

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

Pollutant	Highest Level	2 nd Highest Level	3 rd 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)	<i>The ordinance requires that LID techniques are used when designing and constructing parking and loading areas.</i>	<i>All the elements of the “Good” category, plus pervious pavement options should be considered.</i>	<i>The “Better” approach may be the highest needed for this practice.</i>

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)	<i>The ordinance creates a building setback of 25 feet from significant natural features.</i>	<i>All the elements of the “Good” category, plus the ordinance requires a vegetated buffer strip between buildings and significant natural features.</i>	<i>All the elements of the “Better” category, plus the ordinance requires more than 25-foot setback whenever feasible.</i>

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)	<i>The ordinance has a Site Plan Review standard that sewage disposal and water supply shall remain safe during a development.</i>	<i>The Zoning Ordinance includes groundwater protection standards within the Site Plan Review.</i>	<i>The “Better” approach may be the highest needed for this practice.</i>

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

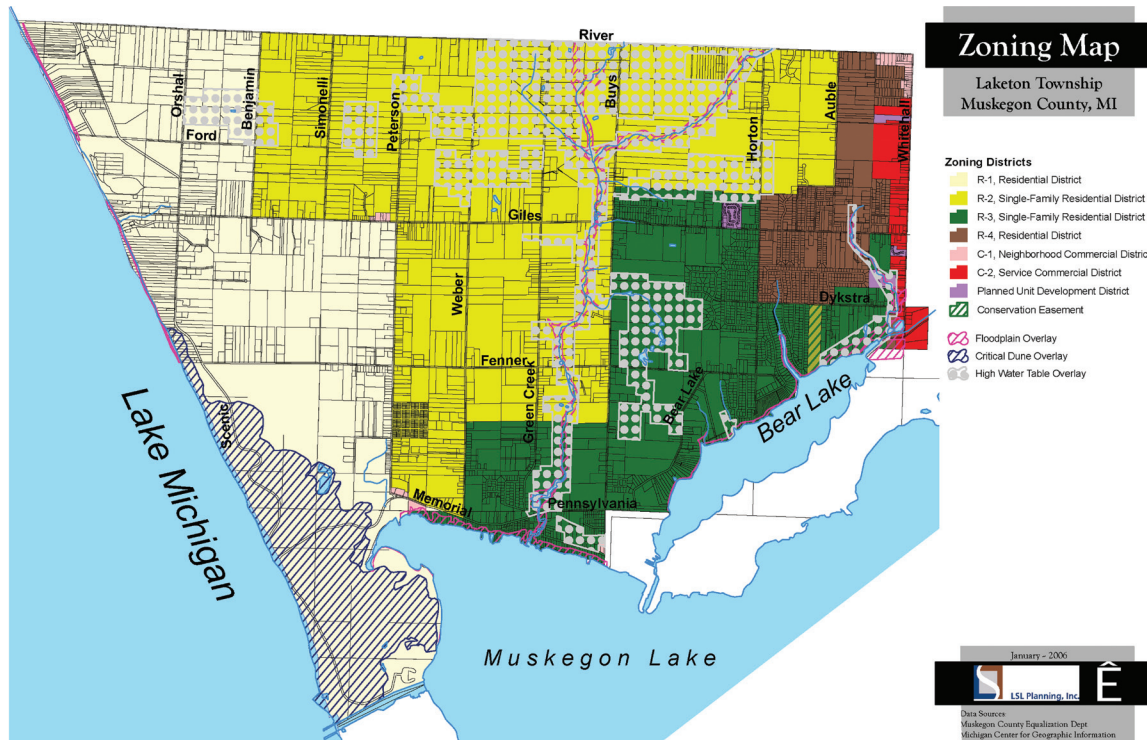
What is Protected?

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 foot 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:

