaches. Several Health Departments around the Saginaw Bay have continued E-Coli bacteria testing that has led to the closing of several beaches to protect public health.

As of 2011, assessment of progress was taking place on sources of bacteria that led to beach closings by Michigan State University scientists, and on bird and animal deformities. The Partnership for the Saginaw Bay Watershed provided a grant to support a Public Advisory Council to help determine strategies to de-list many of the BUIs.

Of note, the use impairment concerning "tainting of fish and wildlife flavor" was removed in 2008. However, in 2011, there were news reports of tainted drinking water flavor in the region.

For information on the status of efforts to improve water quality in the other 13 Areas of Concern, visit:

http://www.michigan.gov/deq/0,4561,7-135-3313_3677_15430---,00.html.

Chapter Three: The Umbrella of Protection for the Watershed

Photo 3–1: Students in Northeast Michigan work with community partners and the Great Lakes Stewardship Initiative on real-world watershed monitoring projects.

This section discusses the roles of individuals and the many organizations involved in the protection of water resources. Generally, individuals are property owners, businesses, and corporations. Organizations include units of government at the local level; agencies at the county or regional, state, and federal levels; and nonprofits. You may want to familiarize yourself with these roles as many also provide opportunities for help with the efforts of your community to protect water quality.

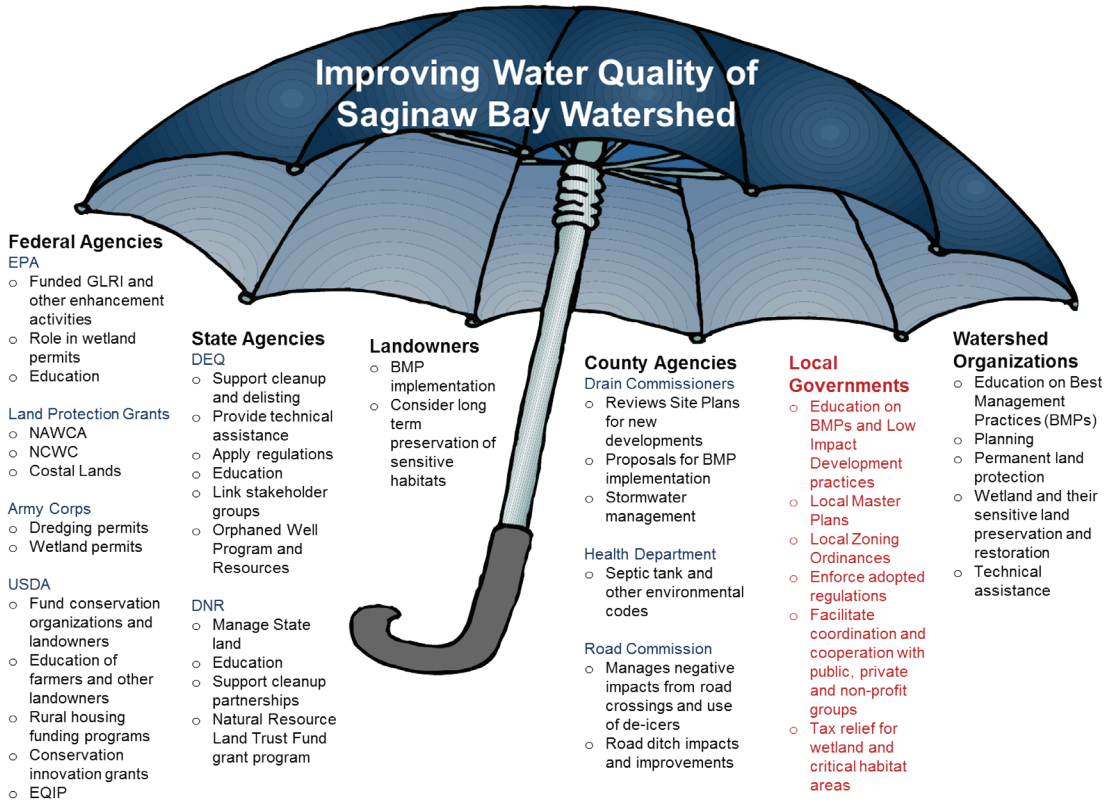
INTRODUCTION

This section discusses the roles of individuals and the many organizations involved in the protection of water resources. Generally, individuals are property owners, businesses, and corporations. Organizations include units of government at the local level; agencies at the county or regional, state, and federal levels; and nonprofits. You may want to familiarize yourself with these roles as many also provide opportunities for help with the efforts of your community to protect water quality. Figure 3–1 illustrates many of these entities and the key roles they play.

ROLE OF PROPERTY OWNERS AND BUSINESSES

Seventy percent of the land in the United States is privately owned, making stewardship by private landowners absolutely critical to the health of our nation's environment (NRCS website, 2011). What property owners do on the land is closely tied to whether nearby waterbodies and groundwater are healthy enough for people to drink, to swim in, to fish from, and to use for other purposes. Thus, the activities of businesses, property owners,

Figure 3-1: Individuals and Organizations with the Capacity to Improve Water Quality



Source: Planning & Zoning Center, Land Policy Institute, Michigan State University.

organizations, and citizens individually, as stakeholders, and as public entities affect the quality of their water. Recognizing this relationship between land use activities and water quality, people have given government some power to regulate those activities in order to protect water quality and prevent water pollution. But there is much property owners can do on their own without waiting for the government to act.

Best Management Practices Implementation

Property owners can apply best management practices (BMPs) to protect the quality of water that collects on their property and the water that flows off into the community. The BMPs include many different techniques for filtering pollutants from stormwater runoff, for reducing the force of stormwater runoff as it flows across the ground or in local drains and streams, for preventing bacteria and chemical contaminates from entering the water system, and other protective approaches. These are discussed in more detail in Chapter 4, and information about BMPs are available from many of the resources listed in this guidebook.

Long-Term Preservation of Sensitive Habitats

Certain landscapes, such as large wetlands, steep slopes, and river and lake shores, are especially valuable as natural areas and they benefit society. Some, such as wetlands and shorelands, produce a rich variety of plants and animals that support tourism, hunting, and fishing economies. Steep slopes are subject to erosion and collapse, which runs up the bill for communities to dredge sediment or repair

Photo 3–2: A natural shoreline can contribute to the quality of Michigan scenery.

collapsed infrastructure, homes, and businesses. Wetlands and floodplains store floodwaters, helping reduce or eliminate flood damage to communities. Communities and individual property owners benefit from preserving these areas. Long-term preservation often comes in the form of conservation easements. These agreements run with the land and are often secured through land conservancies, like the Saginaw Basin Land Conservancy.

Where a Property Owner Can Go for Help

The property owner has a many places to go for help. These include nonprofit conservation organizations, local government, county and state agencies, and some branches of federal agencies. A list of agencies in Michigan, including regional, district, and central offices serving the Saginaw Basin is included in a separate directory, which can be accessed at:

http://www.landpolicy.msu.edu/modules.php?name=Documents&op=viewlive&sp_id=1825.

A discussion of the roles of some of these agencies that help provide the umbrella of protection make up the remainder of this chapter.

THE ROLE OF CONSERVATION ORGANIZATIONS, OTHER COMMUNITY ORGANIZATIONS, FOUNDATIONS, AND EDUCATIONAL INSTITUTIONS

Nonprofit organizations, foundations, and educational institutions have an important role to play in the protection of water quality. Although some are property owners, or owners of habitat protection easements, most are in a position between the property owner and regulatory agencies. These organizations include water quality nonprofits like the Partnership for the Saginaw Bay Watershed, the Saginaw Bay Coastal Initiative, and the Saginaw Bay Watershed Initiative Network (WIN); and conservation organizations like hunt clubs, local chapters of the Audubon Society, and land conservancies. Farm and forest organizations, soil organizations, and foundations support conservation of sensitive lands with unique natural features. Among the roles of these organizations are the following.

Education on Best Management Practices

Educational institutions are often viewed as independent and, thus, credible sources of educational materials and programs on water resource protection. These include websites, printed materials, not-for-credit and for-credit courses and certificate programs, workshops, demonstrations, and hands-on training

programs in subjects as diverse as wetland plant identification, water quality testing, and stream bank restoration. Most of the organizations in this category engage in stakeholder education.

Planning

Nonprofits can be helpful to communities in supporting the development of community Master Plans, and in planning for special projects to protect water quality. They often have specialists trained in the topic area who can help guide the community and individuals in the best approaches to water quality protection.

Permanent Land Protection

A number of conservation organizations and foundations engage in purchasing sensitive lands to protect habitat and water quality, or in purchasing the development rights or conservation easement to those lands. Generally with such a purchase, the conservation organization or foundation enters into an agreement about what level of public access there will be on the land; what level of development will be permitted, if any at all; how the land will be maintained in the future; and who will do the maintenance.

Wetland Preservation and Restoration

Some nonprofit organizations, such as The Nature Conservancy, purchase wetlands or other sensitive lands in order to help protect them. Often such groups serve as a holding agent until other groups, local communities, or other governmental agencies can complete a final purchase and management plan. These plans often focus on short-term restoration activities, as well as long-term preservation.

Technical Assistance

Many nonprofit or educational institutions can provide technical assistance to property owners and local units of government regarding planning for and managing lands for water quality protection.

THE ROLE OF COUNTY, TOWNSHIP, CITY, AND VILLAGE PLANNING AND ZONING

As conflicting demand for use and consumption of our natural resources has increased, so too has the need for regulatory intervention to protect them. It is clear that each level of government has an interest and legal responsibility to preserve Michigan's natural resources and protect its environment. However, it is equally clear that no single level of government can do it alone. In keeping with Michigan's tradition of Home Rule, local governments are increasingly being asked to take the reins to fill in regulatory gaps on many natural resource and environmental protection issues.

There is a long-standing statutory basis for this authority. As early as the City and Village Zoning Act of 1921, local governments have had the authority to implement local regulations that will foster the health and well-being of their communities. Language added to this statute in 1978 *requires* local officials to adopt zoning based on a plan, which serves to "conserve natural resources and energy."[2] It also permits adoption of, "land development regulations and districts, which apply only to land areas and activities, which are involved in a special program to achieve land management objectives and avert or solve specific land use problems."[3] These provisions were retained with the consolidation of city, village, township, and county zoning statutes in 2006.

Current statutory authority for municipal planning and zoning is derived from two laws: the Michigan Zoning Enabling Act (P.A. 110 of 2006) and the Michigan Planning Enabling Act (P.A. 33 of 2008). For communities expecting to engage in the planning process and enforce zoning throughout their jurisdiction, provisions from these State laws must be met in order to achieve authority under the Acts. Statutory compliance under the Enabling Acts is very important, as being "out" of compliance may put into question the legitimacy of the municipality's authority to engage in Zoning Ordinance enforcement. In the worst case scenario, an indefensible ordinance may be struck down in court and leave the municipality with a heavy, yet altogether avoidable legal burden.

For local officials dealing with many permit applicants, heated zoning debates and a multitude of State and federal agencies, life is not always a picnic. However, the different levels of government in the context of environmental protection policy interact similarly to an organized picnic where everyone is supposed

2. City and Village Zoning Act, Act 207, 1921.

3. Section 3 of Township, City, and City-Village Zoning Enabling Acts. Public Acts 184, 285, and 207, as amended.

to bring something. In this instance, the federal government brings the blanket, serving as part of the regulatory foundation on water quality for state and local governments. The State adds to that foundation by providing the necessary utensils. But a critical component, the food, is provided by localities. They complete the scenario by deciding what everyone will eat. As is true for environmental policy, local governments determine how much effort they put into the end result. They can invest in making something really delicious for everyone, or do the required minimum by simply bringing a bag of chips. Although it may be possible to compensate for deficiencies initially, without coordination or contributions among all the participants in either scenario, the success of the real event—environmental protection—is threatened.

Note that generally, local government regulation is limited to new uses and new development. This is very important, because existing structures and uses, like agriculture cannot be retroactively regulated. The principal of nonconforming uses protects them.

Local units of government can also provide education on BMPs and LID practices, and include goals, objectives, and strategies for them in local Master Plans, local Zoning Ordinances, and should facilitate coordination and cooperation with private and nonprofit groups, as well as with federal and state agencies.

It is also the responsibility of local governments to enforce adopted regulations.

COUNTY AGENCIES

One of the primary county agencies with the capacity to work to protect water quality in rural areas is the Drain Commission, through the County Drain Commissioner. County Health Departments, or multi-county Health Departments also play a role, but are discussed later under State agencies.

Drain Commissioners

The County Drain Commissioner (DC) is an elected official who has jurisdiction over all established county drains. He/she performs the duties set forth in the Drain Code, which is to administer the establishment, construction, maintenance, and improvement of county drains. The DC is responsible for the assessment of the costs of administering county drains. Drain projects seek to prevent flooding, decrease soil erosion and the sedimentation of drains, and provide better drainage for agricultural and developed lands. A "drain" may include roadside ditches, agricultural drains, tiling, and other enclosed systems, such as some creeks, rivers, and lakes.

How Does a Drain Project Begin? Drain Commissioners respond to requests by property owners for assistance with a problem associated with water. The DC can only do work on officially established drains, so solving a water-related problem may require a first step of establishing an official drainage district. A drainage district is the area of land that benefits from the drain.

For work on an existing drain, a petition must be signed by at least five property owners whose land is located in the drainage district. These property owners would also be liable to be assessed for a portion of the project costs. A petition can be filed by property owners in the Drainage District; a township, city, or village; the County Road Commission; or the Michigan Department of Transportation. A Board of Determination rules on the necessity of the project.

For a new drain, an application to establish a drainage district must be signed by at least 10 property owners in the township—five of whom must own land in the drainage district. An engineer determines the area that would be drained by and receive benefit from the new drain. If determined practical, the DC then formally establishes the drainage district boundary. A separate petition is needed to locate, establish, and construct a new drain, and which must be signed by 50 percent of the owners whose property would include the new drain.

If the Board of Determination determines a drain project is necessary, the Drain Commissioner decides how to solve the problem. He may contract out various parts of the project, including engineering analysis, project management, and construction.

Land owners and municipalities within a given Drainage District share the cost for drain projects within the district. This includes townships, cities, and villages, because of the public health benefits. County Road

Commissions may also share the costs due to benefits to county roads. If the project is large, it may be financed by the issuance of notes or bonds, with the assessments spread out over many years.

The Michigan Drain Code allows the DC to expend, without petition, up to $5,000 per mile per drain.

Drain Commissioners can also:

- Review site plans for new developments.
- Review proposals for BMP implementation.
- Review stormwater management plans.
- Coordinate with the Health Department on septic tank and other environmental codes.
- Coordinate with the Road Commission.
- Manage negative impacts from road crossings and use of de-icers.

Source: **Citizen Guide to the Drain Code**, Ottawa County Drain Commissioner's Office.

THE ROLES OF FEDERAL GOVERNMENT

The federal government sets the stage for contemporary national air, water, and related environmental standards with the adoption of the National Environmental Policy Act (NEPA) of 1969. The Act was the first federal legislation to identify an environmental protocol to follow. The U.S. Environmental Protection Agency (EPA) was created as the regulatory authority to oversee the provisions of the Act. The purposes of NEPA are to:

- Declare a national policy that will encourage productive and enjoyable harmony between humans and the environment;
- Promote efforts that will prevent or eliminate damage to the environment and biosphere, and stimulate the health and welfare of humans;
- Enrich the understanding of the ecological systems and natural resources important to the Nation.

Source: **The National Environmental Policy Act of 1969**, as amended. (Pub. L. 91–190, 42 U.S.C. 4321–4347, January 1, 1970, as amended by Pub. L. 94–52, July 3, 1975, Pub. L. 94–83, August 9, 1975, and Pub. L. 97–258, § 4(b), Sept. 13, 1982).

Throughout the 1970's, more sweeping federal legislation was adopted that set standards for clean water, clean air, drinking water, industrial pollutants, and pesticide use. As a result, states were required to adopt language protecting air, water, and land resources that were at least as stringent as the federal standards.

Today, the federal government is linked to land use policy primarily through the development of quantifiable standards for protecting ecosystem health, such as water quality monitoring. Federal agencies also provide educational and technical assistance, such as outreach programs and data sharing. Additionally, the federal government maintains grant programs, like those administered by the Michigan Coastal Management Program that, in turn, provide funding opportunities for local initiatives. With the exception of management of federal lands and buildings, military bases, and nuclear power plants, the federal government does not usually have jurisdiction over local land use planning or zoning decisions.

U.S. Environmental Protection Agency

The mission of the U.S. Environmental Protection Agency is to protect human health and the environment. The EPA's purpose is to ensure that:

- All Americans are protected from significant risks to human health and the environment where they live, learn, and work.
- National efforts to reduce environmental risk are based on the best available scientific information.
- Federal laws protecting human health and the environment are enforced fairly and effectively.
- Environmental protection is an integral consideration in U.S. policies concerning natural resources, human

health, economic growth, energy, transportation, agriculture, industry, and international trade; and these factors are similarly considered in establishing environmental policy.

- All parts of society—communities, individuals, businesses, and state, local, and tribal governments—have access to accurate information sufficient to effectively participate in managing human health and environmental risks.
- Environmental protection contributes to making our communities and ecosystems diverse, sustainable, and economically productive.
- The United States plays a leadership role in working with other nations to protect the global environment.

The EPA Develops and Enforces Environmental Protection Regulations

When Congress writes an environmental law, the EPA implements it by writing regulations. Often, the EPA sets national standards that states and tribes enforce through their own regulations. If they fail to meet the national standards, the EPA can help them. The EPA also enforces its regulations, and helps companies understand the requirements.

Role in Wetland Permits

The Clean Water Act is a 1977 amendment to the Federal Water Pollution Control Act of 1972, which set the basic structure for regulating discharges of pollutants to waters of the United States. Section 404 of the Clean Water Act establishes a program to regulate the discharge of dredged and fill material into waters of the United States, including wetlands. In Michigan, wetland permitting authority is delegated by the EPA to the Michigan Department of Environmental Quality (MDEQ).

Role in Water Quality Protection

The EPA has a number of programs to protect or restore water quality, and that are working to protect or clean up water in Michigan. These include the following:

- Great Lakes Restoration Initiative, which includes monitoring polluted Great Lakes Areas of Concern and funding to help clean up AOC sites and the polluted waters flowing into the Great Lakes that contribute to those sites not attaining water quality standards. Nearly half of the EPA budget goes into grants to state environmental programs, nonprofits, educational institutions, and others. They use the money for a wide variety of projects, from scientific studies that help us make decisions to community cleanups and habitat restoration.
- Nonpoint Source Pollution Discharge Elimination System (Clean Water Act Section 402), which requires states to eliminate pollution from nonpoint sources to public waters. This program is administered in Michigan by the MDEQ with federal oversight.
- Partnerships with other federal agencies and tribes to protect water quality by working to make agricultural, transportation, and construction activities use BMPs and LID practices that protect water quality.

Education

The EPA provides a variety of educational programs, including programs for youth and schools, and training programs for professionals involved in air quality, pollutant clean-up, and watersheds. Many of these programs are online and self-paced. The website for the watershed training program is at: **http://water.epa.gov/learn/training/wacademy/index.cfm**.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (ACOE) has been involved in regulating certain activities in the nation's waters since 1890. Until 1968, the primary thrust of the Corps' regulatory program was the protection of navigation. As a result of several new laws and judicial decisions, the program has evolved to one involving the consideration of the full public interest by balancing favorable impacts against detrimental impacts. This is known as the "public interest

review." The program is one that reflects the national concerns for both the protection and utilization of important resources. The ACOE is involved in regulation and permitting of:

- Dams or dikes in navigable waters of the United States (Part 321);
- Other structures or work, including excavation, dredging, and/or disposal activities, in navigable waters of the United States (Part 322);
- Activities that alter or modify the course, condition, location, or capacity of a navigable water of the United States (Part 322);
- Construction of artificial islands, installations, and other devices on the outer continental shelf (Part 322);
- Discharges of dredged or fill material into waters of the United States (Part 323), and the regulation and permitting of other activities the ACOE deems it can administer through a national, "general permit;" and
- Protection of coastal wetlands through wetland permits (Section 404 of Clean Water Act).

U.S. Department of Agriculture

In rural areas particularly, the U.S. Department of Agriculture (USDA) can support local efforts to protect water quality. The mission of the USDA is to provide leadership on food, agriculture, natural resources, and related issues based on sound public policy, the best available science, and efficient management.

The USDA provides programming to protect water quality. Among its programs related to water are the Natural Resources Conservation Service, the Forest Service, and the Water and Environmental programs (WEP). The NRCS's National Water Management Center serves as the production support center and provides leadership, direct assistance, information, and technology on water-related issues for natural resources conservation. Water is one of the most important natural resources flowing from forests. The Forest Service manages the largest single source of water in the U.S., with about one-fifth originating from 193 million acres of land. Additionally, the USDA's Water and Environmental Programs provide loans, grants, and loan guarantees for drinking water, sanitary sewer, solid waste, and storm drainage facilities in rural areas, and cities and towns of 10,000 or less. Public bodies, nonprofit organizations, and recognized Indian tribes may qualify for assistance. The WEP also makes grants to nonprofit organizations to provide technical assistance and training to assist rural communities with their water, wastewater, and solid waste problems.

Photo 3–3: A number of agencies work to keep our waters safe.

U.S. Natural Resources Conservation Service

In this guidebook, we focus mainly on the U.S. Natural Resources Conservation Service (NRCS) as one of the most useful arms of the USDA in helping protect water quality in rural areas. The NRCS is a division of the USDA. The NRCS science and technology experts from many disciplines are involved in helping landowners conserve land, water, and other natural resources in efficient, smart, and sustainable ways. The NRCS works directly with landowners, providing technical assistance and conservation planning. According to the USDA, "NRCS's natural resources conservation programs help people reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters. Public benefits include enhanced natural resources that help sustain agricultural productivity

and environmental quality, while supporting continued economic development, recreation, and scenic beauty" (NRCS website, 2011).

The NRCS has field offices at USDA Service Centers in nearly every county in the nation. The local presence gives NRCS employees an understanding of local resource concerns and challenges. The NRCS also works through partnerships, including individual farmers, landowners, local conservation districts, government agencies, tribes, volunteers, and other committed natural resource groups.

The NRCS has signed an interagency agreement with EPA for approximately $34 million to fund GLRI conservation work in priority watersheds within Great Lakes states. The purpose of the agreement is to provide funding to NRCS to implement priority programs, projects, and activities to protect, restore, and maintain the Great Lakes ecosystem, as identified in the GLRI Action Plan. Among the NRCS priority programs are the following:

"Conservation Technical Assistance Program

Conservation technical assistance is the help NRCS and its partners provide to land users to address opportunities, concerns, and problems related to the use of natural resources and to help land users make sound natural resource management decisions on private, tribal, and other non-federal lands. This assistance can help land users:

- Maintain and improve private lands and their management;
- Implement better land management technologies;
- Protect and improve water quality and quantity;
- Maintain and improve wildlife and fish habitat;
- Enhance recreational opportunities on their land;
- Maintain and improve the aesthetic character of private land;
- Explore opportunities to diversify agricultural operations; and
- Develop and apply sustainable agricultural systems.

This assistance may be in the form of resource assessment, best management practice design, resource monitoring, or follow-up of installed practices. Although the Conservation Technical Assistance Program (CTAP) does not include financial or cost-share assistance, clients may develop conservation plans, which may serve as a springboard for those interested in participating in USDA financial assistance programs. The CTAP planning can also serve as a door to financial assistance and conservation easement programs provided by other federal, state, and local programs."

Emergency Watershed Protection Program Floodplain Easement

Section 382 of the Federal Agriculture Improvement and Reform Act of 1996, Public Law 104–127, amended the Emergency Watershed Protection Program (EWPP) to provide for the purchase of floodplain easements as an emergency measure. Since 1996, the NRCS has purchased floodplain easements on lands that qualify for EWPP assistance. Floodplain easements restore, protect, maintain, and enhance the functions of the floodplain; conserve natural values, including fish and wildlife habitat, water quality, flood water retention, groundwater recharge, and open space; reduce long-term federal disaster assistance; and safeguard lives and property from floods, drought, and the products of erosion.

The NRCS may purchase EWPP easements on any floodplain lands that have been impaired within the last 12 months or that have a history of repeated flooding (i.e., flooded at least two times during the past 10 years).

Under the floodplain easement option, a landowner voluntarily offers to sell to the NRCS a permanent conservation easement that provides the NRCS with

the full authority to restore and enhance the floodplain's functions and values. In exchange, a landowner receives the lowest of the three values established for the NCRS Wetlands Reserve Program as an easement payment:

- A value based on a market analysis;
- A geographic rate established by the NRCS State Conservationist; or
- The landowner offer.

The easement provides the NRCS with the authority to fully restore and enhance the floodplain's functions and values to natural conditions to the greatest extent practicable. The NRCS may pay up to 100 percent of the restoration costs. The NRCS actively restores the natural features and characteristics of the floodplain through re-creating the topographic diversity, increasing the duration of inundation and saturation, and providing for the re-establishment of native vegetation. Landowners retain several rights to the property, including:

- Quiet enjoyment;
- The right to control public access; and
- The right to undeveloped recreational use, such as hunting and fishing.

At any time, a landowner may obtain authorization from the NRCS to engage in other activities, provided that the NRCS determines it will further the protection and enhancement of the easement's floodplain functions and values. These compatible uses may include managed timber harvest, periodic haying, or grazing. The NRCS determines the amount, method, timing, intensity, and duration of any compatible use that might be authorized. While a landowner can realize economic returns from an activity allowed for on the easement area, a landowner is not assured of any specific level or frequency of such use, and the authorization does not vest any right of any kind to the landowner.

Environmental Quality Incentives Program

The Environmental Quality Incentives Program (EQIP) is a voluntary program that provides financial and technical assistance to agricultural producers through contracts up to a maximum term of 10 years in length. These contracts provide financial assistance to help plan and implement conservation practices that address natural resource concerns, and for opportunities to improve soil, water, plant, animal, air, and related resources on agricultural land and non-industrial private forestland. In addition, a purpose of EQIP is to help producers meet federal, state, tribal, and local environmental regulations.

Owners of land in agricultural or forest production, or persons who are engaged in livestock, agricultural, or forest production on eligible land, and that have a natural resource concern on the land may participate in EQIP.

The EQIP provides financial assistance payments to eligible producers based on a portion of the average cost associated with practice implementation. Additional payments may be available to help producers develop conservation plans that are required to obtain financial assistance.

Historically underserved producers (limited resource farmers/ranchers, beginning farmers/ranchers, socially disadvantaged producers, tribes) may be eligible for a higher practice payment rate for the implementation for conservation practices and conservation plans.

Producers may use a certified Technical Service Provider (TSP) for technical assistance needed for certain eligible activities, services, and the development of conservation plans. Historically underserved producers may also be eligible for advance payments up to 30 percent of the cost needed to purchase materials or contracting services to begin installation of approved conservation practices.

The NRCS works with the producer to develop a plan of operations that:

- Identifies the appropriate conservation practice or measures needed to address identified natural resource concerns.
- Implements conservation practices and activities according to an EQIP plan of operations developed in conjunction with the producer that identifies the appropriate conservation practice or measures needed to address identified natural resource concerns. The practices are subject to NRCS technical standards adapted for local conditions.

Participants may not receive, directly or indirectly, payments that, in the aggregate, exceed $300,000 for all EQIP contracts entered into during any six-year period. Participants whose projects the NRCS determines to have special environmental significance may petition the NRCS Chief for the payment limitation to be waived to a maximum of $450,000. Additional payment limitations apply to producers enrolled in the EQIP Organic Initiative.

Farm and Ranch Lands Protection Program

The Farm and Ranch Land Protection Program (FRPP) provides matching funds to help purchase development rights to keep productive farm and ranchland in agricultural uses. Working through existing programs, the USDA partners with state, tribal, or local governments and non-governmental organizations to acquire conservation easements or other interests in land from landowners. The USDA provides up to 50 percent of the fair market easement value of the conservation easement.

To qualify, farmland must:

- Be part of a pending offer from a state, tribe, or local farmland protection program;
- Be privately owned;
- Have a conservation plan for highly erodible land;
- Be large enough to sustain agricultural production;
- Be accessible to markets for what the land produces;
- Have adequate infrastructure and agricultural support services;
- Have surrounding parcels of land that can support long-term agricultural production; and
- Depending on funding availability, proposals must be submitted by the eligible entities to the appropriate NRCS State Office during the application window.

Wildlife Habitat Incentives Program

The Wildlife Habitat Incentive Program (WHIP) is a voluntary program for conservation-minded landowners who want to develop and improve wildlife habitat on agricultural land, nonindustrial private forest land, and tribal land.

The Food, Conservation, and Energy Act of 2008 reauthorized WHIP as a voluntary approach to improving wildlife habitat in our nation. The NRCS administers WHIP to provide both technical assistance and financial assistance to establish and improve fish and wildlife habitat. The WHIP cost-share agreements between the NRCS and the participant generally last from one year after the last conservation practice is implemented, but not more than 10 years from the date the agreement is signed.

In order to provide direction to the state and local levels for implementing WHIP to achieve its objective, the NRCS established the following national priorities [for its 2011 program—other national priorities may be set in subsequent years]:

- Promote the restoration of declining or important native fish and wildlife habitats.
- Protect, restore, develop, or enhance fish and wildlife habitat to benefit at-risk species.

- Reduce the impacts of invasive species on fish and wildlife habitats.
- Protect, restore, develop, or enhance declining or important aquatic wildlife species' habitats.
- Protect, restore, develop, or enhance important migration and other movement corridors for wildlife.

The agreement also supports the participation of the NRCS staff in Lakewide Management Planning activities.

STATE AGENCIES

There are several State agencies in Michigan that have programs aimed at helping protect water quality, and that work with local units of government and property owners. These include the Michigan Department of Environmental Quality, the Michigan Department of Natural Resources, the Michigan Department of Community Health, the Michigan Department of Agriculture and Rural Development, and the Michigan Department of Transportation.

Prior to the National Environmental Protection Act of 1969, Michigan included environmental protection and natural resource management language in Article IV of the State Constitution. This provision serves as the basis for all of Michigan's subsequent environmental and natural resource management laws.

- **Section 52: Natural resources; conservation, pollution, impairment, destruction.** The conservation and development of the natural resources of the State are hereby declared to be of paramount public concern in the interest of the health, safety, and general welfare of the people. The legislature shall provide for the protection of the air, water, and other natural resources of the State from pollution, impairment, and destruction.

  Source: Sec. 52. History: Const. 1963, Art. IV, § 52, Eff. Jan. 1, 1964.

Michigan's primary environmental legislation is contained in the Michigan Natural Resources and Environmental Protection Act (NREPA), Public Act 451 of 1994, as amended. This statute codified hundreds of separate natural resources and environmental protection acts into a single act. Each "Section" or "Part" of the Act, has a different legislative history. As a result, each Part is written a bit differently, with different intended goals, and identifies different roles for local governments. Public Act 451 addresses shared natural resources, like air and water, sets minimum standards for environmental protection, and details State responsibilities to protect the air, water, and land from pollution, impairment, or destruction. The Act also defines the role of local governments in resource management. For the most part, local roles are voluntary and opportunities are slightly different depending on the resource.

Michigan Department of Environmental Quality

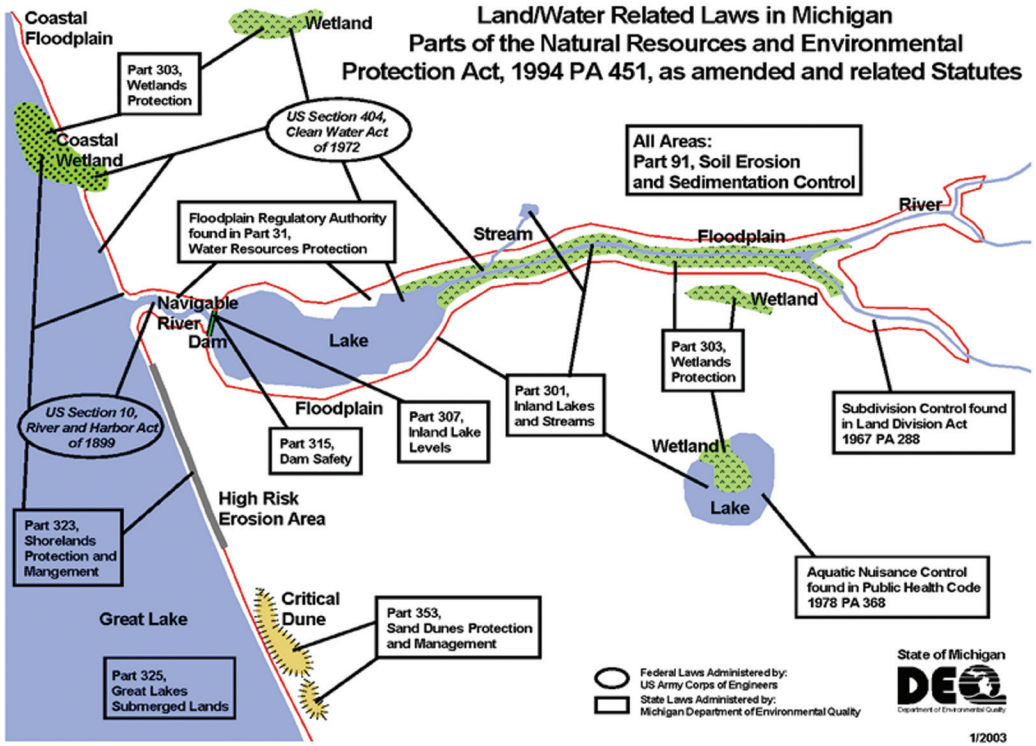
The Michigan Department of Environmental Quality (MDEQ) is the State agency that administers most of the provisions in P.A. 451.

Public Act 451 creates significant opportunities for localities to implement supplemental natural resource management techniques, but does not oversee land use planning at the local level. It is left to the discretion of each of Michigan's 1,800+ local units of government to determine how they will protect the environment through land use planning and local regulations. Therefore, each local government is responsible for helping protect Michigan's environment.

Figure 3–2 illustrates many of the natural features subject to P.A. 451 in Michigan. Notice that although specific features in the ecosystem require State oversight for land cover alteration, many of the areas connecting them do not. This level of land use oversight is left to the discretion of individual communities.

The MDEQ is a State agency dedicated to protecting and enhancing Michigan's environment and public health. According to its vision statement the MDEQ works to achieve an improved quality of life and a sustainable future. As a service to the public it administers programs and enforces laws that protect public health and promote the appropriate use of, limit the adverse effects on, and restore the quality of the environment. It preserves biologically diverse, rare, sensitive, or endangered

Figure 3-2: Land and Water Interface Issues



Source: "Filling the Gaps: Environmental Protection Options for Local Governments," 2nd ed, MDEQ.

plants, animals, and ecosystems through the identification, education, management, and public/private partnerships and initiatives. The MDEQ divisions directly dealing with water quality protection include the Office of the Great Lakes and the Water Resources Division.

The Office of the Great Lakes (OGL) was created by the Michigan Legislature in 1985 to be a one-stop shop for Great Lakes information and a unifying voice on Great Lakes issues. From protecting lake water levels, restoring contaminated areas, addressing the threat of aquatic invasive species, ensuring improving water quality, and supporting wise development of our coastal communities, the OGL is dedicated to the Great Lakes as a source of bounty for Michigan and the foundation of our future.

The Water Resources Division (WRD) was formed on July 26, 2010, from most of the former Water Bureau and the Land and Water Management Division. Its mission is to protect and monitor Michigan's waters—swimmable, fishable, fish safe to eat, and healthy aquatic ecosystems. The WRD has a number of tools to use to help protect water quality, which include the federal Clean Water Act and State statutes, Michigan water quality standards, permits, enforcement, monitoring, grants, and technical assistance.

Among its responsibilities the MDEQ administers:

- Permits for facilities proposing to discharge wastewater to surface waters or groundwaters.
- Enforcement actions where appropriate for noncompliance.
- Emergency response to spills to surface waters.
- Permit activities to control aquatic nuisance plants.
- Ambient water quality and biota monitoring.
- Preparation of plans for water bodies so they meet water quality standards.
- Programs to address nonpoint pollutants (unregulated sources, such as small farms, small construction sites, failing septic systems, etc.) through grants and technical assistance.
- Submerged lands dredging and disposal.
- Nonpoint source pollution permits.

Michigan Department of Natural Resources

The Michigan Department of Natural Resources (MDNR) is committed to the conservation, protection, management, use, and enjoyment of the state's natural and cultural resources for current and future generations. It works on natural resource issues both on land and in the water. Among other priorities, it seeks to:

- Increase participation in outdoor recreation, and reverse the decline in hunting and fishing participation.
- Foster the growth of Michigan's natural resource-based economy.

The MDNR has management, education, and law enforcement programs dealing with fisheries, wildlife, parks and recreation, and forest, mineral, and fire management, each of which can have an effect on the quality of water. The MDNR supports cleanup partnerships with service organizations and youth groups. The MDNR also enforces laws pertaining to water quality.

Michigan Department of Community Health

Public Act 368 of 1978, established Michigan's public health code. It is administrated primarily by the Michigan Department of Community Health (MDCH).

The MDCH administers regulation of and examination of plans for swimming pools, bathing beaches, and sewer and water systems. It also provides for the certification of well-drillers and performs inspections of groundwater supply development or abandonment, and has the right of entry for inspection. The MDCH also makes rules on standards for development or abandonment of wells. The MDCH also permits local Health Departments to regulate public and private sewage treatment systems, including innovative or alternative systems, and develops rules for storage and disposal of medical wastes.

Michigan Department of Agriculture and Rural Development

The mission of the Michigan Department of Agriculture and Rural Development (MDARD) is to protect, promote, and preserve the food, agricultural, environmental, and economic interests of the people of Michigan. While it primarily helps the farm community produce food for society, it also helps farmers learn about, develop plans for, and—in some cases— receive certification for environmental and public health practices. These include a variety of Generally Accepted Agricultural and Management Practices (GAAMPs) dealing with water quality, such as nutrient management, waste management, soil erosion, and chemical and pesticide containment.

The Right to Farm Act (Act 93 of 1981) was passed to reduce the burden on farming operations where non-farm land uses come in conflict with farming operations, such as plowing, spraying, and harvesting. The Act permits farms to engage in agricultural activities that comply with GAAMPs, and precludes local units of government from passing laws that limit farming activities on farms.

Photo 3–4: Water views can be appreciated both from on land and on the water.

Michigan Agriculture Environmental Assurance Program

According to the MDARD, the Michigan Agriculture Environmental Assurance Program (MAEAP) is a voluntary, pro-active program designed by a coalition of farmers, agricultural commodity groups, State and federal agencies, and conservation and environmental groups to reduce producers' legal and environmental risks. It teaches effective land stewardship practices that comply with State and federal regulations, and shows producers how to identify and prevent agricultural pollution risks on their farms. Public Acts 1 and 2 of 2011, codify the MAEAP into law. The program encompasses three systems designed to help producers evaluate the environmental risks of their operation. Each system—livestock, farmstead,

and cropping—examines a different aspect of a farm, as each has a different environmental impact. Through each phase, producers will develop and implement economically feasible, effective, and environmentally sound pollution prevention practices. Within each system there are three phases that must be completed in order to become verified. These phases are:

- **Education:** involves farmer attendance at a qualified MAEAP educational session. Held across the state, these sessions introduce farmers to the MAEAP and update them on new and emerging regulations and opportunities affecting agriculture.
- **On-Farm Risk Assessment:** focuses on evaluating environmental risks and devising farm-specific and economically viable solutions. Each MAEAP system implements a unique risk assessment tool developed to address the environmental impacts of that system.
- **Third-Party Verification:** is where the MDARD verifies the farm after the requirements of Phase 1 and 2 are met, the State's GAAMPs are being followed, and the farm has implemented practices specific to system requirements. When verification requirements are successfully met, producers receive recognition for their accomplishments and access to incentives.

Photo 3–5: Good farming practice can both provide the food we need and protect the quality of our water.

Michigan Department of Transportation

The mission of the Michigan Department of Transportation (MDOT) is to provide the highest quality integrated transportation services for economic benefit and improved quality of life. The MDOT maintains over 10,000 miles of roads and their associated drainage systems. While this transportation network supports extensive commerce and travel, it also accumulates contaminants from vehicles, road construction, and maintenance. Common contaminants include sediment, oil, grease, and fertilizer. In response to this issue, the MDOT has developed a Storm Water Management Plan (SWMP). The SWMP is designed to enhance the way the MDOT does business so that stormwater pollution is reduced or eliminated. Solutions in the SWMP are as simple as good housekeeping, or as complex as building new stormwater management structures. Just as the agency is paying closer attention to its practices, the MDOT encourages residents to educate themselves and do the same.

A National Pollutant Discharge Elimination System (NPDES) Permit (No. MI0057364, hereinafter referred to as the Permit) was issued by the MDEQ for the MDOT-operated separate storm sewer systems throughout the State of Michigan. Procedures developed to comply with each of the six minimum measures stated in the Permit include the following:

- Education and outreach on stormwater impacts – Public Education Program.
- Public involvement/participation.
- Illicit Discharge Elimination Program.
- Post Construction Stormwater Management Program for new development and redevelopment projects.
- Construction stormwater runoff control that includes many of the low impact development techniques described in Chapter 4 of this Guidebook.
- Pollution prevention/good housekeeping for the MDOT operations.

Chapter Four:
Best Management Practices in Rural Areas

Photo 4–1: How we manage land in rural areas affects the quality of our ponds, streams, wetlands, and lakes.

This chapter focuses on provisions that rural communities in the Great Lakes Region can use in Master Plans and Zoning Ordinances to better protect water quality by preventing pollution in the first place. Many of the techniques rely on low impact development approaches to prevent stormwater runoff. Many others are largely educational or encourage property owners to utilize options with less environmental impact.

INTRODUCTION

This chapter focuses on provisions that rural communities in the Great Lakes Region can use in Master Plans and Zoning Ordinances to better protect water quality by preventing pollution in the first place. Many of the techniques rely on low impact development (LID) approaches to prevent stormwater runoff. Many others are largely educational or encourage property owners to utilize options with less environmental impact.

The chapter is divided into four parts. Part A focuses on a half-dozen approaches to water quality protection that should be included in every local Master Plan and Zoning Ordinance. If a community only incorporated these measures into its Master Plan and Zoning Ordinance, it would go a long way to establishing reasonable and prudent water quality protection measures.

Part B focuses on a half-dozen more specific best management practices (BMPs) that are largely tied to LID techniques and basic lot configuration issues.

Part C presents five techniques that are somewhat more sophisticated and require well-trained staff to properly administer. Most are tied to provisions in overlay zones. While there are far more sophisticated zoning techniques that could be used, a fundamental premise of this guidebook is to include techniques that can be utilized by a rural Zoning Administrator with only a modicum of training. These techniques still fit those criteria.

Part D in this chapter presents public education measures primarily designed for inclusion in the Master Plan. The process of preparing a local Master Plan and of reading one after adoption presents great opportunities to educate the community on a wide variety of issues, including water quality protection. A four water quality protection approaches are described in this section.

A. ESSENTIAL ELEMENTS TO INCLUDE IN MASTER PLANS AND ZONING ORDINANCES

The techniques described in this part have been identified as essential for every Master Plan and Zoning Ordinance in the State of Michigan. They are probably applicable throughout the Midwest. These techniques provide a basic level of guidance on matters related to water pollution prevention and coordinated permitting. They are organized around the concept of low impact development, rely on a good environmental inventory, are guided by appropriate goals and objectives in the local Master Plan, and are implemented through coordinated permitting administrative procedures tied to state and local laws. To protect water quality, the techniques that follow should be implemented in the Master Plan and Zoning Ordinance (as indicated) to achieve a contemporary level of water quality protection.

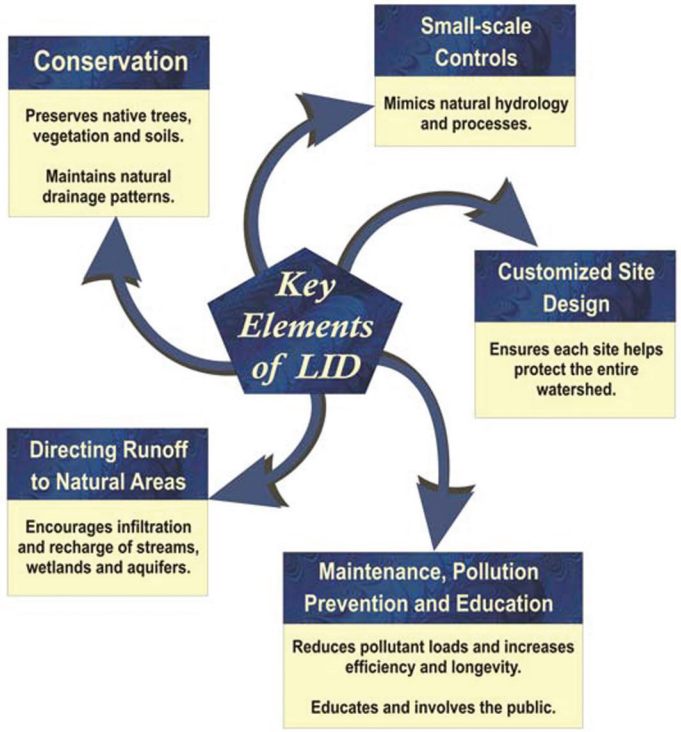
Low Impact Development

What is Low Impact Development?

Low impact development is an organizing concept for developers, contractors, municipalities, property owners, and regulators that seek to minimize environmental damage as new developments occur. According to the U.S. Environmental Protection Agency, LID is an approach to land development that *works with nature* to manage stormwater as close to its source as possible.[4] Low impact development emphasizes cost-effective, site-specific strategies that have the goal of maintaining or replicating predevelopment conditions. These techniques manage stormwater primarily through retention/detention and infiltration, the use of living vegetation as filters, reducing the area of impervious surfaces, and the trapping of sediment through natural courses and baffles[5] (see Figure 4–1). These strategies are targeted to land owners and developers, and should be strongly encouraged through the local Master Plan and Zoning Ordinance with technical support from the municipality and in cooperation with the county's Soil Erosion and Sedimentation Control enforcing agent.

4. Low Impact Development, U.S. Environmental Protection Agency: http://water.epa.gov/polwaste/green/.
5. "Low Impact Development (LID): A Literature Review," U.S. Environmental Protection Agency: http://water.epa.gov/polwaste/green/upload/lid.pdf.

Figure 4–1: Key Elements of Low Impact Development



Source: *Design: Low Impact Development Manual*, U.S. Department of Defense, 2004.

Why Use Low Impact Development?

Traditional curb-and-gutter stormwater infrastructure operates in an "out-of-sight, out-of-mind" framework. These methods work remarkably well for removing water runoff from a site; however, they are designed more to address quantity of water and speed of removal than the quality of the water before it is discharged to the ground or surface water. In contrast, LID techniques are designed to mimic natural systems by accommodating runoff and removing pollutants throughout the conveyance process and without the use of costly end-of-system treatments. Depending on the characteristics of the site, LID techniques may potentially be a more cost-effective solution for managing stormwater than traditional

methods. The applicability of LID may be constrained by specific conditions of the site, such as space available, soil types, and other obstacles, but creative design and a variety of tools available make these techniques adaptable to even the most complicated sites. Removing pollutants before they reach our rivers, lakes, and groundwater can create additional savings due to improved public health, reducing the need for remediation efforts, and an enhanced public perception that the community's water resources are safe, drinkable, swimmable, and provide better habitat for fish and wildlife.

Amending Your Community's Master Plan and Zoning Ordinance to Encourage Low Impact Development

Following is a set of guidelines for amending your community's Master Plan and Zoning Ordinance to encourage LID techniques (see Table 4–1). For specific recommended Master Plan and Zoning Ordinance language regarding this topic, refer to Appendix A, on page A–2.

Master Plan

The municipality should lead by example. If it wants citizens and businesses to adopt and use low impact development best practices, then it needs to use them itself; however, it needs to go a step further by encouraging LID practices in the Master Plan. The Master Plan should include a goal and corresponding objectives for LID, as well as educational information or references to these techniques.

Zoning Ordinance

In very rural communities, the lack of administrative capacity makes it difficult to set and enforce requirements for using LID, since Phase II standards for stormwater control only apply in areas with a population greater than 100,000. The most practical language to use in rural communities is to create zoning guidelines that encourage developers and landowners to consider LID approaches and reference relevant technical and educational documents that can show developers how to help reduce water quality impacts.

Additional Resources

The premier resource for LID in Michigan is the *Low Impact Development Manual for Michigan: A Design Guide for Implementers and Reviewers*, produced by the Southeast Michigan Council of Governments (SEMCOG) for the MDEQ. This document contains a wealth of information on LID, in general, and specific techniques available to developers, and should be at the top of any developer's reading list.

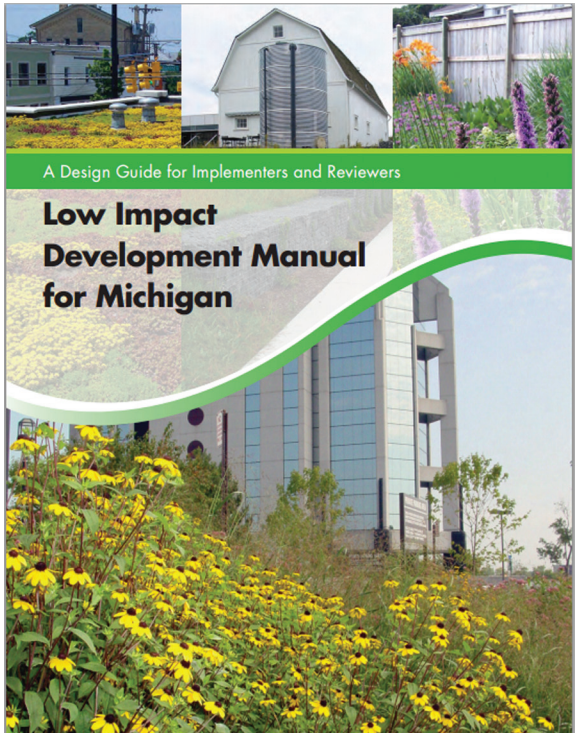


Photo 4–2: The SEMCOG *Low Impact Development Manual for Michigan.*

Table 4–1: Essential Elements in Master Plan and Zoning Ordinance – Low Impact Development

Essential Elements in Master Plan and Zoning Ordinance			
	GOOD	**BETTER**	**BEST**
Low Impact Development	Encourage the use of LID approaches in new development and redevelopment projects.	Describe how LIDs handle stormwater management and give examples.	The "Better" approach may be the highest needed for this element.