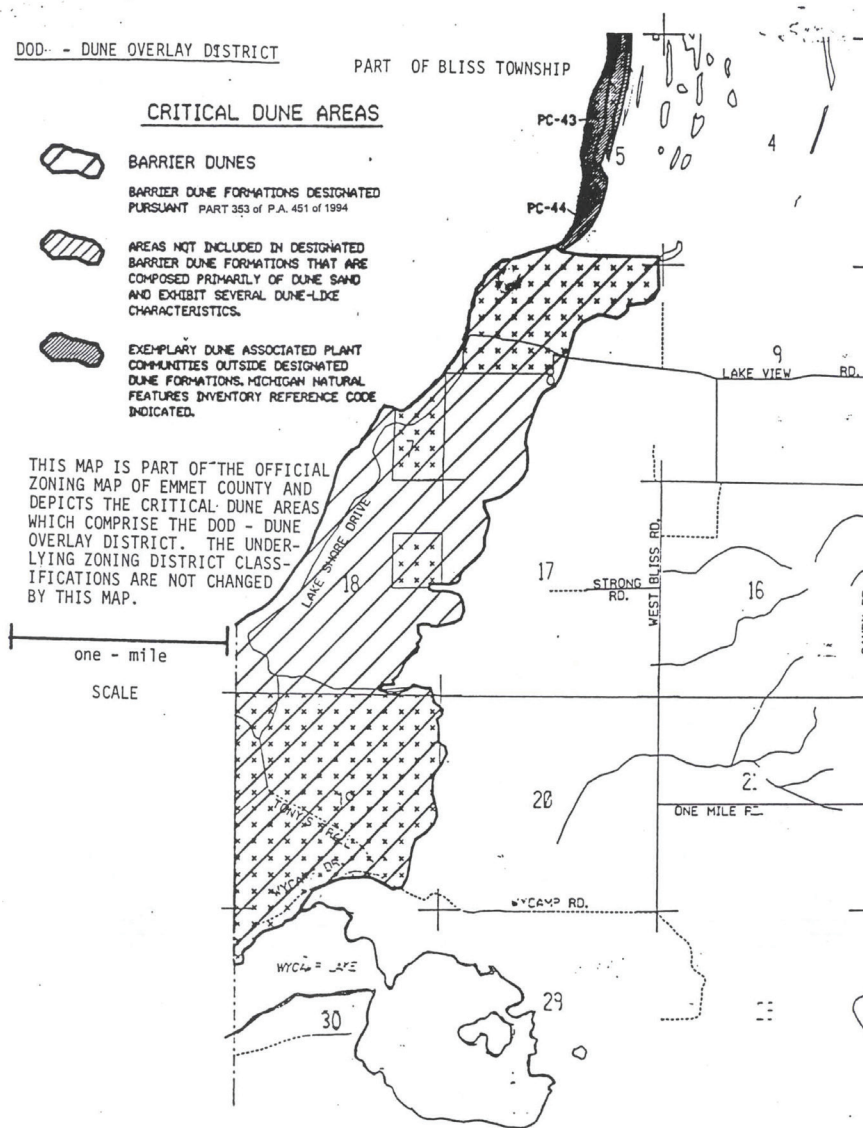
- Vegetation removal;
- Dredging, filling, or in any way altering the soil;
- Alteration of drainage;
- Timber harvest in a colonial bird nesting area; and
- Placement of a permanent structure.

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).

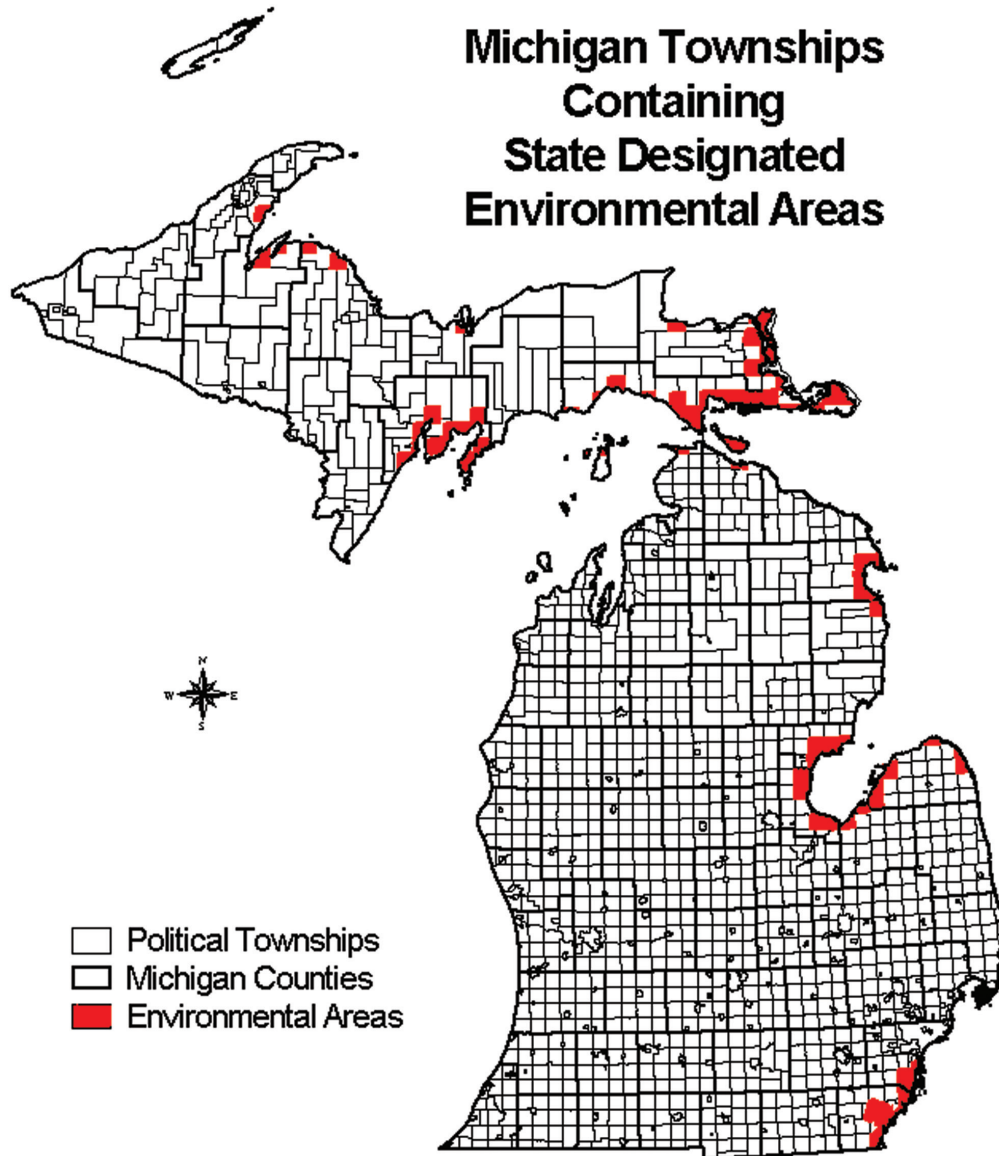
There are other ways to protect specific natural resources. The following sections look into other ways local governments can protect floodplains, woodlands, and wetlands. See Appendix A, on page A-14.