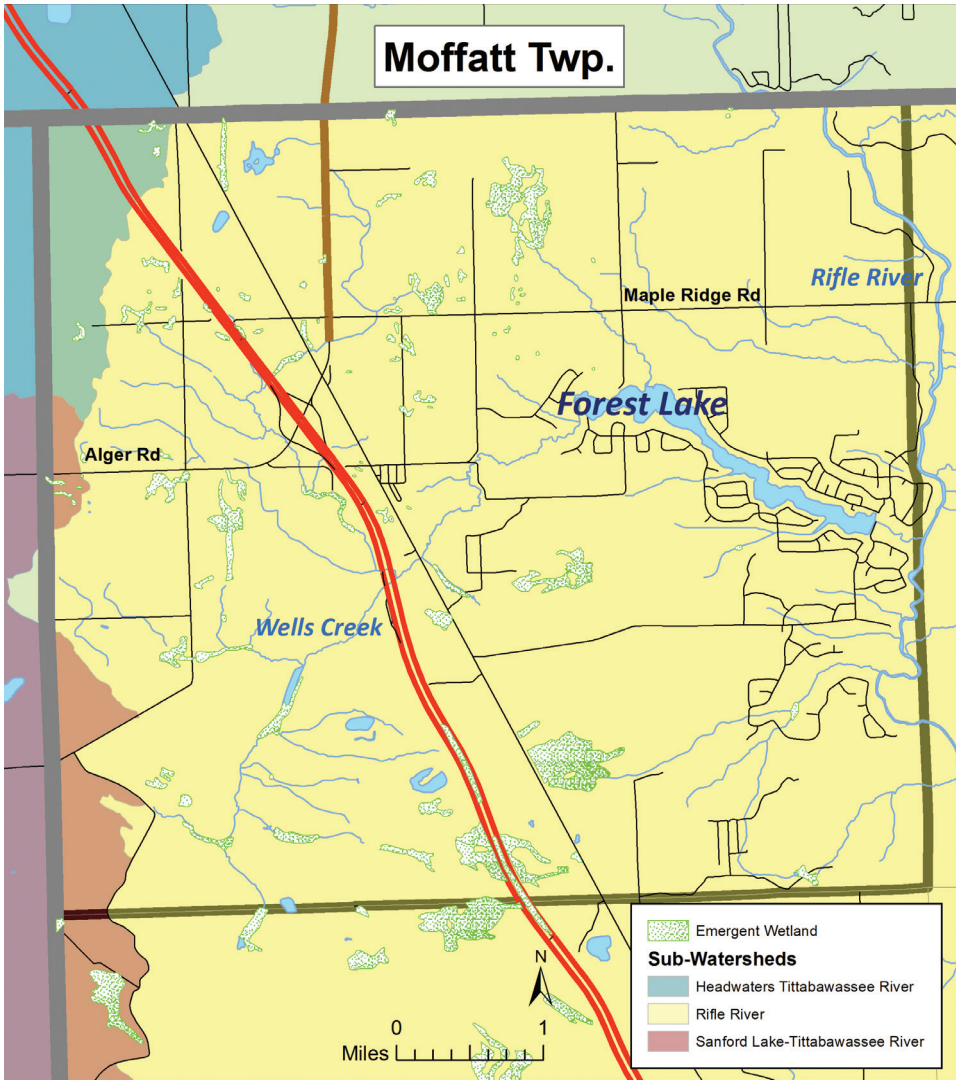
Environmental Inventory

What is an Environmental Inventory?

Even before educating on LID, it is important to learn about the location and condition of existing environmental resources. This requires an environmental inventory, or a natural resource inventory. This is a compilation of text and maps about natural features and characteristics that is included within the community's Master Plan. At a minimum, the environmental inventory should address land cover, topography, hydrology, soils, floodplains, wetlands, high-risk erosion areas, and significant natural features like sand dunes, steep slopes, or sinkholes. Additional elements that could be included are: wildlife/habitat by type, geology, climate, and air quality. An environmental inventory may contain text, maps, tables, figures, and graphs that describe and compare the conditions and locations of natural features within the community. An example environmental inventory map is shown in Figure 4–2, and an aerial photo to identify woodland and other features is shown in Photo 4–3. It is important to connect the local environment's relationship to the bigger picture by relating local environmental features to regional resources, such as watersheds, aquifers, and ecosystems. There are water features in every region and local jurisdiction in Michigan (see Figure 4–3).

The purpose of an environmental inventory is to provide: 1) useful information to facilitate critical thinking and understanding; and

Figure 4–2: Sample Map of Emergent Wetlands and Sub-Watersheds as Part of an Environmental Inventory from Moffatt Township



Source: Michigan Geographic Data Library, Michigan Department of Technology, Management & Budget.

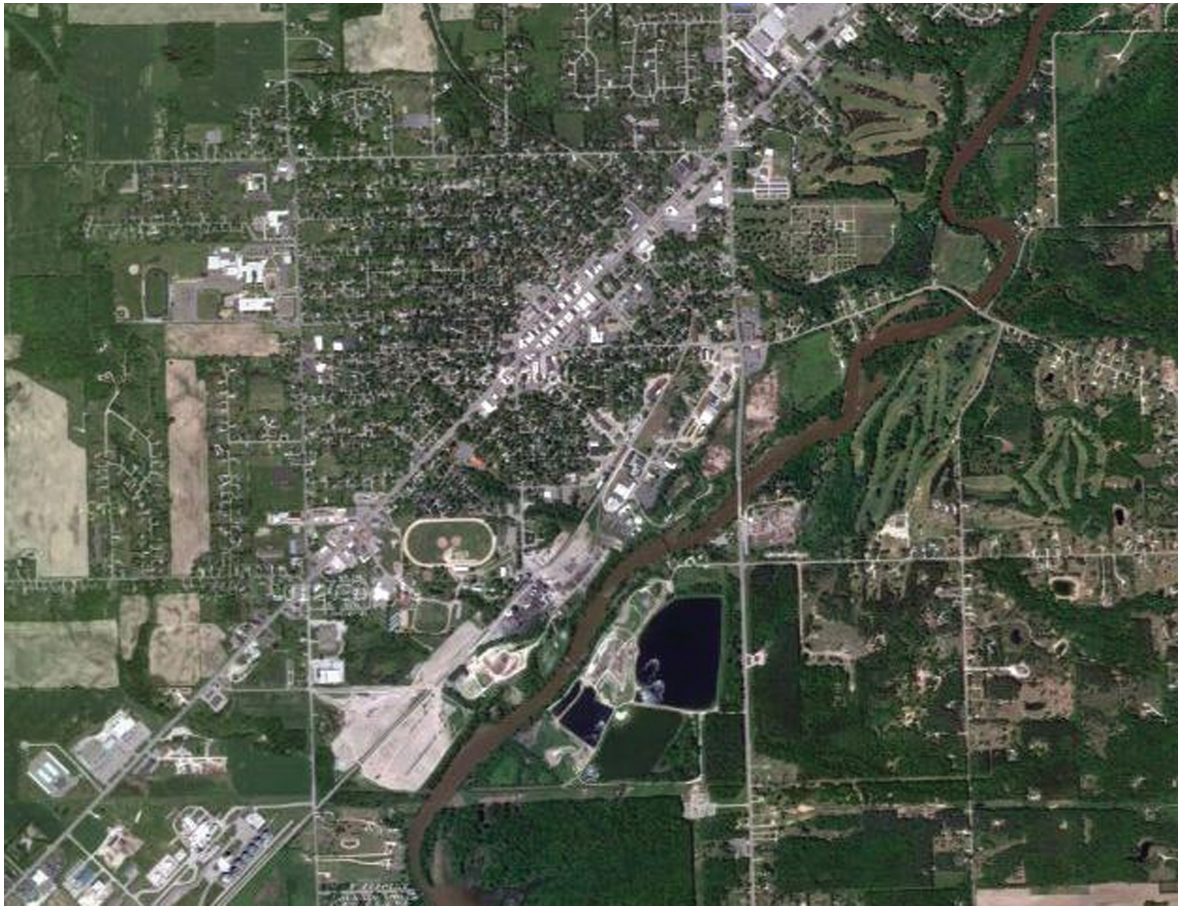


Photo 4–3: Aerial imagery of Caro, MI, shows the woodlots (dark green), sewage lagoon water (dark blue), river (brown) and the agricultural land (light green).

2) as a baseline for resource protection measures within a community. Therefore, the environmental inventory must be objective and descriptive. Interpretation, analysis, and recommendations in regard to environmental resources are appropriate in the Master Plan, but should be separate from the inventory.

Why Do an Environmental Inventory?

With good information about existing environmental features, their locations, and the interrelationship between them and the region, communities can: 1) plan for the protection and management of natural features; and 2) guide development in ways that retain the value of the resource. For example, the environmental inventory can identify areas within the community for wetland or open space preservation and then separately zone these spaces appropriately, to ensure their future protection.

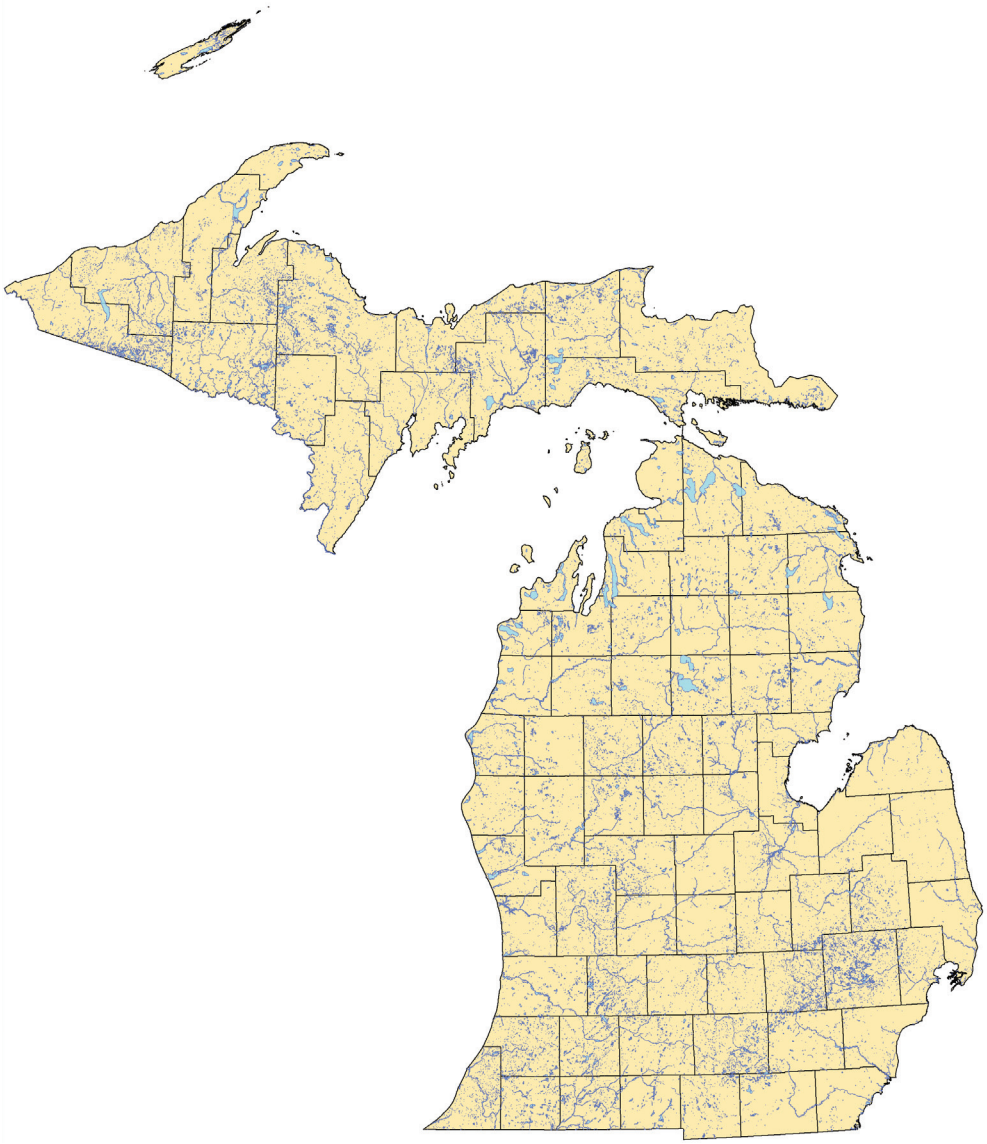
Creating an environmental inventory is also the first step in helping a community identify its environmental goals. Identifying current conditions and trends over the years will help the community target those resources and areas that are in need of protection or remediation.

Municipalities can obtain professionally gathered Geographic Information System (GIS) data regarding these topics from the Michigan Geographic Data Library located at: **http://www.mcgi.state.mi.us/mgdl/**. However, if a community does not have access to computer GIS, or administrative staff to operate it, then the community may want to work with the county or regional planning office, or a consultant for the creation of local maps. While elements, such as woodlands, agricultural fields, and water features, are relatively easy to identify using aerial imagery, features, such as wetlands, may require ground inspection, because wetlands that are only seasonally inundated may be difficult to accurately interpret with aerial imagery.

Updating Your Community's Master Plan to Include an Environmental Inventory

Following is a set of guidelines for updating your community's Master Plan to include an environmental inventory (see Table 4–2). For

Figure 4–3: Michigan Has an Abundance of Water Features



Source: Michigan Geographic Data Library, Michigan Department of Technology, Management & Budget.

a more detailed step-by-step guide, download the West Michigan Tool Kit for Local Green Initiatives, at: **http://www.gvmc.org/naturalresources/documents/WMI_ToolKit_LGI.pdf**.

For recommended plan language regarding this topic, refer to Appendix A, on page A–2.

Master Plan

Include appropriate maps and text that identify natural and environmental resources in the community, giving precise locations and objective descriptions of each. Observations on the impact of development patterns on these resources are encouraged and should be placed in this section; however, goals and objectives for protecting these resources should be included in the designated Goals and Objectives section, which may precede or follow this section.

Zoning Ordinance

No changes are required for the Zoning Ordinance in regard to this topic. However, this is where floodplain maps and wetland maps would be gathered for use in future Zoning Ordinance regulations.

Water Quality

What is the Purpose of Addressing Water Quality in the Master Plan?

A Master Plan is a guiding document for public infrastructure, land use, and private development investment in the community. It is the basis for regulations that are included in the Zoning Ordinance, and it expresses the

Table 4–2: Essential Elements in Master Plan and Zoning Ordinance – Environmental Inventory

Essential Elements in Master Plan and Zoning Ordinance			
	GOOD	**BETTER**	**BEST**
Environmental Inventory	The Master Plan's environmental inventory should, at a minimum, identify existing conditions and issues for major water courses, minor and major drains, hydrologic soils, and other significant natural features.	All the elements of the "Good" category, plus the plan has a goal to consider natural features maps and maps of existing natural resources when planning areas for future land uses or public infrastructure, when considering proposed amendments to the Master Plan or Zoning Ordinance, and when considering any new public or private uses of land or public buildings.	All the elements of the "Better" category, plus the plan has objectives for how to accomplish the goal.

values of the community through a well-defined goal and objectives. Since clean water is one of the building blocks of life and civilization, and is repeatedly identified by citizens as the most important natural resource to protect, it is essential that communities protect their water resources from contamination. The first step to protecting a community's water resources is to develop a plan of action; planning how to safeguard against potential contamination. The Master Plan is the standard tool that allows the community to set goals and objectives for land use that, if implemented, will protect water quality into the future by reducing negative impacts from development.

The development of goals and objectives in a Master Plan creates the basis for future changes in the Zoning Ordinance and in other regulatory ordinances.

Updating Your Community's Documents to Include Water Quality

Following is a set of guidelines for updating your community's Master Plan to include a goal and objectives for water quality and Zoning Ordinance language (see Table 4–3). For recommended language regarding this topic, refer to Appendix A, on page A–2.

Master Plan

Including a goal and objectives in the Master Plan is an important step that sets the stage for other elements, practices, and techniques to protect water quality in a the community.

Zoning Ordinance

Commonly, within the first Article of a Zoning Ordinance there is a section titled "Purpose." This section is designed to explain the rationale for regulation; therefore, it is useful in educating readers and courts about the intent of the community as expressed by the governing body when it adopts the Zoning Ordinance, or amendments to it. The purposes have to be legitimate public health, safety, and general welfare reasons. So, it is appropriate to place a sentence in the Purpose section that shows the ordinance purpose regarding protection of water quality. It can be very simple. See Appendix A, on page A–3, for example language.

Coordinated Permitting

What is Coordinated Permitting?

Coordinated permitting is an administrative process through which all relevant agencies (federal, state, county, and municipal) involved in the development permitting process stage their approvals in a way that ensures due diligence among all parties involved AND a timely response to an applicant. Without a coordinated process, applicants must seek and obtain permits separately and sequentially from all permitting agencies, ensuring the maximum possible time for review and approval. Coordinated permits result in a much shorter review and approval period without any loss of public interests. The final checkpoint on permitting before building permits are considered should be the Zoning Administrator before a zoning permit (sometimes called a land

Table 4–3: Essential Elements in Master Plan and Zoning Ordinance –Water Quality

Essential Elements in Master Plan and Zoning Ordinance			
	GOOD	**BETTER**	**BEST**
Water Quality (Master Plan)	The local community has a goal to preserve and enhance its natural and environmental resources, including surface and ground water.	All the elements of the "Good" category, plus the Master Plan explains specific dangers to the community's waterways and gives possible solutions.	All of the measures of the "Better" approach, plus the plan indicates what measures should be taken.
Water Quality (Zoning Ordinance)	Insert a statement into the Purpose section of the Zoning Ordinance on protecting water quality.	The "Good" approach may be the highest needed for this statement.	The "Good" approach may be the highest needed for this statement.

use permit) is issued; this allows the issuer to withhold the requested permit until all other required permits are accounted for.

Typical parties involved:

- The Michigan Department of Transportation for access to a state highway.
- The Michigan Department of Environmental Quality for a wetland, floodplain, sand dunes, or environmental area.
- The U.S. Army Corps of Engineers for a coastal or connecting waters structure.
- The County Road Commission for access to a county road.
- The County Drain Commissioner for county drain impacts.
- The County Soil Erosion and Sedimentation Control (SESC) enforcing agent for SESC permits.
- The district or county Health Department for septic system permits.
- The county or local Building Department for building permits.
- The county or local Zoning Department for zoning permits.

Why Utilize Coordinated Permitting?

Without a system to coordinate permits among agencies, a situation will arise at some point where a developer receives a building or a zoning permit and proceeds with construction only to later find out that a required permit from another agency was not obtained. This can have extreme consequences, such as with developments in a floodplain, or if a builder installs a septic system without a permit. Subsequently, if a house is flooded or a septic system fails, because it was improperly installed, then not only are those violations of public regulations for which penalties would be imposed, along with the health risks of contaminated water, private law suits would also probably result. This is completely preventable if the Zoning Administrator does not issue any zoning permit until evidence that all other required permits (except building permits) have been obtained. Then the Building Code Administrator can issue a building permit.

Implementing Coordinated Permitting

Following is a set of guidelines for updating your community's Master Plan and Zoning Ordinance to include Coordinated Permitting (see Table 4–4).

Master Plan

Updating your community's Master Plan to include a goal and objectives for the creation of a coordinated permit system for new land uses is the first step in initiating a coordinated permit system. See Appendix A, on page A–3, for sample goal and objectives language for insertion into the Master Plan on this topic.

Zoning Ordinance

The responsibility for coordinated permitting should be provided in the municipal Zoning Ordinance. Including a requirement in the General Provisions section or Zoning Administration section that specifies a zoning permit shall only be issued upon proof that all relevant permits from other agencies have first been obtained is

Table 4–4: Essential Elements in Master Plan and Zoning Ordinance – Coordinated Permitting and Coordinated Site Plan Review

Essential Elements in Master Plan and Zoning Ordinance			
	GOOD	**BETTER**	**BEST**
Coordinated Permitting (Master Plan)	The Zoning Administrator will not issue land use permits nor shall the Building Administrator issue building permits until evidence that other permits required from other agencies has been received.	All the elements of the "Good" category, plus the Master Plan includes a description of the MDEQ Environmental Permits checklist and explains how it is useful for applicants.	All the elements of the "Better" category, plus insert objectives as to how the Planning Commission will accomplish its goals regarding coordinated permitting.
Coordinated Site Plan Review *(Zoning Ordinance)*	*The ordinance requires that all land uses and construction activities shall conform with the provisions of this Ordinance and all applicable local, county, state, and federal regulations including, but not limited to those listed. Also, all required permits must be submitted before obtaining a local building/zoning permit.*	*All of elements in the "Good" category, plus the ordinance lists the specific required permits and where to obtain them.*	*All the elements of the "Better" category, plus specific actions that the Zoning Administrator must take before approving a zoning/land use permit.*

necessary. This type of provision is not difficult to enforce, nor does it place any additional burden upon the Zoning Administrator; the burden is on the applicant, where it should be. This approach provides guidance and predictability throughout the process by identifying the Zoning Administrator as the entity responsible for issuing zoning permits only when evidence is presented that all other required permits were obtained. See Appendix A, on page A–4, for sample Zoning Ordinance language.

Environmental Permits Checklist

Creating, maintaining, and making available a checklist document for all typically required permits is an easy and efficient way to assist landowners, developers, and builders in determining which permits are necessary. The simple procedure of putting a stack of blank permit checklist forms in the municipal planning and zoning department's lobby can effectively minimize time spent on answering simple questions about other agencies' permits. An environmental permits checklist should ask questions about the nature of the activity that the developer would be engaging in, and then provide resources for where more information can be found on the permit related to this activity. Upon completion of a checklist and then appropriate applications elsewhere, the developer will be able to provide proof of receipt of all required permits to the municipal zoning permitting authority and proceed with the process. The Planning & Zoning Center recommends looking at the environmental permits checklist, which can be found on the MDEQ website at:

http://www.michigan.gov/deq/0,4561,7-135-3307_29692---,00.html.

Earth Change Activity

What is Soil Erosion and Sedimentation Control?

The Michigan Soil Erosion and Sedimentation Control Act was adopted in an effort to limit the amount of sediment pollution entering the state's waters by improper construction site management practices. Part 91, Soil Erosion and Sedimentation Control, of the Natural Resources and Environmental Protection Act, 1994 P.A. 451 specifies that a permit is required for any earth change activity that disturbs one (1) or more acres of land and all earth change activities within 500 feet of a water course. Exempted activities include plowing and tilling for crop production and some logging and mining activities.

The purpose of soil erosion and sedimentation control is to mitigate the unnatural loss

and deposition of sand, silt, dust, and other particulates into waterways. While the loss of sediment due to erosion threatens traditionally buildable landscapes, the accumulation of sediment has the potential to cause serious physical and biological impairments to lakes and streams that they flow into. Sediment loads have the potential to alter the hydrology of the water bodies that they are deposited in, and can hold onto harmful pollutants and nutrients, such as phosphorous, which accelerate the growth of unwanted aquatic plants. Remediation efforts to remove deposited sediments and their side-effects typically come at a much higher cost to taxpayers than what preventative measures would take to implement, so it is recommended that BMPs be implemented to mitigate these processes.

Why Include Soil and Sedimentation Controls?

During construction, a significant amount of soil erosion may occur if proper steps are not taken to safeguard against it. Trees, vegetation, and topsoil are often removed in the early stages of construction, which exposes the soil to erosion.

Stormwater from impervious surfaces, if not trapped by vegetation or artificial filters, can carry the nutrients, pathogens, sediments, toxic contaminants, and debris to the nearest watercourse.

The SESC regulations do not include prevention of impacts on all sensitive aquatic resources, including wetlands. Also, the SESC regulations only affect those earth change activities outside of the 500-foot buffer from water courses that are *larger* than one acre; therefore, those communities with the staff capacity may want to expand the SESC permitting process to address these shortcomings.

Counties have the primary responsibility for issuing SESC permits, although some local municipalities have taken on the responsibility within their jurisdiction. Local soil erosion and sedimentation control ordinances and programs must be approved by the MDEQ prior to implementation.

Updating your Community's Documents to Include Soil Erosion and Sedimentation Control

Following is a set of guidelines for amending your community's Master Plan and Zoning Ordinance to include minimal guidelines for Soil Erosion and Sedimentation Control (see Table 4–5). For recommended plan and ordinance language regarding this topic, refer to Appendix A, on page A–6.

Master Plan

The Master Plan should include goals and objectives for controlling soil erosion and sedimentation during and after development of a site. The Master Plan should provide general educational information on the negative impacts of soil erosion and sedimentation and refer to sources for more comprehensive information on the subject, such as a local NRCS Office or the County Drain Commissioner's Office (or whatever office is responsible for SESC permitting).

Zoning Ordinance

The community's Zoning Ordinance should specifically reference Michigan's Natural Resources and Environmental Protection Act of 1994, Part 91 Soil Erosion and Sedimentation Control for specifics on when a soil erosion and sedimentation control permit is required. Provisions should also identify the appropriate authority that developers should contact if a SESC permit is needed.

Accumulation and Disposal of Waste

Why is Regulating the Accumulation and Disposal of Waste Important?

The accumulation of waste and junk is not only unsightly, it has the potential to negatively impact a community's water resources and subsequently, human health. When left exposed to the elements, waste can leach harmful substances that may eventually infiltrate into groundwater or contaminate nearby lakes and streams. For this reason, it is necessary for all communities to regulate the open air storage of waste and junk— usually by preventing/ prohibiting it!

Common types of waste:

- Yard waste;
- Household trash;
- Inoperable automobiles and farm implements;

Table 4–5: Essential Elements in Master Plan and Zoning Ordinance – Earth Change Activity

Essential Elements in Master Plan and Zoning Ordinance			
	GOOD	**BETTER**	**BEST**
Earth Change Activity as Regulated under Soil Erosion and Sedimentation Control Act (Master Plan)	There is nothing to add, as long as the "Good" language for Coordinated Permitting has been added.	The Master Plan has a goal that ensures that the Zoning Ordinance will require a SESC Permit before approving any new development or redevelopment.	All the elements of the "Better" category, plus the plan ensures that the Zoning Ordinance should also take into consideration the topography and existing vegetation before approving a zoning/land use permit.
Earth Change Activity as Regulated under Soil Erosion and Sedimentation Control Act *(Zoning Ordinance)*	*The ordinance requires a SESC Permit to be obtained for all developments within 500 feet of an inland lake or stream.*	*All the elements of the "Good" category, plus the ordinance requires that existing vegetation and topography must be respected.*	*All of the "Better" approach, plus cross-reference the section with regulation on setbacks from sensitive natural features.*

- Chemicals (paints, solvents, cleaners, etc.); and
- Batteries and electronics.

Where to Include Provisions for the Accumulation of Waste and Junk?

The accumulation of waste and junk may be dealt with in two different sections of the local code of ordinances: 1) for communities looking for the most stringent and comprehensive level of regulation in regard to the proliferation of waste, a stand-alone nuisance ordinance may be the best option; 2) for communities that seek to regulate waste by land use or district, an additional section in the General Regulations chapter of the Zoning Ordinance is typically used. It is also possible for a community to adopt a separate nuisance ordinance that establishes a base level of regulation in addition to specific provisions in the Zoning Ordinance, so long as these provisions do not conflict.

In addition, P.A. 316 of 2003 allows for the creation of an administrative hearings bureau that has the power to impose sanctions for violators of the local Zoning Ordinance or other city charters related to blight. This Michigan Public Act pertains to cities with a population of 7,500 or more that is located in any county, or a city that has a population of 3,300 or more and is located in a county that has a population of 2,000,000 or more. For more information regarding the establishment of an administrative hearings bureau, please visit the Michigan State University Extension's website: **http://lu.msue.msu.edu/2004LUlegis.htm**. See Table 4–6, and Appendix A, on page A–7.

B. Best Management Practices for Protecting Water Quality

The following set of best management practices goes a step beyond the basic "Essential Elements" of water quality protection. If implemented, these regulations will have a direct positive impact on a community's ability to protect their water resources through prevention of future contamination. The best practices listed below target some of the most common problems that are associated with new development on water quality and attempts to correct them though improved planning and zoning techniques.

Parcel Splits for Buildable Area

What is a Parcel Split or Land Division?

A parcel split occurs when one lot is permitted to be split from a parent parcel. A land division is a split that results in one or more (but not more than a certain number of) parcels smaller than 40 acres. A land division ordinance may be adopted by a local unit

Table 4–6: Essential Elements in Master Plan and Zoning Ordinance – Accumulation and Disposal of Waste

Essential Elements in Master Plan and Zoning Ordinance			
	GOOD	**BETTER**	**BEST**
Accumulation & Disposal of Waste (Master Plan)	The Master Plan prevents the accumulation of junk or other waste materials in any way that could present a hazard to ground or surface water.	All the elements of the "Good" category, plus the plan has objectives for how to accomplish the goal.	The "Better" approach may be the highest needed for this element.
Accumulation & Disposal of Waste *(Zoning Ordinance)*	*The ordinance does not allow for accumulation of junk or other waste.*	*Same as the "Good" approach, but specifically cross-reference other ordinances and regulatory agencies. Add language to the Site Plan Review section of the Zoning Ordinance per the Groundwater Protection – Zoning Ordinance in Appendix A.*	*The "Better" approach may be the highest needed for this element.*

of government to regulate parcel splits and land divisions as long it is in accordance with Section 109 of the Land Division Act, Public Act 288 of 167, as amended (MCL 560.109). In addition to standards for lot size, width-to-depth ratio and relationship to access are also provided by the statute. There are exceptions, as bonus lots are permitted for shared access and open space preservation. An existing lot in a subdivision cannot be further divided or split, unless there is a local ordinance adopted that provides for a review and process to approve the lot splitting.

The Land Division Act also contains requirements for platting (more lots than allowed under Section 109).

Why Parcel Splits for Buildable Area?

Environmentally speaking, the primary issues related to parcel splits are associated with lot width, depth, area, access, and "buildability" of the parcel. For example, deep, narrow frontage lots along shorelines will often result in long driveways and structures close to the water. Commonly, this translates into substantial impervious surface, which will help carry pollutants, nutrients, and warm water into the water courses (see the section on Impervious Surfaces for more information).

Proper review and approval of parcel splits can reduce future problems associated with the use of lots. The process is similar to a Site Plan Review, except that in a parcel split there are many other statutorily required reviews by different entities. For example, the local government, the County Road Commission, the Drain Commissioner, the MDOT, and the MDEQ, may all have different requirements, depending on the location and proposed lot characteristics.

Amendments for Better Parcel Splits

Following is a set of guidelines for amending your community's Master Plan and Zoning Ordinance to include guidelines for parcel splits (see Table 4–7). For recommended plan and ordinance language regarding this topic, refer to Appendix A, on page A–8.

Master Plan

Goals within a Master Plan should at the very least state that unbuildable land divisions should be prevented. In addition, the goal may call for the review of proposed lot splits to meet minimum standards.

Zoning Ordinance

The Land Division Act requires an applicant to submit the proposed split or plat to the community for administrative review. Therefore, a local ordinance should identify the steps necessary to get a parcel split approved.

Table 4–7: Best Management Practices – Parcel Splits for Buildable Area

Best Management Practices			
	GOOD	**BETTER**	**BEST**
Parcel Splits for Buildable Area (Master Plan)	The Master Plan has a goal to not create any unbuildable lots.	All the elements of the "Good" category, plus an objective for the Zoning Ordinance to require a review of all proposed lot splits for buildability.	The "Better" approach may be the highest needed for this practice.
Parcel Splits for Buildable Area *(Zoning Ordinance)*	*The Zoning Ordinance requires that all divisions/ splits comply with the Land Division Act.*	*All the elements of the "Good" category, plus a requirement that there is enough buildable area when also including significant natural features areas.*	*All the elements of the "Better" category, plus a provision in the Site Plan Review that requires that the natural features and character of a land are preserved wherever possible.*

This is often a separate ordinance. It should be referenced in the Zoning Ordinance. A community would also benefit from stating that a parcel of land shall not be split in a way such that an "unbuildable" parcel is created; taking into account floodplains, wetlands, and other features that may create serious difficulties.

Land Division Alternatives

What are Land Division Alternatives?

Planned unit developments (PUDs) and site condominiums are the two most common alternatives to land division in Michigan. These techniques are typically utilized by developers of multi-family housing, mixed-use developments, and other large-scale developments with a range of lessees.

Why Use Land Division Alternatives?

Land division alternatives allow the municipality and the developer an opportunity to work with natural characteristics of a site, while maximizing open space and preserving sensitive natural features. Preserving the natural landscape of the overall site typically yields a higher potential for control of runoff than if the site has been stripped of vegetation, graded, and developed parcel-by parcel. Excessive divisions of land can result in an increased negative impact on water quality due to increased impervious coverage, compacted soils, and the total area consumed by buildings.

Amendments to Encourage Land Division Alternatives

Following are guidelines for amending your community's Master Plan and Zoning Ordinance to include guidelines for PUDs and site condominiums (see Table 4–8). For recommended plan and ordinance language regarding this topic, refer to Appendix A, on page A–9.

Master Plan

The Master Plan should have a goal and objective to guide municipal planning and zoning officials to encourage developers to utilize site condominium development and PUDs when feasible. These officials should conduct a Site Plan Review in these cases to identify and preserve natural features while avoiding negative impacts on the land.

Zoning Ordinance

A fairly standard provision for these types of developments is to require the identification of watercourses or other natural features to be identified. This may allow the developer to count features, such as wetlands and woodlots, as part of an open space requirement. The Zoning Ordinance should also specify in the cases of PUD and site condominium developments, that natural features and natural flow pathways for stormwater be preserved and that adequate protections be made for these features where appropriate.

Table 4–8: Best Management Practices – Land Division Alternatives

Best Management Practices			
	GOOD	**BETTER**	**BEST**
Land Division Alternatives (Master Plan)	The Master Plan includes a goal to encourage landowners with significant natural features to utilize land division alternatives to minimize negative impacts on identified natural features.	All the elements of the "Good" category, plus an objective on how to accomplish the goal.	The "Better" approach may be the highest needed for this practice.
Land Division Alternatives *(Zoning Ordinance)*	*The ordinance requires that all existing watercourses are identified during the Site Plan Review process.*	*All of the elements in the "Good" category, plus the natural features and character are preserved wherever possible.*	*All the elements in the "Better" category, plus language that encourages the preservation of natural features within PUDs and condominium subdivisions.*

Stormwater Management

What is Stormwater Management?

In low impact development, the goals of stormwater management are to detain, slow, or generally reduce the amount of runoff from a site. The implementation practices used as part of a stormwater management strategy typically consist of site design elements, such as retention basins, swales, and the use of baffles or vegetation in flow pathways.

Why Is Stormwater Management Important?

Since the rise of traditional "curb and gutter" stormwater infrastructure, our culture has typically looked at stormwater runoff as more of a nuisance than a resource and as a result, we have operated in an "out-of-sight, out-of-mind" attitude towards dealing with it. What many do not realize is that by collecting and moving stormwater away in pipes we are creating even greater problems for ourselves, such as burdensome maintenance expenses and contaminated stormwater, by taking this approach, rather than allowing water to take its natural course.

When stormwater runs off of an impervious surface, such as roads and parking lots, it carries with it any pollution that was on the surface. Dust from brake pads, oil, salt, bacteria, and general litter among other things are carried away, untreated, through traditional curb, gutter, and underground pipe systems and eventually end out in our rivers, streams, and lakes. These harmful pollutants can adversely affect these ecosystems, as well as public health of those that come in contact with the water.

Managing stormwater to mitigate the amount and quality of runoff is a responsible approach that all developers should be encouraged to do; responsible management means cleaner waters, healthier communities, and less money spent on remediation in the future.

Amendments to Promote and Enforce Stormwater Management

Following are a set of guidelines for amending your community's Master Plan and Zoning Ordinance to include elements that encourage stormwater management (see Table 4–9). For recommended plan and ordinance language regarding this topic, refer to Appendix A, on page A–9.

Master Plan

The Master Plan should include a goal and objectives for the control of stormwater and acknowledge the extent to which developers of sites should attempt to manage runoff (for example, designing to accommodate: 10-, 50-, or 100-year storms). References should be provided for educational resources, such as those referenced in the LID chapter; information on any relevant local initiatives surrounding stormwater management; as well as contact information for your community's County Drain Commissioner, the NRCS districts, and the MDEQ.

Table 4–9: Best Management Practices – Stormwater Management

Best Management Practices			
	GOOD	**BETTER**	**BEST**
Stormwater Management (Master Plan)	The Master Plan has a goal to establish minimum stormwater management standards and incorporate LID standards in the Zoning Ordinance.	All of the elements of the "Good" category, plus objectives on how to reach the goal.	All of the elements of the "Better" category, plus an objective to Initiate efforts in cooperation with the Drain Commissioner and conservation organizations to educate landowners and stakeholders about the potential benefits of various LID techniques and other stormwater BMPs.
Stormwater Management *(Zoning Ordinance)*	*The ordinance includes Site Plan Review language that requires attention be paid to surface drainage.*	*All the elements of the "Good" category, plus the ordinance does not allow for an approved permit if stormwater runoff creates a negative impact on adjacent lands, watercourses, or water bodies above the run-off impact when the application was made.*	*The "Better" approach may be the highest needed for this practice.*

Zoning Ordinance

The most fundamental ordinance provision for stormwater is one that requires all new development to manage its runoff on-site without directly contributing additional runoff to adjacent properties and municipal sewers. At the "Better" and "Best" levels, these regulations can be adapted to address increased severity of storm events; from 10-, to 50- and 100-year storms.

Impervious Surface Reduction

What is Impervious Surface Reduction?

Impervious surface reduction involves decreasing the amount of land cover that prevents water from being infiltrated into the ground before it reaches streams or lakes.

In less developed areas, precipitation will infiltrate the ground and eventually make it to bodies of water through groundwater seeps or springs. The water that is soaked up by vegetation will cycle through the atmosphere through evaporation. However, if the land is covered with an impervious surface the water will run off of the surface directly into a stream or lake, likely through some type of stormwater conveyance. This process can increase the velocity of streams to highly erosive levels after large snowmelts or rain showers and slow streams to nearly dry during dry times.

Stream degradation has been observed at impervious levels as low as 10–20 percent watershed wide. However, there are many tools that can be utilized to reduce the amount of impervious land cover. For example, decrease the width of driveways, require parking lot landscaping, include open space provisions, and mandate that more pervious materials be used for new pavement, are all ways to reduce imperviousness through local ordinances.

Why should your Community Use This Best Management Practice?

Both the high flows and the low flows caused by large amounts of impervious surface in watersheds damage streams. The high flows have been shown to degrade water quality by increasing pollutants, such as fertilizer, sediment, and pesticides. Table 4–10 shows common pollutants borne from runoff and their major sources. Runoff from impervious surfaces also increases the temperature of the stream, which will decrease the amount of dissolved oxygen, harming aquatic wildlife. The heavy rains that cause high flows also collect debris on the way to rivers and streams.

Table 4–10: Common Pollutants Borne from Runoff and Their Major Sources

Pollutant	Highest Level	2nd Highest Level	3rd Highest Level
E. Coli	Residential feeder streets	Residential collector streets	Residential Lawns
Sediments	Industrial collector streets	Industrial arterial streets	Residential feeder streets
Total Phosphorus	Residential lawns	Industrial collector streets	Residential feeder streets
Zinc	Industrial roofs	Industrial arterial streets	Commercial arterial streets
Cadmium	Industrial collector streets	Industrial arterial streets	Commercial arterial streets
Copper	Industrial collector streets	Industrial arterial streets	Commercial arterial streets

Source: Kalkaska County, 2003

Amendments to Encourage Reduced Imperviousness

Following are guidelines for amending your community's Master Plan and Zoning Ordinance to include elements that encourage developers to reduce impervious coverage (see Table 4–11). For recommended plan and ordinance language regarding this topic, refer to Appendix A, on page A–11.

Master Plan

The Master Plan should identify goals and objectives for impervious surface reduction and provide some degree of education on the benefits of reducing imperviousness and supplement this information with references on where the public and developers can learn about LID techniques for reducing impervious coverage.

Zoning Ordinance

Paved surfaces are easiest to reduce prior to construction. Therefore, proper site plan development standards that limit the amount of impervious surface are paramount. There are three places that commonly contain provisions for impervious surface reduction within the Site Plan Review section: streets and access, parking, and site design.

Design standards for streets and access, such as minimum on-street parking standards, required pavement, length of driveways, and the design of driveways, can all influence the amount and pace at which water infiltrates the ground. Some BMPs include allowing connected driveways, limiting the number and length of cul-de-sacs, and limiting the type of material that can be used in surfacing parking lots. For instance, when installing a new driveway or pedestrian pathway, instead of concrete the developer could use gravel, bricks, stone, bark chips, etc.

Changing the characteristics of parking lots is also a great way to reduce the overall imperviousness of a development.

Table 4–11: Best Management Practices – Impervious Surface Reduction

	Best Management Practices		
	GOOD	**BETTER**	**BEST**
Impervious Surface Reduction (Master Plan)	There is nothing to add as long as the "Good" language for Natural Feature and Drain Setbacks has been added.	The Master Plan has a goal to keep the amount of new impervious surfaces low and reduce impervious surface area.	All the elements of the "Better" category, plus the plan has objectives for how to accomplish the goal.
Impervious Surface Reduction *(Zoning Ordinance)*	*The ordinance requires that LID techniques are used when designing and constructing parking and loading areas.*	*All the elements of the "Good" category, plus pervious pavement options should be considered.*	*The "Better" approach may be the highest needed for this practice.*

Imperviousness can be reduced by providing compact car spaces, mandating parking lot landscaping, using pervious surfacing, and by encouraging shared parking between compatible users. Shared parking can be encouraged by allowing a reduction in the minimum number of parking spaces needed if entities with non-conflicting peak hours share the space.

Table 4–12 has examples of land uses with different peak time hours.

Table 4–12: Examples of Land Uses with Different Peak Time Hours

Weekday	Evening	Weekend
Schools, daycare centers, colleges	Auditoriums	Religious institutions
Banks	Bars	
Professional services	Meeting halls	
Offices	Restaurants	Restaurants
	Hotels	

Site design standards can impact the imperviousness of an area. For example, having open space buffers next to sensitive water features allows more flood water to be absorbed before it affects the community.

Natural Feature and Drain Setbacks

What is a Natural Feature and Drain Setback?

A setback from natural features means a specified distance that a building (or other impervious surface) is required to be located away from a natural feature, like a stream, pond, or wetland. The distance is typically a requirement set forth in the Zoning Ordinance.

Why Should Your Community Utilize Setbacks for Natural Features?

Runoff from impervious surfaces that passes through the natural landscape is filtered and the amount of pollutants reduced before entering a body of water. Impervious surfaces, such as driveways and roofs, which are warmed by the sun, heat stormwater to levels that may disrupt the natural biological functions of the receiving body of water if they are discharged without passing through the cooling ground or shaded, vegetated areas. Setbacks allow runoff to flow through a vegetation filter and to soak into the soil as it passes over the setback, which also reduces the volume of runoff the receiving body takes on. Setbacks also serve a purpose of protecting natural features like woodlots where encroachment by heavy equipment or building excavation can have a permanently damaging effect on the root systems of trees.

Amendments to Include Natural Feature Setbacks

Following are guidelines for amending your community's Master Plan and Zoning Ordinance to include guidelines for natural feature setbacks (see Table 4–13). For recommended plan and ordinance language regarding this topic, refer to Appendix A, on page A–12.

Master Plan

The Master Plan can be updated for natural feature setbacks simply by adding a goal and objectives for amending the Zoning Ordinance at a future date and encouraging the use of vegetated filters within setback areas.

Zoning Ordinance

Your community's Zoning Ordinance can be amended to utilize buffer requirements on natural features of varying distances. A minimum distance of 25 feet is recommended. However, larger distances improve the effectiveness of this BMP. A deeper setback should be considered when stormwater would flow down a slope toward the natural feature. This provides more vegetation to slow the increased and highly erosive velocity of the runoff.

Groundwater Protection

Why Protect Groundwater?

Clean potable water sources are essential for a healthy and functional community, so ensuring that a basic level of protection exists for groundwater is a necessary endeavor for all local governments. While a portion of these duties are serviced by the various county and district Health Departments throughout Michigan, more can be done at the local level to reduce the potential for contamination.

Table 4–13: Best Management Practices – Natural Feature and Drain Setbacks

Best Management Practices			
	GOOD	**BETTER**	**BEST**
Natural Feature and Drain Setbacks (Master Plan)	The Master Plan includes a goal to implement land use patterns, and search out techniques and programs to protect and improve natural resources.	All the elements of the "Good" category, plus the plan has objectives for how to accomplish the goal.	All the elements of the "Better" category, plus outline separate elements to include in the Zoning Plan section of the Master Plan.
Natural Feature and Drain Setbacks *(Zoning Ordinance)*	*The ordinance creates a building setback of 25 feet from significant natural features.*	*All the elements of the "Good" category, plus the ordinance requires a vegetated buffer strip between buildings and significant natural features.*	*All the elements of the "Better" category, plus the ordinance requires more than 25-feet setback whenever feasible.*

At a minimum, local governments and conservation nonprofits should provide educational materials for property owners on the importance of protecting groundwater, the dangers of contamination, and what they can do to help protect groundwater through the management of their own properties. Local governments can work with other governmental agencies (primarily the Health Department) to review new development plans, provide educational materials, and to establish toxic material recycling programs. Local governments should establish goals and objectives for groundwater protection in their Master Plans and supplement these plans with adequate building and zoning regulations.

Amendments for Groundwater Protection

Following are guidelines for amending your community's Master Plan and Zoning Ordinance to include guidelines for protecting groundwater (see Table 4–14). For recommended plan and ordinance language regarding this topic, refer to Appendix A, on page A–13.

Master Plan

The Master Plan should include goals and objectives specifically for the protection of groundwater, which may include elements for the identification and proper containment of potentially hazardous substances, abandoned well capping, and the remediation of leaking underground storage tanks. The Master Plan should also include references to more detailed resources on groundwater protection, such as your community's county or district Health Department or the MDEQ.

Zoning Ordinance

Your community's Zoning Ordinance should be amended to include general regulations for the proper identification, storage, loading/unloading, and disposal of potentially hazardous substances. The Zoning Ordinance should also contain specific requirements in the Site Plan Review section for the location of hazardous substances being stored, the identification of general purpose floor drains (including the point of discharge), and underground storage tanks. Furthermore, the ordinance should reference state and federal laws for storage, spill prevention, record keeping, and emergency response.

C. Resource Protection Methods for Protecting Water Quality

The techniques described in this section relate to resource protection. There are many levels of protection within each technique; however, they all focus on protection of water quality in some regard. There are levels of protection, because every community has a different capacity to implement such techniques. The techniques below range from minor to major changes in a community's Master Plan and/or Zoning Ordinance.

Table 4–14: Best Management Practices – Protecting Groundwater

Best Management Practices			
	GOOD	**BETTER**	**BEST**
Protecting Groundwater (Master Plan)	The Master Plan has a goal to protect groundwater from contamination.	All the elements of the "Good" category, plus the plan has objectives for how to accomplish the goal.	The "Better" approach may be the highest needed for this practice.
Protecting Groundwater *(Zoning Ordinance)*	*The ordinance has a Site Plan Review standard that sewage disposal and water supply shall remain safe during a development.*	*The Zoning Ordinance includes groundwater protection standards within the Site Plan Review.*	*The "Better" approach may be the highest needed for this practice.*

Resource Protection Overlay Districts

What is a Resource Protection Overlay District?

A jurisdiction that has significant natural features within its boundaries that may or may not be adequately protected under State laws, may want to adopt local regulations for preserving these natural features. A Resource Protection Overlay District is an effective way of doing this. Overlay districts help to eliminate confusion about the location of natural features by visually defining which areas are being protected and establishing what types of uses can occur within or adjacent to them. An overlay zone is a district that lies on top of other underlying districts, such as the floodplain overlay zone in Figure 4–4. Land within the boundaries of overlay zones is subject to more stringent development conditions, or may be restricted from development entirely.

Potential natural features to include in a Resource Protection Overlay Zone are:

- Floodplains;
- Wetlands;
- Woodlots;
- Lakes, rivers, streams, and abutting parcels;
- Endangered or threatened species habitats;
- Areas identified for high groundwater recharge potential;
- Steep slopes and erodible soils;
- High-risk erosion areas;
- Critical dune areas (CDAs);
- State designated environmental areas; and
- Prime agricultural land.