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 statute. 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)	<i>Prohibit tree cutting of more than “X” living trees and soil removal without an approved plan. (“X” is decided by the community.)</i>	<i>All of the elements of the “Good” category, plus require protection of existing woodlots as new residential subdivisions and development along waterways occurs.</i>	<i>The “Better” approach may be the highest needed for this practice.</i>

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 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;



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

- Nutrient utilization;
- Irrigation water use;
- Pesticide utilization/pest control;
- Cranberry production; and
- Farm markets.

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

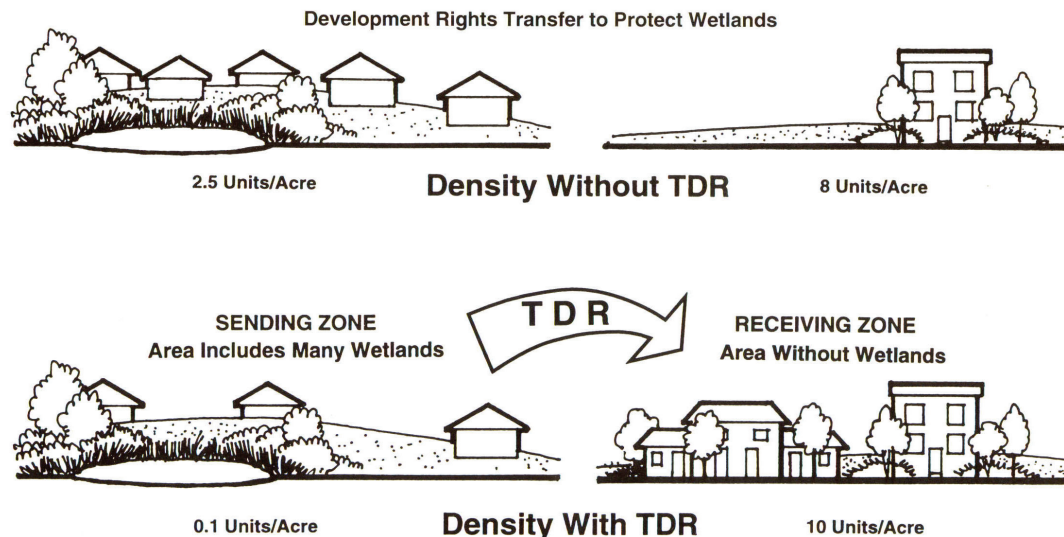
Follow the instructions provided in the section on Conservation Easements and follow this up with education on other resources, such as model PDR/TDR programs, farmland preservation, and transitional zoning techniques, or model ordinances for conservation subdivisions and Open Space PUDs. See Table 4–21,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