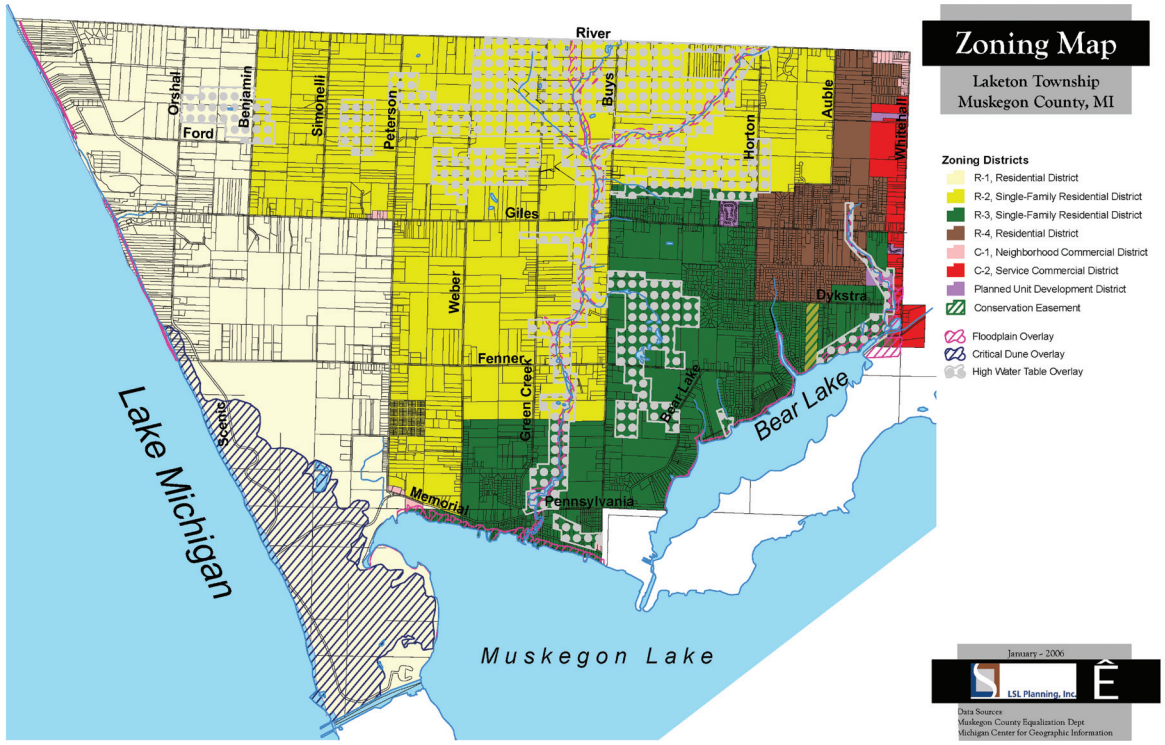
Resource Protection Overlay Districts will typically contain trees, scrub/shrub cover, and other natural vegetation that can help slow down pollutants from reaching waterways. Resource protection areas help prevent impacts, such as stream bank and channel erosion, habitat destruction, and a decrease in a stream's biological diversity.[6]

What is Protected?

The State of Michigan has statutes in place to protect critical dune areas and environmental areas (EAs). Part 353, Sand Dunes Protection and Management, of the Natural Resource and Environmental Protection Act (NREPA), created approximately 70,000 acres of CDAs (See Figure 4–5). The Sand Dune Protection and Management provisions require a permit from the MDEQ if the proposed project is more likely than not to increase erosion or decrease the stability of the CDA, and whether there will be significant or unreasonable depletion or degradation of the diversity, quality, or functions of the CDA.[7] There is nearly 250,000 acres of dunes not designated as CDAs and there are no regulations to protect these dunes

6. What is a Resource Protection Area?, Henrico County, Virginia: http://www.co.henrico.va.us/works/what-is-a-resource-protection-area.html.
7. Amendments to the Critical Dune Area Statute, MDEQ: http://www.michigan.gov/deq/0,4561,7-135-3311_4114_4236-284824--,00.html.

Figure 4–4: Sample Floodplain Overlay Map



Source: Laketon Township Zoning Ordinance.

unless local governments have implemented protection measures of their own.

Additionally, the State of Michigan has identified approximately 275 linear miles of Great Lakes shoreline as essential wildlife and fish habitats, or environmental areas (See Figure 4–6). The approximately 118 environmental areas represent around 8.5 percent of Michigan's Great Lakes shoreline.

An EA designation is limited to areas up to 1,000 feet landward of the ordinary high water mark of a Great Lake, or 1,000 feet of the ordinary high water mark of lands adjacent to waters affected by levels of a Great Lake. If the EA boundary encompasses an entire parcel, a 12,000 square feet structure zone is identified where construction can be permitted. The goal of an EA is to limit or prohibit the area from human disturbance, and specifically the following activities are not allowed without a permit:

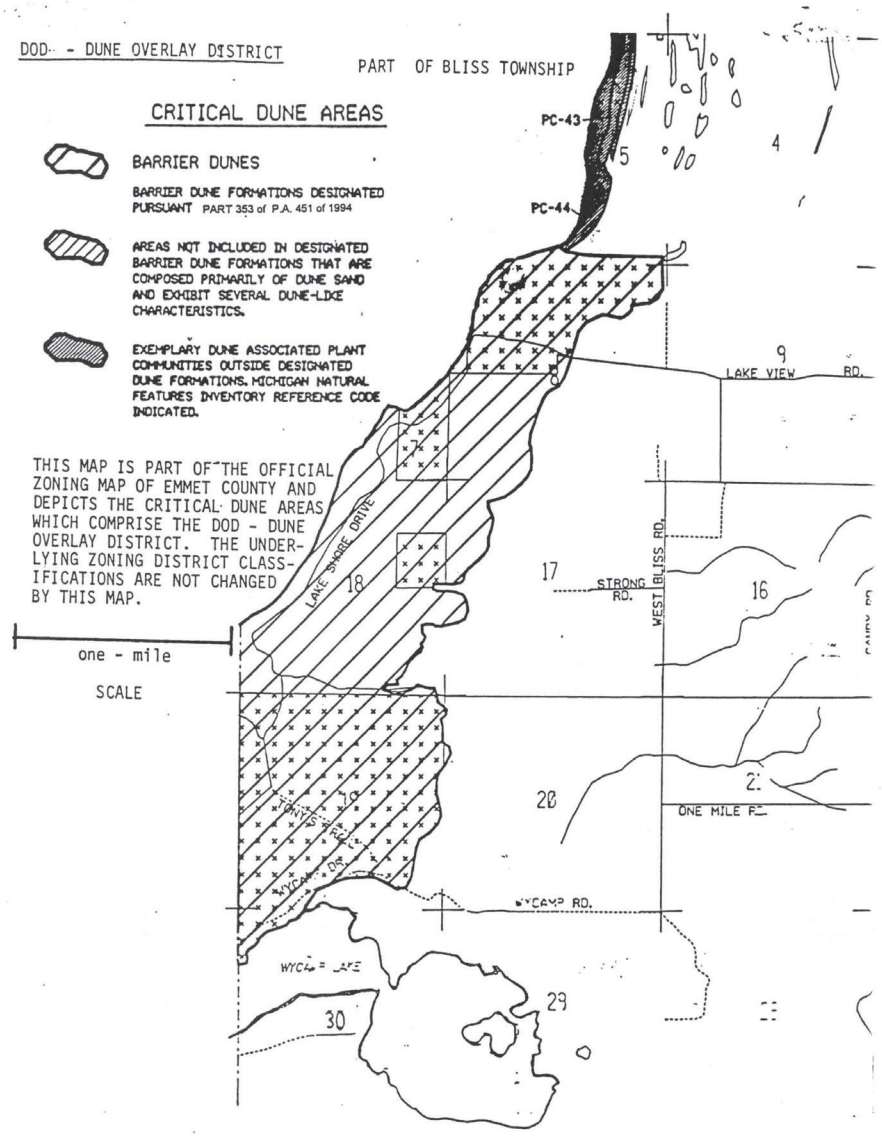
- Vegetation removal;
- Dredging, filling, or in any way altering the soil;
- Alteration of drainage;
- Timber harvest in a colonial bird nesting area; and
- Placement of a permanent structure.

However, along with sand dunes, there are thousands of acres of shoreline natural habitats that are unprotected unless a local government has resource protection ordinances.

Amendments for Resource Protection Overlay Districts

There are a range of levels of regulation when it comes to resource protection; however, the first step will always be to identify which resources need protecting. Contemporary Master Plans typically include an environmental inventory map (See Part A, on page 4–5) of the entire jurisdiction that identifies many of the resources listed above. Overlay districts can be created by designating boundary lines around the resources the community intends to protect using the environmental inventory map; this should be done in a way that gives an adequate buffer space that will ensure the resources in question remain undisturbed.

Figure 4–5: Sample Map of Critical Dunes



Source: Emmet County Zoning Ordinance.

Once the community has identified which natural resources need protection, a goal should be placed in the Master Plan to create one or more resource protection overlay districts (see Table 4–15). This would be followed by the creation of a text amendment for each Resource Protection Overlay District within the Zoning Ordinance that has additional development regulations depending on the resource that is to be protected. This procedure is best completed with trained staff or consultant that can identify resources that need protecting and implement the ordinance once established.

For jurisdictions without the capacity to create or enforce regulations in an overlay zone, implementing the coordinated permitting ordinance language would suffice in having "Good" Zoning Ordinance resource protection (See the Essential Elements section for more on coordinated permitting).

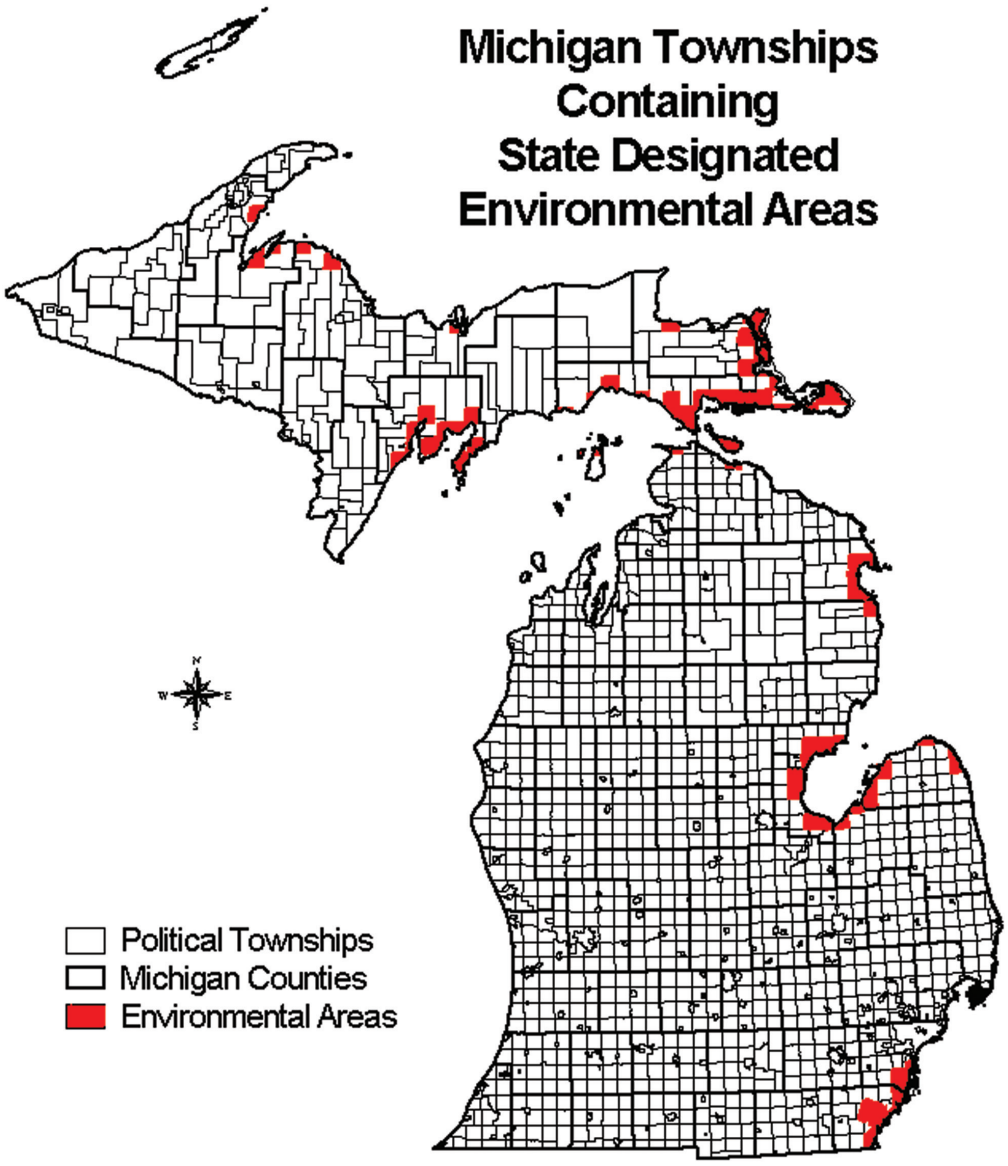
There are other ways to protect specific natural resources. The following sections look into other ways local governments can protect floodplains, woodlands, and wetlands. See Appendix A, on page A–14.

Floodplains

What are Floodplains?

On occasion, a river, stream, or lake may overflow its banks and inundate adjacent land areas with flood water. The area that may be inundated with water is called a floodplain. The term "floodplain" is defined by the land area

Figure 4–6: Sample Map of State Environmental Areas



Source: Michigan Department of Environmental Quality.

that will be inundated during a 100-year flood. A 100-year flood is one that has a one percent chance of occurring in any given year.

Floodplains are regulated under Part 31 Water Resources Protection of NREPA, P.A. 451 of 1994, as amended. The purpose of Part 31 is to assure that the flow carrying capacity of a watercourse is not harmfully obstructed, and that the floodway portion of the floodplain is not used for residential construction. The floodway is the channel that carries most of the flow during a flood. Any development within the floodplain could cause floods to rise higher. Floodplains are also regulated federally through the Federal Emergency Management Agency (FEMA). The FEMA manages the National Flood Insurance Program (NFIP), which has three components:

1. Flood Insurance;
2. Floodplain Management; and
3. Flood Hazard Mapping.

A city, village, or township can join the NFIP, which would enable its residents to obtain subsidized flood insurance. For more information regarding the services provided by FEMA, visit their website at:

http://www.fema.gov/about/programs/nfip/index.shtm.

Table 4–15: Resource Protection Techniques – Resource Protection Overlay Districts

Resource Protection Techniques			
	GOOD	**BETTER**	**BEST**
Resource Protection Overlay Districts	The Master Plan includes a goal to create an overlay zone to protect valuable natural features.	All of the elements in the "Good" category, plus the Master Plan adds objectives for how to accomplish the goal.	Only after conducting a full natural features inventory, and including appropriate maps in the Master Plan, the Planning Commission may find it desirable to create a new Natural Features Protection Overlay District, similar to the existing Floodplain Overlay District. It could be targeted to protecting existing wetlands and/or woodlands.

Why is a Floodplain Ordinance Important?

As the amount of prime buildable land decreases, future construction begins to move to land that is not as well suited for construction. In addition, the loss of wetlands in and outside of floodplains intensifies flood events, because there are fewer places to hold water. Wetlands can hold up to 1.5 million gallons of floodwater per acre, depending on conditions. When they are destroyed, the water cannot be effectively absorbed, which leads to increased flooding.

Floodplain ordinances seek to preserve floodplains and reduce risks and hazards to humans and property. Floods are a powerful natural force; therefore, land use decision makers should anticipate floodwaters and plan for them accordingly. Typically, communities place low-intensity land uses along floodplains so that property and financial damage is minimized. Such land uses include parks, boardwalks, trails, and environmental education stations.

Protecting Floodplains

As with other local ordinances adopted in accordance with NREPA, floodplain ordinances are bound to the provisions of the statue. However, there are several levels of protection that local communities can offer (see Table 4–16). For example, a Master Plan should include a floodplain map that identifies land subject to flooding. In addition, the Master Plan may include any of the following measures/goals:

- Enroll in the FEMA National Flood Insurance Program;
- Educate the public on floods and floodplains; and
- The creation of a Flood Hazard Overlay Zone.

In addition to a floodplain map, the Master Plan should address goals to protect landowners from floods, which will be the basis for creating a Floodplain Overlay Zone in the Zoning Ordinance, if the local community chooses to increase their level of protection. See Appendix A, on page A–14.

Woodland Protection

Why Regulate Woodlands?

The State of Michigan is very fortunate to have an abundance of woodlands. Woodlands are not only aesthetically pleasing, but they also offer many quality-of-life benefits. Tree canopies surrounding a property can help lower heating and cooling costs of a home by 8–10 percent. In addition, a U.S. Department of Energy study found that a 100-foot wide and 45-foot tall patch of trees can reduce noise levels by 50 percent.

Table 4–16: Resource Protection Techniques – Floodplains

Resource Protection Techniques			
	GOOD	BETTER	BEST
Floodplains	A floodplain map is included in the environmental inventory.	A FEMA approved 100-year flood map is available either in the Master Plan or at the Community Hall.	The "Better" approach may be the highest needed for this practice.

Trees are also beneficial to the environment; their roots help stabilize soils and prevent flooding and stream bank erosion. A USDA Forest Service report also found that a forest can help reduce peak storm runoff by 10–20 percent, and less runoff results in better water quality. Finally, protecting woodlands also helps preserve natural habitats. Outdoor activities, such as camping, bird watching, hiking, photography, in addition to many other recreational activities, would not be possible without preserving our woodlands. Many suburban communities, cities, and villages have few woodlands left. Those that remain are often near waterways and wetlands and are important to protect.

Amendments to Promote and Enforce Woodland Protection

There are many ways a local government can help protect woodlands. As mentioned earlier, a Resource Protection Overlay District could be created, which could encompass woodlots, wetlands, and water courses in one ordinance. Local leaders could also help property owners with woodlots to contact land conservancies in order to put a conservation easement on their property. But the most important measures are simple education through the Master Plan and then if the community has the administrative capacity and political will, zoning measures could be put in place. See Table 4–17, and Appendix A, on page A–14.

Wetland Protection

What are Wetlands?

Wetlands are areas of land that are year-round or seasonally inundated with water and are characterized by plant life suited to these conditions; such as Rushes and flowers like Milkweed. Soil conditions in these lands are characteristically classified as "hydric soils;" these are often poorly suited to building on due to their highly organic composition and ease of water saturation. Additionally, wetlands are diverse ecosystems that offer habitats for many of Michigan's plants and animals.

Table 4–17: Resource Protection Techniques – Woodland Protection and Reforestation

Resource Protection Techniques			
	GOOD	BETTER	BEST
Woodland Protection and Reforestation: (Master Plan)	The Master Plan has a goal to identify places where woodland protection, restoration ,or development of a Woodland Management Plan should take place.	All of the elements in the "Good" category, plus Master Plan adds objectives for how to accomplish the goal.	The "Better" approach may be the highest needed for this practice.
Woodland Protection and Reforestation *(Zoning Ordinance)*	*Prohibit tree cutting of more than "X" living trees and soil removal without an approved plan. ("X" is decided by the community.)*	*All of the elements of the "Good" category, plus require protection of existing woodlots as new residential subdivisions and development along waterways occurs.*	*The "Better" approach may be the highest needed for this practice.*

Wetlands over five acres in size are protected under Part 303 of the Natural Resources and Environmental Protection Act; however, smaller, non-coastal wetlands are not provided for, so developing local policies and practices that protect and restore wetlands should be a priority for communities with the staff capacity to administer wetland regulations.

The Michigan Department of Environmental Quality's website provides county-wide wetlands maps in PDF and ArcGIS shapefiles format, as well as an online interactive mapping system called the Wetland Map Viewer. All of these resources can be found at:

http://www.michigan.gov/deq/0,1607,7-135-3313_3687-11178--,00.html.

These maps are also commonly on file in paper format with the County Clerk, the county extension office, and the county register of deeds. However, these maps are *not* intended to be used to determine specific locations and jurisdictional boundaries for regulatory purposes. Only an on-site evaluation by the MDEQ, or a person trained in wetlands identification can be used for regulatory determinations.

Why Protect Wetlands?

In addition to their ecological benefits, wetlands function as natural sponges for stormwater runoff following periods of significant rainfall, thereby reducing the burden placed on stormwater infrastructure and lowering the chances of floods. Successfully utilizing wetlands as a form of "green infrastructure" has the potential to lower the cost associated with expanding and replacing traditional stormwater infrastructure.

Amending Your Master Plan and Zoning Ordinance

The Master Plan and Zoning Ordinance language that is proposed for natural features setbacks will adequately protect, restore, and create wetlands (see Table 4–18). The Master Plan language includes adding a goal and objectives for amending the Zoning Ordinance at a future date and encourage the use of vegetated filters within setback areas. The Zoning Ordinance can be amended to utilize buffer requirements at various distances to help protect natural features, including wetlands. Please refer to Appendix A, on page A–12, for natural features plan and ordinance language.

Conservation Easements

What is a Conservation Easement?

Fundamentally, a conservation easement is a transfer of certain use rights for the purpose of conservation. Protection occurs by separating the right to development from the other property rights for an extended period of time. The property owner still maintains legal ownership of the land and may continue the current land use, and in return, the property owner commonly receives significant state and federal tax advantages.

In order to qualify for tax benefits, the conservation easement must be donated to a governmental unit, or a qualifying conservation or historic preservation organization. The State of Michigan has an Agricultural Conservation Easement program that will reduce State

Table 4–18: Resource Protection Techniques – Wetland Protection/ Restoration/Creation

Resource Protection Techniques			
	GOOD	**BETTER**	**BEST**
Wetland Protection/ Restoration/Creation	There is nothing to add, as long as the "Good" language for Natural Feature and Drain Setbacks has been added.	There is nothing to add, as long as the "Better" language for the Natural Feature and Drain Setbacks has been added. Master Plan adds objectives for how to accomplish this goal.	Unless there is local capacity to administer a full Natural Features Protection Ordinance (which is rare in rural areas), the "Better" approach is the appropriate solution for this practice.

property taxes if the application for the easement program is accepted for the specific property. A parcel accepted for its conservation qualities would be defined as an area in its present condition that would conserve natural or scenic resources, including:

- The promotion of the conservation of soils, wetlands, and beaches;
- The enhancement of recreation opportunities;
- The preservation of historic sites; and
- Idle potential farmland of not less than 40 acres that is substantially undeveloped, and because of its soil, terrain, and location is capable of being devoted to agricultural uses as identified by the MDARD.

For more information please visit:

http://www.michigan.gov/mdard/0,4610,7-125-1567_1599_2558-146458--,00.html.

In Michigan, there are many qualifying not-for-profit organizations dedicated to land preservation. The Saginaw Basin Land Conservancy is one of those organizations. Other regional nonprofit conservation programs are based in communities throughout the Midwest.

Why Use Conservation Easements?

Conservation easements can help maintain vegetated areas, wetlands, and floodplains in an undisturbed or minimally disturbed condition, which helps precipitation soak into the ground, and helps filter or store runoff. They have benefits for the landowner and the community. Farmland conservation safeguards access to local foods, as well as ensuring that these local farms will not contribute to urban sprawl. In addition, all the benefits mentioned previously regarding woodlands, wetlands, open space, and wildlife habitats would also be realized through conservation easements.

Amending your Master Plan

Conservation easements are a voluntary implementation technique; therefore, they can only be encouraged, not required (see Table 4–19). A local government's role is to make the process as painless as possible.

The environmental inventory within the Master Plan can help identify critical natural resources in need of protection. The Master Plan can also explain the benefits of conservation easements and provide contact information. See Appendix A, on page A–15.

D. Public Education

An informed community is perhaps one of the most effective defenses against water pollution. By educating the public about the sources of water pollution and teaching them how to prevent conditions that lead to the impairment of their water resources, the local government is engaging in a non-regulatory strategy that effectively reduces the potential for expensive remediation efforts. Of the recommendations put forth in this guidebook, public education techniques are perhaps the least invasive. They require no additional regulations or changes to local ordinances. They are simply guidelines

Table 4–19: Resource Protection Techniques – Conservation Easements

Resource Protection Techniques			
	GOOD	**BETTER**	**BEST**
Conservation Easements	The Master Plan has a goal to encourage landowners and businesses to use land donation, conservation easements, deed restrictions, and targeted land purchases to protect sensitive natural features and other natural resources.	All of the elements in the "Good" category, plus the Master Plan adds an objective for how to accomplish the goal.	All the elements in the "Better" category, plus the Master Plan adds an additional objective.

in the Master Plan that outline a strategy for engaging with the community and connecting them with the resources available to help people make good choices with regard to environmental protection in general and water quality in particular.

Agricultural Education and Outreach

Why Engage in Agricultural Education and Outreach?

In rural areas, stormwater runoff from agricultural land is often the primary source of water pollution. Pesticides, fertilizers, and animal waste from feed lots all have a negative impact on water quality when it is carried off farmland. It is important to reduce the impact through the use of Generally Accepted Agricultural and Management Practices, or GAAMPs. The GAAMPs are best practices developed with assistance from the farming community that take rational steps towards reducing pollution loads in agricultural runoff. They are also serve to protect the fertility of agricultural lands, protecting the economic vitality of farmers. These techniques are grouped into categories for the general type of farming activity being conducted. Current GAAMPs include the following:

- Manure management/utilization;
- Site selection (for Concentrated Animal Feeding Operations);
- Care for farm animals;
- Nutrient utilization;
- Irrigation water use;
- Pesticide utilization/pest control;
- Cranberry production; and
- Farm markets.

Photo 4–4: A farm market on an MAEAP-verified farm.

These practices are discussed in further detail on the MDARD's website and are recommended reading for all farmers and rural land use decision makers. Assistance with understanding and implementing these techniques can be found at your community's local MSU Extension office or Natural Resources Conservation Service district office.

Amending the Master Plan to include Agricultural Education and Outreach

Amending your community's Master Plan for agricultural education and outreach begins with adding a goal on the topic (see Table 4–20). To do this, your community should develop a goal of educating the farming community on the benefits of utilizing GAAMPs, followed up by objectives for coordinating with local nonprofit partners that specialize in land use and agricultural outreach. The intended audience for this strategy should be the agricultural community at-large and should specify that these techniques, while highly recommended, are voluntary. Language for this technique should be fairly general in regard to applications; deferring to the expertise of these organizations to work with landowners on a case-by-case basis, and should not attempt to prescribe any specific techniques generally. See Appendix A, on page A–15.

Preserving Open Space

What is Open Space Preservation?

Open space preservation is the practice of leaving a portion of land free from the pressure of development through different approaches, such as planned unit developments (PUDs) or conservation easements as described earlier. Other land use strategies like Purchases or Transfers of Development Rights (PDR and TDR, respectively) are other approaches (See Figure 4–7). Open space preservation does not necessarily mean keeping land entirely "undeveloped," as it can also include farmlands and developed "green space."

Why Should Your Community Preserve Open Space?

As stated in the section on Best Management Practices, keeping the overall percentage of impervious surfaces low in the watershed is essential for maintaining water quality. Preserved open space ensures that a portion of land will remain in a natural state and ensures that the imperviousness of the landscape of the area remains low.

However, not all open space is created equal; land in a completely natural state, such as prairies with deep-rooted native vegetation, or woodlands, are optimal conditions for open spaces. Totally natural conditions like these manage stormwater to a much higher degree than developed land; reducing runoff potential by approximately 50 percent better than an area with rural land covers (10–20 percent impervious) and approximately 66 percent better than suburban land covers (25–50 percent impervious)[8]. Having open space with well-established vegetation helps mitigate the volume of stormwater and filters out pollutants and debris that would otherwise end up in our waterways.

Amendments to Include Education on Open Space Preservation

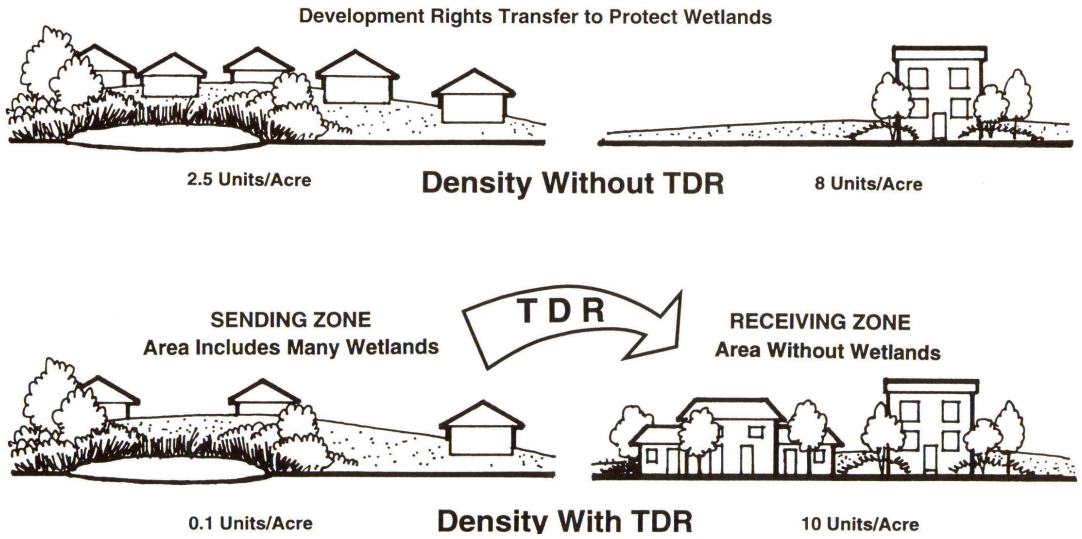
Follow the instructions provided in the section on Conservation Easements and follow this up with education on other resources, such as model PDR/TDR programs, farmland preservation, and transitional zoning techniques, or model ordinances for conservation subdivisions and Open Space PUDs. See Table 4–21, and Appendix A, on page A–16.

8. Urban Water Cycle, Rain Garden Network: http://www.raingardennetwork.com/urban.htm.

Table 4–20: Public Education – Agricultural Best Management Practices

Public Education	
	MASTER PLAN GOALS:
Agricultural BMPs	Support and encourage best management practices for agriculture that respect the environment and protect water quality.

Figure 4–7: Transfer of Development Rights



Source: Planning & Zoning Center, Inc., 1995.

Table 4–21: Public Education – Open Space Preservation

Public Education	
	MASTER PLAN GOALS:
Open Space Preservation	The preservation or provision of open space and native vegetation helps retain the natural character of the community and reduces negative impacts of development on water quality. Open space should be encouraged on every site.

Water Quality Monitoring

What is Water Quality Monitoring?

Public beaches, recreational rivers, and streams are often monitored by county and district Health Departments for bacterial contamination. Other water quality measures that can be monitored, and which help give a picture of the quality and safety of water include turbidity, oxygen content, nutrients, heavy metals, chlorophyll-a, and other measures.

Why Should Your Community Provide Education on Water Quality?

Local communities can establish water quality monitoring programs to inform residents of the quality of water in streams, rivers, and lakes, and whether water quality is getting better, declining, or remaining the same. Often, volunteer groups help perform water quality sampling. Private and public testing labs then determine levels of pollutants and other characteristics of the samples. It is important that when test results are completed, that the community makes those results publicly available so residents can make informed decisions about whether to use the water for various household or recreational uses. With water quality information, residents can also adopt water quality protection behaviors and work toward community actions to improve and protect water quality. It is important for residents to understand that it can be easier to protect high-quality water than to restore poor-quality water to a good condition.

Amendments to Include Education on Water Quality Monitoring

The Master Plan should identify sources for water quality information and credit organizations or public agencies that monitor the quality of surface water in and around the community. At the very least, the plan should refer individuals to a resource (most commonly a website) that posts periodic updates on the quality of the water resources in question. Additional resources, such as those provided

by the local Health Department, may provide information on the dangers associated with full and partial-body contact with contaminated waters and how to take proper precautions to avoid health risks. Going a step further, a community may opt to coordinate with nonprofits and other government agencies to host public education events related to water quality or develop outreach programs to target the public. See Table 4–22, and Appendix A, on page A–16.

Drain Maintenance, and Road and Stream Crossings

Why is Education on Drain Maintenance, and Road and Stream Crossings Important?

A significant source of sedimentation in our drains results from where roads and driveways intersect with streams. The stream crossings may be a bridge over a river or a simple culvert over a creek, but in either case, poorly designed erosion control will almost certainly result in soil erosion around the structure and sedimentation into the waterway. Soil erosion has the potential to lower the integrity of the structure, causing dangerous conditions for traffic and the resulting sedimentation may cause a backup in the drain, resulting in buildups of debris and flooding. In both situations, the remedies tend to be expensive, inconvenient, and entirely avoidable through better design and construction. Most commonly, these methods target rural landowners with large tracts of land and the means to "do-it-yourself" installation of culverts, and so connecting these landowners to professional resources, like the County Road Commission or the Drain Commissioner, will benefit all parties involved. Permits are required prior to such work, but often are not obtained.

Amending the Master Plan

Adding basic language to the Master Plan's environmental resource section on coordination with soil erosion and sedimentation authorities is a simple first step. Language should direct anyone doing a significant amount earth change activity to contact the county's SESC enforcing agent. Language should inform landowners that engaging in earth change activities in and along a designated county drain requires them to obtain an SESC permit from a specified authority. To obtain an SESC permit, a landowner will have to demonstrate

Photo 4–5: An old road crossing of a river that prevented fish passage and allowed sediment to pollute the river.

Photo 4–6: The bridge that replaced the road culvert river crossing in Photo 4–5 protects the river from sediment and reconnects the fishery to the Great Lakes.

Table 4–22: Public Education – Water Quality Monitoring

Public Education	
	MASTER PLAN GOALS:
Water Quality Monitoring	The Planning Commission and the Zoning Administrator will take advantage of opportunities to educate citizens, property owners, and other local government officials on the status of water quality, and the values and benefits of water quality protection.

an adequate design and demonstrate how sediment will be managed during the construction process. Typically, County Drain Commissioners and Road Commissions are the local enforcing agents for SESC permits and usually the most experienced in culvert construction and maintenance, so referring individuals to these authorities is a good idea. See Table 4–23, and Appendix A, on page A–16.

Table 4–23: Public Education – Drain Clearing, Road and Bridge Repair, and Stream Crossings

Public Education	
	MASTER PLAN GOALS:
Drain Clearing	Promote education about, and the coordination of, drain maintenance activities with public and private landowners for the implementation of BMPs to reduce soil erosion and sedimentation of drains and other water bodies.
Road and Bridge Repair, and Stream Crossings	Promote education about, and the coordination of, road and bridge repair, and stream crossing construction activities with public and private landowners for the implementation of BMPs to reduce soil erosion and sedimentation of drains and other water bodies.

Appendices

Photo A–1: Good quality streams are health and economic assets for rural communities.

Appendix A:
Master Plan and Zoning Ordinance Sample Language

ESSENTIAL ELEMENTS

Low Impact Development – Master Plan

Good Approach

Insert language as a goal within the Master Plan.

> **Goal:** New development and redevelopment projects should incorporate low impact development (LID) approaches. These approaches include the reduction of hard or impervious surfaces, the use of vegetation to filter runoff from developed or cleared areas, and the use of natural swales to convey and filter stormwater.

Better Approach

Include the goal in the "Good" approach, but also insert language below within the environmental/natural resources section of the Master Plan.

- One of the most cost-effective ways to accommodate new development and redevelopment projects with the least impact on the environment is by means of LID approaches. Low impact development is a set of approaches to stormwater management that are designed more like how nature handles stormwater than highly engineered and constructed systems. The LID approaches tend to be much less expensive for developers and public agencies, do more to purify stormwater, protect groundwater and surface sources of water for domestic use, reduce the temperature of stormwater to protect fisheries, and contribute to a natural or rural scenic quality than conventionally engineered stormwater systems.

  The LID approaches include the reduction of hard or impervious surfaces, the use of vegetation to filter runoff from developed or cleared areas, and the use of natural swales to convey and filter stormwater and simultaneously allow it to soak into the ground.

Best Approach

The language in the "Better" approach may be the highest needed for this element of the Master Plan.

Environmental Inventory – Master Plan

Good Approach

The environmental inventory should, at a minimum, identify existing conditions and issues for major water courses, minor and major drains, hydrologic soils, and other significant natural features.

Better Approach

Insert language as a goal within the Master Plan.

> **Goal:** Consider natural features maps and maps of existing natural resources when planning areas for future land uses or public infrastructure, when considering proposed amendments to the Master Plan or Zoning Ordinance, and when considering application for any new public or private uses of land or public buildings.

Best Approach

Insert the "Better" approach, plus the following:

> **Objectives:**
> The Planning Commission will:
>
> - Use natural features maps, and maps of existing natural resources to plan for future land use, infrastructure, and economic development.
> - Update the Zoning Ordinance to include further consideration of natural features and natural resources on amendments and Site Plan Review decisions.

Water Quality – Master Plan

Good Approach

Insert language as a goal within the Master Plan.

> **Goal:** Preserve and enhance [or protect from contamination and restore where polluted] natural and environmental resources and the quality of surface and ground water of (NAME OF JURISDICTION) for all current and future residents.

Better Approach

Include the goal in the "Good" approach, but also insert language that follows within the environmental/natural resources section. (The following example is from a specific community. In your community's Master Plan, refer to water quality issues specific to your community and/or regional watershed.)

- The Saginaw Bay is a federal-designated Area of Concern, because degraded water quality conditions have impaired a number of beneficial uses. It is up to the community and all other jurisdictions within the 22 counties that are a part of the Saginaw Bay Watershed, to protect its water courses from nonpoint source pollution, and, hence, help reduce sediment and soil erosion from further contaminating the Bay.

Best Approach
Same as the "Better" approach, plus indicate what measures should be taken to accomplish this goal, such as referring to the proposed zoning measures outlined in the Zoning Plan section of the Master Plan or including objectives, such as those below

Objectives:

- Our Community will ensure that as future development occurs, LID approaches for managing stormwater will be encouraged/ required to be used where feasible.

- Our Community will provide guidelines for the safe and responsible storage and use of hazardous chemicals and waste products in the community.

Water Quality – Zoning Ordinance

Good Approach
Insert language into the Purpose section of the Zoning Ordinance.

SECTION 102: PURPOSE

A. Protect the character of the community and enhance the social and economic stability of the Township and individual zoning districts as herein set forth.

1. Protect natural features, ground, and surface waters from pollution.

Better Approach
The "Good" approach may be the highest needed for this element.

Best Approach
The "Good" approach may be the highest needed for this element.

Coordinated Permitting – Master Plan

Good Approach
Insert language as a goal within the Master Plan.

Goal: The Zoning Administrator will not issue Zoning/Land Use permits nor shall the Building Administrator issue building permits until evidence that all other permits required from other agencies have been received.

Better Approach
Insert the "Good" approach, plus the following:

Objective: Obtain the current MDEQ Environmental Permits Checklist and insert all the local agency contacts information and place on the counter of the offices of the Zoning Administrator and Building Inspector.

Best Approach
Insert language as a goal within the Master Plan.

Goal: The Planning Commission will help establish a coordinated permit system among local, county, and state government, including a Site Plan Review, to ensure water quality protection standards are met and development activities proceed without unnecessary burden on private interests.

Objectives:

- Amend the Zoning Ordinance to provide that no zoning/land use permit, special use permit, or any other permit authorized under the Zoning Ordinance will be issued by the Zoning Administrator for a project until all other required agency approvals have been granted, or that any zoning or other permit under the Zoning Ordinance shall only be issued conditioned on the receipt of valid permits from certain specified agencies within a specified time.

- The coordinated permit system will involve staff of the following agencies, depending on the jurisdiction: county zoning, county building, county soil erosion and sedimentation control,

county drains, the County Road Commission, the Michigan Department of Transportation (MDOT), the U.S. Army Corps of Engineers (USACOE), the Michigan Department of Environmental Quality (MDEQ), and any other pertinent local authority.

- The coordinated permit system will include the following elements: 1) a quick determination that all required information has been received from the applicant for all the agencies involved; 2) a commitment from each agency to review permits within a reasonable, specified period of time; 3) a commitment by each agency to share review comments and where feasible work out differences; 4) a commitment by all agencies to coordinate responses back to the applicant (usually through conditional approvals); 5) a commitment by all agencies to make final decisions in timely fashion (usually after an applicant submits revised documents that meet ordinance/code requirements); and 6) a Zoning Ordinance provision that provides no zoning/land use permit, special use permit, or any other permit authorized under the Ordinance will be issued by the Zoning Administrator for a project until all other required agency approvals have been granted, or that any zoning or other permit under the Ordinance shall only be issued conditioned on the receipt of valid permits from certain specified agencies within a specified time.
- A lead agency will be designated and that agency will coordinate joint meetings to consider project requests involving many county permits.
- The lead agency will also coordinate review with other agencies that might be involved, such as agencies within the MDEQ, the MDOT, USACOE, and others as appropriate.

Coordinated Permitting – Zoning Ordinance

Good Approach

Insert into General Provisions section, or where applicable.

> SECTION _.__. PERMIT COORDINATION
> All land uses and construction activities shall conform with the provisions of this Ordinance, and all applicable local, county, state, and federal regulations, including, but not limited to, those listed below. Prior to the issuance of a Building Permit, Zoning/ Land Use Permit, Special Approval Use Permit, or other permit required under this Ordinance, there shall be submitted to the Zoning Administrator the following approved permits in all cases where such permits are required, or applicable:
>
> A. Driveway permit, including approved culverts, where necessary, as approved by the County Road Commission or the MDOT, as applicable.
>
> B. Septic system permit approved by the [county or district] Health Department.
>
> C. Soil erosion and sedimentation control permit from the local SESC permitting agency.
>
> D. Floodplain permit from the Zoning Administrator.
>
> E. Wetland permit from the MDEQ.
>
> F. Erection of towers or communication equipment from the Federal Communications Commission.
>
> G. Other permits from local, county, state, or federal authorities as pertinent, such as transport, storage, use, and/ or disposal of hazardous substances, waste, or other materials.
>
> H. Any other permits except a Building Permit, which cannot be obtained until a Zoning/Land Use Permit is obtained from the Zoning Administrator.

Better Approach

Insert into the General Provisions section, or where applicable.

> SECTION _.__ DRIVEWAY, SEPTIC, SOIL EROSION, FLOODPLAIN, AND OTHER PERMITS
> All land uses and construction activities shall conform with the provisions of this ordinance and all applicable local, county, state, and federal regulations, including, but not limited, to those listed below. Prior to

the issuance of a Building Permit, Zoning/ Land Use Permit, Special Use Permit, or other permit required under this Ordinance, there shall be submitted to the Zoning Administrator the following approved permits in all cases where such permits are required, or applicable:

A. Driveway permit, including approved culverts, where necessary, as approved by the County Road Commission or the MDOT, as applicable.

B. Septic system permit approved by the [county or district] Health Department.

C. Soil erosion and sedimentation control permit from the local SESC permitting agency.

D. Floodplain permit from the County Building and Zoning Department.

E. Wetland permit from the MDEQ.

F. High-risk erosion area permit from the MDEQ.

G. Designated environmental area permit from the MDEQ.

H. Bottomlands, shorelines or coastal wetlands permits from the USACOE.

I. Erection of towers or communication equipment from the Federal Communications Commission.

J. Erection of tall buildings or structures within an airport approach zone, from the airport authority.

K. Other permits from local, county, state, or federal authorities as pertinent, such as transport, storage, use, and/ or disposal of hazardous substances, waste, or other materials.

L. Building Permit addressing requirements of the State Construction Code from the County Building and Zoning Department.

Best Approach

Insert the "Better" approach, plus the following:

SECTION _.__ COORDINATED PERMITTING

On any application requiring review and/ or approval of another agency in addition to the approving entities authorized by this Ordinance, the Zoning Administrator shall do the following:

A. Coordinate permit review with the County Building Permit staff, the County Soil Erosion and Sedimentation Control staff, the County Drain Commissioner, the County Road Commission staff, the County Health Department staff, and any pertinent local authority, or any pertinent state or federal agency, including, but not limited to, the Michigan Department of Natural Resources (MDNR), the MDEQ, the MDOT, the U.S. Environmental Protection Agency (USEPA), or the USACOE.

B. Ensure that the above named or other pertinent agencies have a copy of the application and site plan, if any, within one week of a determination that it meets all the submittal requirements of the Zoning Ordinance. If one of the agencies indicates the application does not meet the submittal requirements of the rules or regulations of that agency, ask the applicant to submit an updated copy of the application and any site plan to all the agencies involved at the same time it is provided to an agency requesting updated or supplementary information.

C. Request review comments of each agency by the time specified in the ordinance for the nature of the request, or within two weeks of receipt of the application and any site plan from the Zoning Administrator, whichever comes first.

D. Schedule a meeting with the pertinent review agencies to go over comments received and determine what if any conditions are necessary under each set of rules or regulations in order to receive approval of the request. This shall include any conditions by one agency of approval of another agency.

E. Take action to approve, disapprove, or approve with conditions the application within the time specified

in the ordinance, or within the time specified in the agreement with the cooperating agencies. Such action may include conditional approval of a Zoning/Land Use Permit, Special Use Permit, or other permit under this Ordinance upon evidence that all other required permits have been received by the other pertinent agencies.

Earth Change Activity per SESCA – Master Plan

Good Approach

There is nothing to add as long as the "Good" language for Coordinated Permitting has been added.

Better Approach

Insert language as a goal within the Master Plan.

> **Goal:** Zoning regulations ensure new development and redevelopment protects water bodies and water quality by proceeding according to an approved Soil Erosion and Sedimentation Control Permit.

Best Approach

Insert the "Better" approach, plus the following:

- Zoning regulations ensure all new development projects are required to provide for on-site stormwater retention and use LID techniques where reasonable and feasible.
- Zoning regulations reflect that existing vegetation that is healthy and suitable for landscaping objectives and that reduces soil erosion and sedimentation, will remain undisturbed as new development occurs.
- Zoning regulations reflect that existing topography be respected and utilized to the advantage of proposed development, without resorting to massive excavation and drastic alteration. Zoning regulations should restrict uses permitted in steeply sloped areas to those which the existing terrain can accommodate without unreasonably presenting future threats of soil erosion, or unnecessary risks of new buildings cracking or slumping.

Earth Change Activity per SESCA – Zoning Ordinance

Good Approach

Insert into Site Plan Review section:

> SECTION _.__. SOIL EROSION AND SEDIMENTATION
> The proposed development shall include measures to prevent soil erosion and sedimentation during and after construction. All development within 500 feet of an inland lake or stream, or that proposes to expose more than an acre of soil shall obtain a Soil Erosion and Sedimentation Control Permit before undertaking land clearing, top soil removal, tree cutting or development unless the activity is exempt under the Natural Resources and Environmental Protection Act, as it is for bonafide agricultural activities.

Better Approach

In addition to the "Good" approach, insert the following language into General Provisions or where applicable.

> SECTION _.__ RESPECT EXISTING TOPOGRAPHY AND NATURAL VEGETATION
>
> A. All development within 500 feet of an inland lake or stream, or which proposes to expose more than an acre of soil shall obtain a Soil Erosion and Sedimentation Control Permit before undertaking land clearing, top soil removal, tree cutting, or development unless the activity is exempt under the Natural Resources and Environmental Protection Act, as it is with agricultural activities.
>
> B. All land development for which a Zoning/Land Use Permit is required shall attempt to incorporate low impact development solutions before employing more aggressive engineering solutions, including, but not limited to, the following:

1. All development applications shall demonstrate respect for existing topography and utilize it to the advantage of the proposed development, without resorting to massive excavation and drastic alteration except where lot characteristics and the characteristics of abutting land make such limited topographic change unreasonable. Steep slopes should be avoided for alteration or new building construction to prevent soil erosion and unnecessary risk of new buildings cracking or slumping.

2. Existing vegetation that is healthy and suitable for landscaping objectives and that would reduce soil erosion and sedimentation, should remain undisturbed as new development occurs to the extent that is reasonable under the circumstances.

C. The Zoning Administrator shall determine whether the requirements of sub-section (B) above have been met after consulting with the Soil Erosion and Sedimentation Control officer.

Best Approach
All of the "Better" approach, plus cross-reference section with regulation on setbacks from sensitive natural features.

Accumulation and Disposal of Waste – Master Plan

Good Approach
Insert a goal within the Master Plan.

> **Goal:** Prevent the accumulation of junk or other waste materials in ways or places that present actual or potential hazards to human health, pets or livestock, or to ground or surface water.

Better Approach
Insert the goal in the "Good" category into the Master Plan, plus add the following objectives.

> **Objectives:**

- The Zoning Ordinance should be amended, or local Junk and Blight Control Ordinances should be adopted and updated as needed to prevent blight and prohibit the storage of waste and other materials that are not in approved buildings, containers or other places authorized by law.

- Add a standard to the Site Plan Review section of the Zoning Ordinance, which requires new businesses storing hazardous materials, waste, fuels, salt, or chemicals to be designed to prevent spills and discharges of polluting materials to the surface of the ground, groundwater, lakes, streams, or wetlands.

Best Approach
The "Better" approach may be the highest level needed for this element.

Accumulation and Disposal of Waste – Zoning Ordinance

Good Approach
Insert language into General Provisions or where applicable.

> SECTION _.__. ACCUMULATION OF JUNK OR OTHER WASTE
> No junk or other waste shall be accumulated, stored, or placed outside of a building of any property except as specifically permitted under this Ordinance, or by any local ordinance.

Better Approach
Same as "Good" approach but specifically cross-reference the other ordinance(s) and other entities with regulatory authority (such as Public Health Department). Also, add language in the Site Plan Review section of the Zoning Ordinance shown under the Groundwater Protection – Zoning Ordinance in this Appendix, on page A–13.

Best Approach
The "Better" approach may be the highest level needed for this element.

BEST MANAGEMENT PRACTICES

Parcel Splits for Buildable Area – Master Plan

Good Approach

Insert a goal within the Master Plan.

> **Goal:** Prevent the creation of unbuildable lots on vacant land, as part of a lot split, subdivision, site condominium project, or planned unit development (PUD).
>
> *Or*,
>
> **Goal:** Review proposed lot splits for "buildability" to ensure that all new parcels and lots that are proposed to be created, meet the requirements of the Land Division Act, and minimum Zoning Ordinance requirements not only for lot frontage, depth and area, but also have enough buildable area for erection of a structure, plus well and on-site septic system if needed outside of a floodplain, wetland, or sensitive groundwater recharge area.

Better Approach

Insert the "Good" approach, plus the following objective:

> **Objective:** Include in the Zoning Ordinance and local lot split ordinances a provision requiring review of proposed lot splits for "buildability" to ensure that all new parcels and lots that are proposed to be created, meet the requirements of the Land Division Act, and minimum Zoning Ordinance requirements not only for lot frontage, depth, and area, but also have enough buildable area for erection of a structure, plus a well and on-site septic system if required outside of a floodplain, wetland, high-risk erosion area, designated sand dune, designated environmental area, and/or sensitive groundwater recharge area.

Best Approach

The "Better" approach may be the highest level needed for this element.

Parcel Splits for Buildable Area – Zoning Ordinance

Good Approach

Insert language into the General Provisions or where applicable

> SECTION _.__ LAND DIVISIONS AND ACCESS REQUIREMENTS
>
> A. All divisions/splits of land shall comply with the provisions of P.A. 288 of 1967 as amended by P.A. 591 of 1996, and P.A. 87 of 1997, being the Land Division Act, State of Michigan. Where land does not abut an existing public or private road or private easement, and a new access route is proposed, standards for the new access route(s) are noted below:
>
> 1. The legal description of the access route shall be recorded with the description of the new parcel(s); and,
>
> 2. Where new access roads cross a watercourse, drainage way, channel, or stream, bridge(s), or other structures providing access over such watercourse(s) they shall be designed and constructed so as to permit use and provide access to emergency vehicles, i.e., fire trucks, ambulances, tow trucks, road maintenance equipment, etc.

Better Approach

Insert the "Good" approach, plus the following addition:

> 3. There is adequate buildable area for erection of a structure, plus a well and on-site septic system if required if the land is within a State-regulated floodplain, wetland, high-risk erosion area, or designated environmental area; unless the parcel is being split for purposes other than building development, in which case the same shall be indicated on a notice filed with the deed also indicating the parcel did not have adequate area for a building under applicable regulations at the time it was approved.

Best Approach

Insert the "Better" approach and add the following language to the Site Plan Review section, within the Submittal Requirements sub-section:

> B. Any use that requires Authorization by Special Approval, including PUDs and condominium subdivisions.
>
> C. Identification and location of all existing watercourses and ponds, vegetation,

concentrations of trees, steep slopes, wetlands, floodplains, very porous soils, and any state- or federal-designated natural features for which a permit from a state or federal agency is required.

D. The natural features and character of lands shall be preserved wherever possible. Due regard shall be shown for all natural features, such as large trees, natural groves, water courses, and similar community assets that will add attractiveness and value to the property, if preserved. The preservation of drainage and natural stream channels must be considered by the land owner or developer, and the provision of adequate barriers, where appropriate, shall be required.

Land Division Alternatives – Master Plan

Good Approach

Insert language as a goal within the Master Plan.

> **Goal:** The Zoning Administrator and the Planning Commission should encourage landowners with significant natural features to utilize Site Plan Review, open space provisions, and PUD options so as to minimize negative impacts on identified natural features.

Better Approach

Insert the "Good" approach, plus the following objective:

> **Objective:** Ensure Site Plan Review and planned unit development provisions of the Zoning Ordinance require identification of natural features on required submittal documents, and are structured to encourage landowners to avoid negative impacts on these natural features as part of an effort to in essence "build with nature."

Best Approach

The "Better" approach may be the highest needed for this practice.

Land Division Alternatives – Zoning Ordinance

Good Approach

Insert language into Site Plan Review submittal requirements sub-section:

A. Identification and location of all existing watercourses and ponds, vegetation, concentrations of trees, steep slopes, wetlands, floodplains, very porous soils, and any state- or federal-designated natural features for which a permit from a state or federal agency is required.

Better Approach

Insert the "Good" approach, plus the following language in the Site Plan Review criteria/standards:

B. The natural features and character of lands shall be preserved wherever possible. Due regard shall be shown for all natural features, such as large trees, natural groves, water courses, and similar community assets that will add attractiveness and value to the property, if preserved. The preservation of drainage and natural stream channels must be considered by the proprietor and the provision of adequate barriers, where appropriate, shall be required.

Best Approach

Insert the "Better" approach, plus add the following language to PUDs and condominium subdivisions:

C. The natural features and character of land within the proposed PUD shall be preserved wherever possible. Due regard shall be shown for all natural features, such as large trees, natural groves, water courses, and similar community assets that will add attractiveness and value to the property, if preserved. The preservation of drainage and natural stream channels must be considered by the proprietor and the provision of adequate barriers, where appropriate, shall be required.

Stormwater Management – Master Plan

Good Approach

Insert language as a goal within the Master Plan.

> **Goal:** Educate land owners and developers on the importance of environmental conservation practices, such as low impact development, and conservation easements that contribute to preservation of natural systems.

Or,

Goal: Monitor water quality, establish minimum stormwater management standards and incorporate low impact development standards in the Zoning Ordinance.

Better Approach

Insert the "Good" approach, plus add the following objectives:

Objectives:

The Planning Commission will:

- Every five years update the water quality data of each of the water bodies in the community.
- Take action to protect wetlands for their ability to store and filter stormwater before releasing into watercourses.
- Propose amendments to the Zoning Ordinance to include stormwater management standards that protect adjacent waters from runoff from developed areas as the result of 50-year storm events.
- Include LID standards in the zoning plan element of the Master Plan and in the Zoning Ordinance.
- Initiate efforts and support efforts of others to education citizens and stakeholders about water quality trends, threats from poorly managed stormwater runoff and other threats to water quality, and actions that can be taken by individuals and businesses to protect water quality.

Best Approach

Insert the "Better" approach, plus add the following objective:

- Initiate efforts in cooperation with the Drain Commissioner and conservation organizations to educate landowners and stakeholders about the potential benefits of various LID techniques and other stormwater management BMPs, including, but not limited to:
  - Rain gardens;
  - Bioretention;
  - Constructed surface or subsurface filters;
  - Wet ponds, retention basins;
  - Dry retention basins;
  - Two-stage ditches/channels or naturalized ditches;
  - Infiltration basins;
  - Level spreaders;
  - Pervious pavement;
  - Stormwater planters;
  - Vegetated buffer strips;
  - Water quality devices (hydrodynamic separators and baffle boxes);
  - Wind barriers and shelters;
  - Vegetative cover;
  - Steep slope protections; and
  - Natural feature setbacks.

Stormwater Management – Zoning Ordinance

Good Approach

Insert in Site Plan Review section:

Surface Water Drainage

Attention shall be given to proper site surface drainage so that removal of surface waters will not adversely affect neighboring properties or the public storm drainage system. Stormwater shall be removed from all roofs, canopies and paved areas, and carried away in such a manner that it will not obstruct the flow of vehicular or pedestrian traffic, and will not puddle or freeze in paved areas. Run-off waters shall be detained or retained to remove sediments and to prevent erosion. Design of stormwater management measures should protect adjacent waters from runoff from developed areas as the result of 10-year storm events, unless the Drain Commissioner indicates a higher standard is necessary based on the characteristics of site and

surrounding property. Low impact development standards shall be applied wherever and feasible.

Better Approach

Insert into General Provisions or where applicable.

SECTION _.__ DRAINAGE
All lots and parcels shall retain stormwater runoff on-site from a 10-year storm event, or detain it so as to allow discharge without negative impact on adjacent lands, watercourses or water bodies above the run-off impact when the application was made. No request for land use approval shall be permitted that will increase the rate of run-off discharge from a lot or parcel or otherwise cause erosion or direct sedimentation upon adjacent properties, including an adjacent street. No request for land use approval shall be permitted that will reduce the level of service currently being provided by existing stormwater management infrastructure or existing drainage patterns unless necessary improvements to such infrastructure or natural drainage pattern are first made according to the terms of permits issued by the proper authorities.

Best Approach

The "Better" approach may be the highest needed for this practice.

Impervious Surface Reduction – Master Plan

Good Approach

There is nothing to add, as long as the "Good" language for Natural Feature and Drain Setbacks has been added.

Better Approach

Insert a goal within the Master Plan.

Goal: Keep the amount of new impervious surfaces low and reduce impervious surface area or impact where the opportunity presents itself. Impervious surfaces include parking lots, roads, building rooftops, and walkways.

Best Approach

Insert the "Better" approach, plus the following objectives:

Objectives:

- Zoning Ordinance standards will be used over time to keep the amount of impervious surface inside the community below 20 percent in developed areas, and below 10 percent in rural areas. Limited residential lots in the township and clustering of buildings in PUDs and condominium developments would all help to reduce the amount of impervious surface.
- The Planning Commission will encourage that public facilities consider the installation of pervious pavement on walks, drives, and parking lots when designing new or replacement facilities. Private parties shall be encouraged to consider those options as well.
- The Planning Commission will encourage the use of green roofs on the construction of new public buildings.

Impervious Surface Reduction – Zoning Ordinance

Good Approach

Insert in Parking Lot Requirement sub-section.

A. An applicant shall use LID techniques when designing and constructing the parking and loading areas on a site.

Better Approach

In addition to the language in the "Good" approach, insert in Parking Lot Requirement sub-section.

B. Pervious pavement options shall be considered by the applicant on walks, drives, and parking lots when designing new facilities or replacing existing ones.

Best Approach

The "Better" approach may be the highest needed for this practice.

Natural Feature and Drain Setbacks – Master Plan

Good Approach

Insert a goal within the Master Plan.

> **Goal:** Search out and/or devise techniques and programs to protect and improve the natural resources of the township, including, but not limited to, incorporating into the Zoning Ordinance adequate natural feature setbacks of buildings and impervious surfaces from watercourses, drains, and sensitive natural features.
>
> *Or,*
>
> **Goal:** Implement land use patterns, search out and/or devise techniques and programs to protect and improve the natural resources of the township, including, but not limited to, incorporating adequate LID setbacks into the Zoning Ordinance of buildings and impervious surfaces from natural features, such as shorelines, woodlands, wetlands, steep slopes, and areas subject to flooding.

Better Approach

Insert the "Good" approach, plus the following objectives:

> **Objectives:**
> The Planning Commission will:
>
> - Propose incorporating natural feature setbacks into the standards in the Zoning Ordinance.
> - Encourage growth of native vegetation along all watercourses and drains as a natural buffer strip.

Best Approach

Same as "Better" approach, plus outline specific elements of natural feature setbacks in the Zoning Plan section of the Master Plan. The Zoning Plan section of the Master Plan identifies all of the following:

- A proposed schedule of regulations by district that includes at least building height, lot area, bulk, and setbacks.

  (Note: this is intended to lay the groundwork for a schedule of regulations in the Zoning Ordinance.)

- Standards or criteria to be used when considering rezonings consistent with the Master Plan.
- Suggested boundaries of zoning districts.
- An explanation of how the land use categories on the future land use map relate to the districts on the zoning map.

Natural Feature and Drain Setbacks – Zoning Ordinance

Good Approach

Insert into the General Provisions or where applicable.

> SECTION _.__ SETBACKS FROM SIGNIFICANT NATURAL FEATURES
>
> A. A building setback of at least 25 feet with the setback area planted with sod-forming vegetation or covered by retaining naturally occurring vegetation, including shrubs and trees, is encouraged to be maintained along all watercourses, drains, water bodies, and wetlands.
>
> B. The building setback standard in sub-section (A) above is required to be maintained by any land use receiving site plan approval pursuant to Section 1601. Vegetation within the buffer strip may not be clear cut, plowed or graded, except as part of an official drain cleaning project.

Better Approach

Insert into the General Provisions or where applicable.

> SECTION _.__ VEGETATED BUFFER STRIPS
>
> A. Buffer strips of at least 25 feet in width and planted with sod-forming vegetation or by retaining naturally occurring vegetation, including shrubs and trees, are encouraged to be maintained along all watercourses, drains, and water bodies to filter stormwater.
>
> B. The buffer strip standard in sub-section (A) above is required to be maintained by any land use receiving site plan approval pursuant to Section 14.28. Vegetation

within the buffer strip may not be clear cut, plowed, or graded, except as part of an official drain cleaning project.

Best Approach

Same basic language as the "Better" approach, but the ordinance requires more than 25 feet setback from natural features wherever feasible. So 25 feet is enlarged to 40 feet or 50 feet or more depending on local circumstances. It could be a sliding scale in some cases. Language must be developed locally.

Groundwater Protection – Master Plan

Good Approach

Insert language as a goal within the Master Plan.

> **Goal:** Encourage the use of land and construction of new buildings in ways that protect groundwater from contamination by ensuring storage and use of hazardous substances occurs only in places with adequate secondary containment, separation from wells, and away from drains that discharge into soil.

Better Approach

Insert these objectives within the Master Plan.

> **Objectives:**
>
> - Site Plan Review standards are included in the Zoning Ordinance to protect groundwater from pollution by addressing secondary containment, drain discharge location, and setback from wells.
> - The Planning Commission and Zoning Administrator will provide educational materials to citizens and stakeholders on protecting groundwater and on the outcome of groundwater monitoring.
> - The Planning Commission and the Zoning Administrator will coordinate the Site Plan Review, and coordinate compliance inspections with the Health Department and Drain Commissioner.

Best Approach

The "Better" approach may be the highest needed for this practice.

Groundwater Protection – Zoning Ordinance

Good Approach

Insert language into Site Plan Review criteria/standards:

A. Whether the sewage disposal and water supply will be safe and adequate.

Better Approach

Insert the following language to the Site Plan Review section of the Zoning Ordinance:

SECTION _.__GROUNDWATER PROTECTION STANDARDS

A. The project and related improvements shall be designed to protect the natural environment, including lakes, ponds, streams, wetlands, floodplains, groundwater, and steep slopes. For facilities that use, store or generate hazardous substances in quantities greater than 100 kilograms per month (equal to about 25 gallons or 220 pounds), the following additional Site Plan Review information is required:

   1. Location and size of interior and exterior areas and structures to be used for storage, use, loading/unloading, recycling, or disposal of hazardous substances.
   2. Location of all underground and above ground storage tanks for such uses as fuel storage, waste oil holding tanks, chemical storage, hazardous waste storage, collection of contaminated storm water, or wash water, and all similar uses.
   3. Location of exterior drains, dry wells, catch basins, retention/detention areas, sumps, and other facilities designed to collect, store or transport stormwater or wastewater. The point of discharge for all drains and pipes shall be specified on the site plan.
   4. Delineation of areas on the site, which are known or suspected to be contaminated, together with a report on the status of site cleanup.

B. Site Plan Review standards for facilities that use, store, or generate hazardous substances:

1. Sites at which hazardous substances are stored, used or generated shall be designed to prevent spills and discharges to the air, surface of the ground, groundwater, lakes, streams, rivers, or wetlands.

2. Secondary containment for above ground areas where hazardous substances are stored or used shall be provided. Secondary containment shall be sufficient to store the substance for the maximum anticipated period of time necessary for the recovery of any released substance.

3. General purpose floor drains shall only be allowed if they are approved by the responsible agency for connection to a public sewer system, an on-site closed holding tank (not a septic system), or regulated through a State of Michigan groundwater discharge permit.

4. State and federal agency requirements for storage, spill prevention, record keeping, emergency response, transport, and disposal of hazardous substances shall be met. No discharges, shall be allowed without required permits and approvals.

Best Approach
The "Better" approach may be the highest needed for this practice.

RESOURCE PROTECTION TECHNIQUES

Resource Protection Overlay District – Master Plan

Good Approach
Insert a goal within the Master Plan.

> **Goal:** Create overlay zone provisions in the Zoning Ordinance where necessary to protect identified natural features that are valuable in protecting water quality and local quality of life.

Better Approach
Insert the "Good" approach, plus the following objectives:

> **Objectives:**
> The Planning Commission will:
>
> 1. Consider creation of overlay protection districts in Zoning Ordinance for waterbodies, wetlands, floodplains, steep slopes, and soils with high permeability.
>
> 2. Encourage the Federal Emergency Management Agency (FEMA) to use not larger than two-foot contours when doing all future floodplain mapping in the community.
>
> 3. Prepare and support adoption of Site Plan Review regulations for protection of sensitive natural features.

Best Approach
Only after conducting a full natural features inventory, and including appropriate maps in the Master Plan, the Planning Commission may find it desirable to create a new Natural Features Protection Overlay District, similar to the existing Floodplain Overlay District. It could be targeted to protecting existing wetlands and/or woodlands.

Floodplains – Master Plan

Good Approach
A floodplain map is included in the environmental inventory.

Better Approach
A FEMA-approved 100-year flood map is available either in the Master Plan or at the Community Hall.

Best Approach
The "Better" approach may be the highest needed for this technique.

Woodland Protection and Reforestation – Master Plan

Good Approach
Insert a goal within the Master Plan.

> **Goal:** Identify places to expand woodlands and develop measures to encourage reforestation.

Better Approach
Insert the "Good" approach, plus the following objectives:

Objectives:
The Planning Commission will:

- Encourage communities and landowners to engage in the reforestation of undeveloped lands, and to engage in tree planting on publicly owned lands in partnerships with conservancies, habitat improvement organizations and other organizations.
- Encourage public road authorities to plant trees on public right-of-way to expand and re-establish forest cover where they would help reduce soil erosion on abutting farmland.
- Encourage use of native species with all tree planting.

Best Approach
The "Better" approach may be the highest needed for this technique.

Woodland Protection and Reforestation – Zoning Ordinance

Good Approach
Insert language into Site Plan Review criteria/standards:

A. The cutting of more than (X) trees and the removal of soil without an approved site plan is prohibited. (X = Community decides how many trees.)

Better Approach
Insert the "Good" approach, plus the following language within the Site Plan Review section:

Woodland Protection: as new residential subdivisions are developed, and as property along waterways are developed, trees in clusters shall be protected, wherever feasible, as a part of the Site Plan Review process.

Best Approach
The "Better" approach may be the highest needed for this technique.

Wetland Protection/Restoration/Creation
Wetlands are defined as sensitive natural features; therefore, the approaches used in the Natural Feature and Drain Setback are sufficient to protect, restore, and create wetlands (see page A–12).

Conservation Easements – Master Plan

Good Approach
Insert a goal in the Master Plan.

Goal: Encourage landowners and businesses to use land donation, conservation easements, deed restrictions, and targeted land purchases to protect sensitive natural features and other natural resources.

Better Approach
Insert the "Good" approach, plus the following objective:

Objective: The Planning Commission will work with a local land conservancy and conservation organizations, as well as private landowners to protect sensitive natural features and certain natural resources through the donation of land, conservation easements, deed restrictions, or targeted land purchases.

Best Approach
Insert the "Better" approach, plus the following objective:

Objective: The Planning Commission, local land conservancy and local conservation organizations will periodically mutually co-sponsor educational workshops on a variety of conservation techniques.

PUBLIC EDUCATION – MASTER PLAN
The following elements would be added to the Master Plan. There are no corresponding zoning elements.

Agricultural Best Management Practices

Goal: Support and encourage best management practices for agriculture, which respect the environment and protect water quality.

Objective: Provide information on the Right-to-Farm Act and the following agricultural BMPs to farmers and other rural residents.

- Generally Accepted Agricultural and Management Practices from the

Michigan Department of Agriculture and Rural Development;

- Michigan Agriculture Environmental Assurance Program;
- Conservation tillage (no-till/strip till, mulch till, ridge till);
- Nutrient and pest management;
- Conservation buffers (field borders, filter strips, wind barriers and breaks, contour strips, grassed waterways, riparian woodlands, etc.);
- Animal feeding operation management (placement and land application potential); and
- Conservation Reserve land.

Open Space Preservation

Goal: The preservation or provision of open space and native vegetation helps retain the natural character of the community and reduces negative impacts of development on water quality. Vegetated open space should be encouraged on every site.

Objective: The Planning commission and the Zoning Administrator should provide published information on the water quality benefits of different open space vegetation type and management regimes to all applicants for zoning approval.

Water Quality Monitoring

Goal: The Planning Commission and Zoning Administrator will take advantage of opportunities to educate citizens, property owners, and other local government officials on the status of water quality and the values and benefits of water quality protection.

Objectives:

- The Planning Commission will provide pamphlets and links to websites with information on low impact development and other BMPs for water quality.
- Initiate efforts and support of others to educate citizens and stakeholders about water quality trends, threats from poorly managed stormwater runoff and other threats to water quality, and actions that can be taken by individuals and businesses to protect water quality.

Drain Clearing

Goal: Promote education about, and the coordination of, drain maintenance activities with public and private landowners for the implementation of BMPs to reduce soil erosion and sedimentation of drains and other water bodies.

Objective: Work with local conservation organizations to educate landowners about drainage methods that clear fields without causing sediment loads that close and dam; and encourage local schools to host experts in water quality protection and involve K–12 students in dissemination of information.

Road and Bridge Repair, and Stream Crossings

Goal: Promote education about, and the coordination of road and bridge repair and stream crossing construction activities with public and private landowners for the implementation of BMPs to reduce soil erosion and sedimentation of drains and other water bodies.

Objective: Work with local conservation organizations to educate landowners about road and bridge repair, and stream crossing; and encourage local schools to host experts in water quality protection and involve K–12 students in dissemination of information.

Appendix B:
Local Planning and Zoning Assessment Tool

INTRODUCTION

A. Purpose

The Watershed Protection Planning and Zoning Assessment Tool has been developed for the purpose of evaluating the effectiveness of water quality protection strategies by local governments within the Saginaw Bay Watershed. This pilot assessment specifically analyzes the Master Plans and Zoning Ordinances of communities located within the Rifle River, the Cass River, the Pigeon/ Pinnebog Rivers sub-watersheds.

B. Method

The Team at the Planning & Zoning Center at MSU will implement the Assessment Tool to determine the level of each community's adherence to contemporary goals, regulations, standards, and practices as they apply to protecting surface water quality. Determining a community's existing level of adherence will be accomplished by identifying the presence of three fundamental aspects of watershed protection by means of local planning and Zoning Ordinances: 1) identification of goals and objectives for water quality protection and improvement; 2) identification of specific strategies and best management practices for meeting goals and objectives; and 3) an analysis of opportunities and barriers to implementing key land use strategies as they apply to watershed management. An analysis will be provided for each community in each sub-watershed as they relate to surface water quality. This is not a comprehensive assessment of Master Plans and Zoning Ordinances, it is only an assessment relative to water quality protection.

C. Organization and Content

The assessment tool is designed as a survey-style form with "yes" and "no" questions and space for a comment.

D. How to Use the Assessment

After obtaining the Master Plan and Zoning Ordinance of each jurisdiction within each sub-watershed, apply every question in the assessment to each document and fill in the appropriate response.

E. Defined Terms

"Master Plan" refers to a plan prepared by a local Planning Commission pursuant to the Michigan Planning Enabling Act, P.A. 33 of 2008, as amended.

"Zoning Ordinance" refers to the Ordinance adopted by a local governing body pursuant to the Michigan Zoning Enabling Act, P.A. 110 of 2006, as amended.

F. Notes

When completing the assessment questions, **always cite the page number of document**.

COMMUNITY ASSESSMENT TOOL

Name of Jurisdiction: _____.

Who Completed the Assessment:

_____.

Date Prepared: _____.

Background

County: _____.

Sub-Watershed: _____.

A. What is the population of the community based on the 2010 Census Data?:

_____.

B. Is there a County Drain Commissioner or Local Stormwater/Sewer Authority? Yes: ___ or No: ___. If yes, list the name and contact information:

_____

_____

_____

_____.

C. Which Health Department serves the community?

_____

_____.

D. Does the community have a Master Plan? Yes: ___ or No: ___.

Title: _____.

If yes,

- Creation date: _____.
- Last updated: _____.
- Prepared by: _____.

If answered "No," does the township, city, or village claim that they are covered under the county Master Plan? Yes: ___ or No: ___. If yes, what does the county Master Plan state relative to that specific community and is it adequate for county zoning? (Individual sub-section for each jurisdiction must be clearly identified within the county Master Plan).

_____

_____

_____

_____

_____.

E. Does the community have an adopted Zoning Ordinance? Yes: ___ or No: ___. If yes, list the title:

_____.

- If no, name the entity whose zoning regulations the community falls under, if there is one:

  _____.
- Creation date: _____.
- Last amended (list each amendment that pertains to water quality):

_____

_____.

- Prepared by: _____.

F. Conformance with Michigan Planning and Zoning Enabling Acts (Answer questions in Table A–1.)

General Questions, Provisions, and Supplementary Information

A. What standards does the County Drain Commissioner use to review new development against?

_____

_____

_____.

B. What standards does the Health Department use to review on-site septic systems against?

_____

_____

_____.

C. Does the community make use of an environmental permits checklist that includes requirements from county, state, and federal agencies? Yes: ___ or No: ___. If yes, when was this document last updated? Provide a copy if possible.

_____

_____

_____.

Master Plan

A. Background

To determine acres and percentages of land use and land cover categories, see the method described in the Attachments section, on page A–31.

1. In the Master Plan, what is the approximate makeup of land uses in the community?
   - Agricultural: __ %.
   - Forested: __ %.

Table A–1: Conformance with Michigan Planning and Zoning Enabling Acts

Conformance with P.A. 33 of 2008 (Michigan Planning Enabling Act) and P.A. 110 of 2006, as amended (Michigan Zoning Enabling Act)	Circle One per Element
Notes:	
Has the Planning Commission updated the community's Master Plan to include *all* of the following elements, as required by the Michigan Planning Enabling Act of 2008?	Yes No Unable to Determine
1. Do both the Master Plan and Zoning Ordinance refer to the administrative body that maintains these documents as a "Planning Commission" and no other term? In other words, there is no longer any authority for "zoning boards." *(Note: This does not refer to the Zoning Board of Appeals (ZBA), which is a lawful entity pursuant to 2006 P.A. 110, MCL 125.3601.)* [2008 P.A. 33, MCL 125.3815 and 125.3301.]	Yes No Unable to Determine
2. Has the Master Plan either undergone an official five-year review/update by the Planning Commission, or does it cite a creation date within the last five years? [2008 P.A. 33, MCL 125.3845, (2)]	Yes No Unable to Determine
3. Does the Master Plan contain a land use component that identifies *all* of the following?: • Existing land use conditions and definitions of land use categories/districts. • Future land use plan. • Future land use map. • Recommendations for the future development of the jurisdiction. (If "No", indicate missing elements: _____.) [2008 P.A. 33, MCL 125.3833, (1) and (2)(a)]	Yes No Unable to Determine
4. Does the Master Plan contain an infrastructure component that includes data on the character, extent, expansions, and improvements for public infrastructure (utilities, roads, sewers, structures, etc.)? [2008 P.A. 33, MCL 125.3833, (2)(b).]	Yes No Unable to Determine

Note: This table continues on the next page.

- Commercial: _%.
- Industrial: _ %.
- Institutional: _%.
- Parks/green space: _%.
- Residential: _%.
- Undeveloped: _%.

2. In the Master Plan, what is the approximate general makeup of land covers in the community?

- Agricultural land: _%.
- Surface water: _%.
- Wetlands, floodplains, and other intermittently inundated areas: _%.

Table A–1: Conformance with Michigan Planning and Zoning Enabling Acts (cont.)

Conformance with P.A. 33 of 2008 (Michigan Planning Enabling Act) and P.A. 110 of 2006, as amended (Michigan Zoning Enabling Act)	Circle One per Element
5. Does the Master Plan include redevelopment and rehabilitation plans for blighted areas? *(Note: May not be applicable to communities lacking a significant amount of blighted areas.)* [2008 P.A. 33, MCL 125.3833, (2)(c).]	Yes No Unable to Determine
6. Does the Master Plan contain a zoning plan component that identifies *all* of the following?: • A proposed schedule of regulations by district that includes at least building height, lot area, bulk, and setbacks. *(Note: this is intended to lay the groundwork for a schedule of regulations in the Zoning Ordinance.)* • Standards or criteria to be used when considering rezonings consistent with the Master Plan. • Suggested boundaries of zoning district. • An explanation of how the land use categories on the future land use map relate to the districts on the zoning map. (If "No", indicate missing elements: _____.) [2008 P.A. 33, MCL 125.3833, (2)(d) and 125.3305, (a) and (b).]	Yes No Unable to Determine
7. Does the Master Plan offer recommendations for implementing any of the Master Plan's proposals (goals and objectives)? [2008 P.A. 33, MCL 125.3833, (2)(e).]	Yes No Unable to Determine
8. Does the Zoning Ordinance contain (or is it accompanied by) a zoning map and text that indicates zoning districts within the jurisdiction, as well as regulations within these districts? [2008 P.A. 110, MCL 125.3305, (c).]	Yes No Unable to Determine

- Natural vegetation (includes forests, shrublands, fields, etc.): __%.
- Urban or built-up: __%.
- Roads: __%.

3. What is the approximate percentage of impervious land cover in the community: __%?

Note: In order to determine the percentage of impervious surfaces in a municipality, a current land use chart is necessary. The percent of impervious surface can be calculated by summing the amount of land covered by roofs, roads, and parking lots, then dividing by the total.

If a current land use chart is unavailable, then use the approximate makeup of land uses in the question on the Master Plan (A.1) on page A–19, and in Table A–2.

4. What are the predominant land uses, within a one-mile perimeter, in the principal (predominant zoning districts) zones along the major and minor streams? If mixed, indicate approximate percent of each land use.

_____

_____.

Table A–2: Example of a Land Use Chart

Land Use Category		Acres	% Impervious	Impervious Acres
Residential	Low-density		19	
	Medium-density		38	
	High-density		50	
	Mobile home		60	
Institutional			30	
Commercial/Industrial			80	
Agricultural Land			2	
Open Space			2	
Surface Water			100	
Outdoor Recreation			11	
Road*	Local, subdivision		45	
	Major, highway/freeway		50	
TOTAL Imperviousness				
TOTAL Acres				
Percent Impervious				

**Includes road right-of-way.*

5. In the future land use maps, what are the predominant land uses in the principal (predominant zoning districts) zones along the major and minor streams in the future land use maps?

   _____

   _____

   _____.

6. Does the community indicate that they have worked with or discussed water quality management with adjacent jurisdictions? Yes: ___ or No: ___. If yes, which jurisdictions?

   _____.

B. Goals and Objectives

1. Are goals present that indicate the community's desire to protect water resources? Please list.

   _____

   _____

   _____

   _____.

   - Do they focus on groundwater, surface water, or both?

     _____.

   - Do they focus on protection, remediation or both?

     _____.

2. Does the plan inventory water resources and describe water quality issues? Yes: ___ or No: ___.

3. Are any of the water quality protection measures listed in Table A–3 included in the Master Plan's goals, objectives, strategies, or action items? Yes: ___ or No: ___.

Table A–3: Water Quality Protection Measures

	Yes	No
Coordinated Site Plan Review		
Land division		
Buffer strips		
Impervious surface reduction		
Resource Protection Overlay District		
Conservation easements		
Green streets bioretention		
Natural feature and drain setbacks		
Improving groundwater recharge		
Pollution prevention: *Wellheads, chemical storage and disposal, storm drain inlet labeling, building and demolition materials storage and disposal*		
Floodplain protection		
Woodland protection and reforestation		
Wetland protection/restoration/creation		
Accumulation and disposal of waste (junk and yard waste), and other materials		
Septic systems		
Public Education: *Agricultural best management practices*		
Public Education: *Open space protection*		
Public Education: *Water quality monitoring*		
Public Education: *Drain clearing*		
Public Education: *Road and bridge repair, and stream crossings*		
Road construction/repair BMPs		
Stream and drain crossing/bridges		

4. Are goals present that indicate the community's desire to conserve open space/undeveloped land? Yes: ___ or No: ___.

   - If so, please list them?

     _____

     _____

     _____.

   - If so, are lands adjacent to drains, streams, and rivers a priority? Yes: ___ or No: ___.

5. Does the Master Plan acknowledge state and federal development rights agreements? Yes: ___ or No: ___. If so, which ones? Check all that apply.

   - ❑ Farmland and Open Space Preservation Program (P.A. 116).
   - ❑ State parks.
   - ❑ Wetlands.
   - ❑ Environmental areas.
   - ❑ Floodplains.
   - ❑ State game areas.
   - ❑ National parks.

6. Does the plan acknowledge the concept of "smart growth" (or any other development principles)? Yes: ___ or No: ___.

7. Are any of the following tenets of smart growth present in the plan? Yes: ___ or No: ___. If so, check all that apply below and indicate how they are proposed to be achieved?

   ❑ Create a range of housing opportunities and choices.

   _____

   _____.

   ❑ Create walkable communities.

   _____

   _____.

   ❑ Encourage community and stakeholder collaboration in development decisions.

   _____

   _____.

   ❑ Foster distinctive, attractive communities with a strong sense of place.

   _____

   _____.

   ❑ Make development decisions predictable, fair, and cost-effective.

   _____

   _____.

   ❑ Mix land uses.

   _____

   _____.

   ❑ Preserve open space, farmland, natural beauty and critical environmental areas.

   _____

   _____.

   ❑ Provide a variety of transportation options.

   _____

   _____.

   ❑ Strengthen and direct development towards existing communities.

   _____

   _____.

   ❑ Take advantage of compact building design.

   _____

   _____.

   Note: Water quality benefits associated with smart growth techniques. "Using Smart Growth Techniques as Stormwater Best Management Practice," ***http://www.epa.gov/smartgrowth/stormwater.htm****.*

8. Does the Plan state goals to reduce the community's impact on global climate change? Yes: ___ or No:

   - If so, explain objectives for reaching this goal:

   _____

   _____.

C. Growth and Development

1. In the Master Plan, what is the approximate makeup of future land uses in the community?

   - Agricultural: __%.
   - Forested: __%.
   - Commercial: __%.
   - Industrial: __%.
   - Institutional: __%.

- Parks/green space: __%.
- Residential: __%.
- Undeveloped: __%.

2. In the Master Plan, what is the approximate general makeup of future land covers in the community?
   - Agricultural land: __%.
   - Surface water: __%.
   - Wetlands, floodplains, and other intermittently inundated areas: __%.
   - Natural vegetation (includes forests, shrublands, fields, etc.): __%.
   - Urban or built-up: __%.
   - Roads: __%.

3. How does the community plan for higher-density development, based on a comparison of current and future land use maps? Check one.
   - ❑ Future growth strives to maintain **low density**.
   - ❑ Future growth plans indicate an increasing concentration around commercial areas and **moderate density** residential developments.
   - ❑ Future growth plans indicate a strategic grouping of **higher-density** residential and commercial districts and the mixing of uses around the core of the community and at key nodes.

4. Which of the following statements best describes the objective of the Master Plan with respect to the character of the community? Check one.
   - ❑ Maintain a rural character (farm-like, forested, meadows, wetland, small estates, large lots) and/or promote the preservation of farmland.
   - ❑ Striving for growth and the attraction of new businesses.
   - ❑ Improving housing stock and building contemporary neighborhoods.
   - ❑ Preservation of natural features and scenic beauty.
   - ❑ Reinvigorating the urban core through redevelopment of blighted and underused areas.

5. Does the Master Plan state any of the following water quality protection goals: Check all that apply.
   - ❑ Update the environmental inventory.
   - ❑ Protection of water quality or sensitive lands.
   - ❑ Protection of groundwater.

6. Does the community plan for an urban growth boundary, municipal/urban service limit line, or other similarly named boundary for managing urban growth, OR operate a Capital Improvements Program that manages infrastructure growth? Yes: ___ or No: ___.

   If yes, how much undeveloped land is included inside the boundary?

   _____.

Zoning Ordinance

A. General

1. On the zoning map, what is the approximate percentage of the total land comprised of each of the following zoning districts?
   - Agricultural: __%.
   - Forested: __%.
   - Rural residential: __%.

- Suburban residential: _%.
- Urban residential: _%.
- Commercial: _%:
  - Downtown: _%.
  - Corridor:_%.
  - Interchange: _%.
  - Neighborhood: _%.
- Industrial: _%:
  - Heavy: _%.
  - Light: _%.
- Institutional: _%.
- Parks/green space: _%.

2. What are the predominant land uses within a one-mile perimeter, in the principal (predominant zoning districts) zones along the major and minor streams? If mixed, indicate approximate percent of each land use.

_____

_____

_____.

3. Are any of these identified in the zoning map? Check all that apply.

   ❑ Farmland and Open Space Preservation Program (P.A. 116) lands.

   ❑ State parks.

   ❑ Wetlands.

   ❑ Environmental areas.

   ❑ Floodplains.

   ❑ State game areas.

   ❑ National parks.

4. Is the application of any of the following low impact development techniques (for stormwater management or pollution prevention) required or encouraged by the Zoning Ordinance? Please fill out Table A–4.

5. Does the local Zoning Ordinance attempt to prevent livestock pollution of streams? Yes: ___ or No: ___. If so, how (i.e., secured manure ponds, exclusion from streams)?

_____

_____

_____.

6. If the community's Zoning Ordinance contains provisions for planned unit developments, is open space design/cluster development a requirement for these places? Yes: ___ or No: ___. If so, what is the standard for the minimum amount of open space?

_____.

Does the same standard apply to site condominium development? Yes: ___ or No: ___.

7. Does the local Zoning Ordinance have provisions for conservation subdivisions? Yes: ___ or No: ___.

8. Does the Zoning Ordinance contain impervious surface area regulations or guidelines for individual lots? Yes: ___ or No: ___. If so, what is the standard?

_____.

9. Does the Zoning Ordinance permit any of the following elements of alternative street design for controlling stormwater runoff: Check all that apply.

   ❑ Elimination of curb, gutters, and storm sewers.

Table A–4: Low Impact Development Techniques

LIDs	Required (pg. #)	Potential BMP(s) to apply	Notes (Citations, characteristics, etc.)
Stormwater management: Other Site Plan Review standards			
• Bioretention or rain gardens			
• Vegetated, grassed, or bio swale			
• Constructed surface or subsurface filters			
• Wet ponds or retention basins			
• Dry detention basins			
• Two-stage ditches/channels or naturalized ditches			
• Infiltration basins			
• Level spreaders			
• Pervious pavement			
• Stormwater planters			
• Vegetated filter strips			
• Water quality devices (such as hydrodynamic separators and baffle boxes)			
Wind barriers (such as no-till, shelterbelts, contouring farming, wind breaks)			
Steep slope protection (such as riprap, level spreaders, reinforced soil)			
Lot coverage			
Prohibiting the storage of potentially contaminating materials in floodplain			
Provisions for the rebuilding/ demolition of nonconforming structures within a floodplain			

Note: This table continues on the next page.

- ❑ Encourage medians with swales to channel and absorb stormwater.

10. Does the Zoning Ordinance permit a large car parking without providing for small cars? Yes: ___ or No: ___.

11. Does the Zoning Ordinance require/ encourage shared use of parking between adjacent land uses? In what districts? Yes: ___ or No: ___.

12. Does the Zoning Ordinance provide for overflow parking? Yes: ___ or No: ___.

13. Does the Zoning Ordinance require/encourage parking lots to be paved? Yes: ___ or No: ___.

14. Does the Zoning Ordinance require/encourage pervious surface parking lots? Yes: ___ or No: ___.

15. Does the Zoning Ordinance require minimum landscaping standards in parking lots? Yes: ___ or No: ___. If yes, in what districts?

_____

_____.

Table A–4: Low Impact Development Techniques (cont.)

LIDs	Required (pg. #)	Potential BMP(s) to apply	Notes (Citations, characteristics, etc.)
Utilization of overlay zoning to protect environmentally sensitive areas. Indicate the types of overlay zones used:			
• **Riparian corridor**			
• **Wetlands**			
• **Woodlands**			
• **Groundwater recharge**			
• **Wellhead protection**			
• **Other**			
Provisions for wastewater disposal systems to be setback from surface waters and natural features. **What distance?**			
Buffers between natural features and development activities. **Width Required?**			
Identification of stormwater drainage patterns, in respect to the final grading			
Other, specify: _____.			

16. Does the Zoning Ordinance allow for shared driveways? Yes: ___ or No: ___. If yes, in what instances and in what districts?

    _____

    _____

    _____.

17. Does the Zoning Ordinance have a floodplain ordinance/provision? Yes: ___ or No: ___.

18. Is an area designated as a "Natural River" by the State of Michigan within the community? Yes: ___ or No: ___.

19. If the jurisdiction has local zoning regulations and Natural River zoning is present, how does the jurisdiction coordinate with the MDNR?

    _____

    _____.

    If zoning regulations are present are they consistent with Natural River zoning?

    _____

    _____.

B. Site Plan Review (Indicate Section #_____) (Fill out Table A–5.)

1. In what instances is the Site Plan Review process required? (Insert actual ordinance language here.)

    _____

    _____.

2. List the Site Plan Review standards related to water quality that must be met in order to get approval.

    _____

    _____.

Table A–5: Checklist for Site Plan Review

Basic Information & Determination	
Whether the site requires any special reviews, because It is in a location subject to special regulations, such as the following:	
A. Designated high-risk of erosion areas.	
B. Designated natural river.	
C. Designated environmental area.	
D. Designated sand dune area.	
E. Designated historic district.	
F. Designated or known groundwater recharge area.	
G. Designated wetland.	
H. Adjoining an inland lake or stream.	
I. Identified hazardous waste area.	
J. Known site for disposal of solid waste.	
K. Whether the land is subject to a farmland or open space agreement.	
L. Others, specify: _____.	
Which other local, county, state and federal agencies need to be contacted for review and comment, and whether any other special permits have to be obtained from them, such as Wastewater or Air Discharge Permits. Possibilities include:	
A. Wastewater Discharge Permits.	
B. Pollution Incident Prevention Plans from the MDNR.	
C. Hazardous Waste Storage, Treatment or Disposal, or Septic Permits from the MDNR.	
D. Air Pollution Control Permits for Air Discharges of Industrial Processes or Burning of Solid or Hazardous Wastes from the MDNR.	
E. Dredging within 500 feet of a River, Stream, Creek, Ditch, Wetland, or Floodplain Permit from the MDNR.	
F. Dredging, Filling, or Construction in a Waterbody Permit from the MDNR.	
G. Others, specify: _____.	

Note: This table continues on the next two pages.

3. Are topography lines required on the site plan (existing and proposed)? Yes: ___ or No: ___.
4. Is it a requirement to identify existing vegetated areas and/or impervious surfaces? Yes: ___ or No: ___.
5. Is a parking plan required for site plan approval? Yes: ___ or No: ___.
6. Does the Zoning Ordinance prohibit land clearing or soil stripping prior to Site Plan Review? Yes: ___ or No: ___.
7. Is there a requirement for the identification of stormwater drainage patterns, in respect to the final grading? Yes: ___ or No: ___.
8. What other agencies review and comment on the site plan?

   ❑ County Drain Commissioner.

   ❑ Health Department.

   ❑ Road Commission.

   ❑ The Michigan Department of Transportation.

   ❑ The Michigan Department of Environmental Quality.

   ❑ Other entity (please be specific) _____.

Table A–5: Checklist for Site Plan Review (cont.)

Basic Information & Determination	
Risks of Natural Hazards	
Whether any risks of natural hazards from flooding, high-risk of erosion, slumping of steep slopes or sandy soils, subsidence or other natural event has been adequately considered.	
Drainage and Watercourse	
Whether proposed grades, drainage, and stormwater retention/detention is adequate and whether any required fencing thereof is indicated and of proper materials and sizes.	
Whether required sediment control plans are adequate.	
Whether proposed locations of structures and uses relative to wetlands, water recharge areas, and floodplains are adequate.	
Whether proposed bulkheads, docks, fill, or other structures in or adjacent to a watercourse meet local, state and federal requirements.	
Solid and Hazardous Waste	
Whether solid waste disposal is Illustrated and adequate.	
Whether the location and specifications for storage of any chemicals, salts, flammable materials, or hazardous materials on the site meets local, state, and federal requirements.	
Other Environmental Impacts	
Whether any endangered plant or animal habitat would be affected.	
Whether any unacceptable pollution, impairment or destruction of the environment would occur if the site plan were approved.	
Have Comments Been Received from the Following Agencies?:	
County and Local Agencies:	
• Road Commission or Street Department.	
• Health Department (Septic/Well Permits).	
• Department of Public Works.	
• Drain Commissioner.	
• Fire Chief (water lines, hydrants, emergency vehicle access).	
• Sheriff's Department or Police Chief.	
• Engineering Department (easements , rights-of-way, utility lines).	
• Building Department (Building Code, sometimes Sign Codes).	

Note: This table continues on the next page.

9. Does the Zoning Ordinance allow the jurisdiction to withhold approval until evidence of receipt of permit requirements by other agencies has been received? Yes: ___ or No: ___.

C. Subdivision/Plot Regulations

1. Does the community have subdivision/land division regulations? Yes: ___ or No: ___.

2. What standards must be met to get approval of a land division adjacent to a river or stream?

_____

_____.

D. Other Observations:

_____

_____

_____

_____

_____

_____.

Table A–5: Checklist for Site Plan Review (cont.)

Basic Information & Determination	
Have Comments Been Received from the Following Agencies? (cont.):	
County and Local Agencies:	
• Water Department (water lines, hydrants, valves).	
• Wastewater Treatment Department.	
• Zoning/Planning Department.	
• School district(s).	
State Agencies:	
• Michigan Department of Transportation (Driveway Permits, access onto property along state or federal trunklines and freeways).	
• Michigan Department of Natural Resources.	
• Floodplains.	
• Inland Lakes and Streams Permits.	
• Wetland Permits.	
• Solid Waste Permits.	
• Hazardous Waste Permits.	
• Air Discharge Permits.	
• Michigan Department of Commerce.	
• Condominium approvals.	
• Plat approvals.	
• Mobile home park approvals.	
• Michigan State Police/Fire Marshall (Flammable materials storage).	
Federal Agencies:	
• U.S. Army Corps of Engineers (Permits for activities in certain wetlands, floodplains, and navigable watercourses along the Great Lakes and connecting waters).	

ATTACHMENT

To determine the number of acres in each land use and land cover category:

A. Using the grid sheet (Figure A–1), multiply the length of a grid square by the map scale, and square the resulting sum. For example, if you are using a 1/4" grid, and a map with a scale of 1"=1,000', the calculation would be as follows[9]:

$$(1/4 \times 1{,}000)^2 = 62{,}500 \text{ ft}^2.$$

This calculation gives you the number of square feet in a grid square, according to the map scale.

B. Convert the square foot per grid square identified into acres by dividing the calculated value by 43,560:

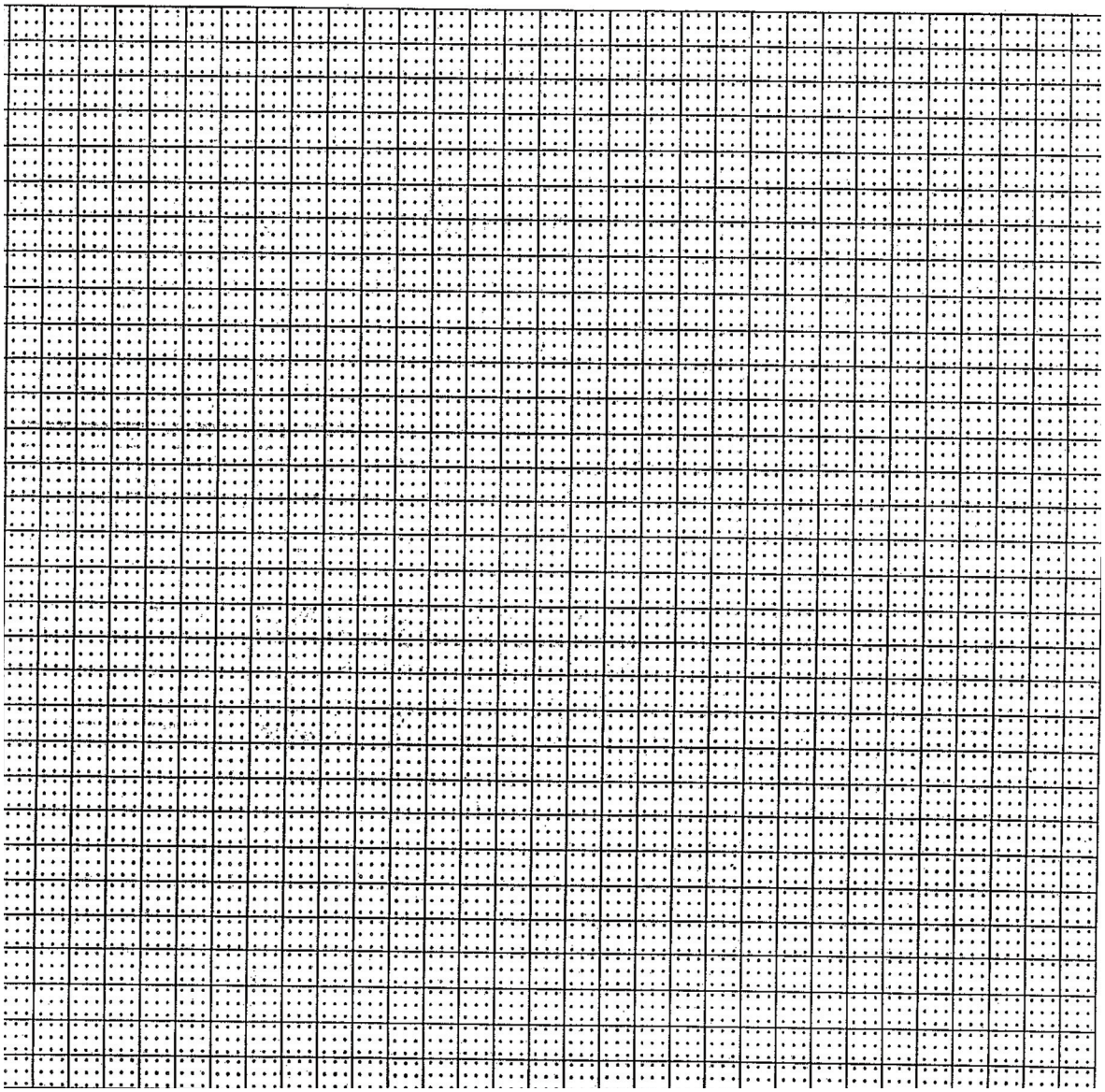
$$\frac{62{,}500}{43{,}560.} = 1.43 \text{ acres}$$

C. Divide the number of acres in a grid square by the number of dots within a grid square. For example, the attached grid sheet has nine dots per grid square:

$$\frac{1.43 \text{ acres/grid sheet}}{9 \text{ dots/grid square.}} = 0.16 \text{ acres/dot}$$

9. We recommend copying the grid sheet on a transparency or thin paper.

Figure A–1: Sample Gridsheet



Source: Grid sheet found in Workbook for Preparing or Updating a Master Plan and/or Preparing a Growth Management Plan, prepared for the Michigan Society of Planning Officials by the Planning & Zoning Center, Inc.

D. On a separate sheet of paper create a worksheet to record your results. Write down all of the zoning classifications (i.e., A – Agriculture, B–2 Local Business, etc.) at the top and leave room to list the acreage of each area of that classification.

E. Once the worksheet is complete, tape the zoning map to a light table, or identify a window in which you can hold the map up to.

F. Place the grid paper on top of the zoning map so the different zoning districts can be seen through the map. Carefully calculate each individual zone and record the acreage of each instance.

G. Once each zoning acreage has been calculated, sum each classification and divide that by the total amount of acreage in the municipality to determine the percent of each zoning classification that is represented in the city.

(Explanation found in the *Saginaw Bay Watershed Land Use & Zoning Study* prepared by the Michigan United Conservation Clubs with assistance of the Planning & Zoning Center, Inc.)

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Planning & Zoning Center
Michigan State University
Manly Miles Building
1405 S. Harrison Road, Room 310
East Lansing, MI 48823
517.432.2222
517.432.3222 fax
www.pzcenter.msu.edu