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A STEP-BY-STEP  
GUIDE TO  
CONSERVATION  
PLANNING  
AND DESIGN



FOR SUCCESS

# ACKNOWLEDGMENTS

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# PREFACE

"A healthy ecology is the basis for a healthy economy."

*Claudine Schneider, U.S. Representative*

**S**ome folks do not believe that it is possible to develop land and protect natural resources. The authors of this book contend that both objectives can be achieved simultaneously. Beginning in 1996, a partnership was formed to find common ground in the desire to protect the natural environment that makes Northern Michigan special as well as create economically viable developments. Momentum from this partnership resulted in the promotion of conservation planning and design with its inherent economic and ecological benefits.

Conservation planning and design is an established technique. The principles have been successfully applied to developments in Michigan and throughout the United States. A main selling point of conservation planning and design is the economic benefits that can be realized from this process. Some of these are as follows:

- Sales of lots can be faster and at a higher price than more traditional development designs
- The need for permits and associated permit fees is reduced
- Development costs are reduced by efficiently locating roads, sewer, and other infrastructure
- The tax base is protected and strengthened
- Resale of lots is potentially better
- New marketing incentives are created
- Public review time of the project can be reduced

This document is a how-to manual, designed to be used by anyone who wants to develop property and/or effectively manage the resources on a piece of property. It is most commonly applied to residential and mixed use developments, but its principles can be applied to almost any plot of ground. It will not solve all the issues related to new development. But it will help to protect our natural heritage, create communities that are great to live in, and enrich the local economy. The developer, the buyer, and the environment are all winners in this process. ■

# CONSERVATION PLANNING

## PART ONE

### INTRODUCTION

This manual is a result of the ideas, work, and dreams of many people. It was initiated by the Tip of the Mitt Watershed Council as a follow-up to the Northwest Michigan Roundtable on Tourism and Natural Resources Stewardship. The Roundtable was a collaboration of businesses, environmental organizations, local governments, and citizens in northwest Michigan that worked for two years to develop recommendations on how to protect natural resources in a thriving tourism economy.

In May 1996, the Roundtable sponsored a conference to gather public input about how to accomplish the goal of balancing natural resource protection and tourism development. At the conference the idea of conservation planning—planning that gives attention to the resources first—was embraced by nearly all of the 100 attendees. Although there was much support for the concept of conservation planning, there were also many questions, such as: was anyone doing conservation planning and how do you do conservation planning?

Because of the overwhelming support for conservation planning, the Watershed Council decided to organize a new group of diverse interests to explore what conservation planning really entails and how it is best done. The result is this manual which defines the steps to conservation planning as well as conservation design.

Conservation planning can be done on any scale, from a 50' by 50' urban lot to an entire county. The scope can also vary greatly from designing plans for a single lot to updating a municipality's master plan. This manual concentrates on how the individual property owner can do conservation planning. The manual does not

guide local governments through a conservation master planning process, but still offers valuable information for municipalities.

Developers, county planners, builders, business owners, bankers, environmental representatives, and farmers are just a few of the interests that helped to shape this scientifically accurate approach to conservation planning. This document will be an aid to anyone planning to alter or develop property. It will also help our communities find the balance between natural resource protection and growth and development in Michigan.

### WHAT IS CONSERVATION PLANNING?

The concept of conservation planning is fairly simple. Conservation planning determines suitable locations for land use activities based on the natural resource features of either a large planning unit such as a township or a piece of property. Common sense? Mostly. But the way most planning and development is done today often neglects to adequately consider natural resources.

Conservation planning and conservation design are not new techniques. In the late 1880s and early twentieth century there were many examples, including the summer resort Bay View, located near Petoskey. There are many other examples of good results from conservation planning across the country and in Michigan. It was in the late 1960s and 1970s, as the environmental and conservation movement gained strength and environmental regulations were passed, that conservation planning became more mainstream. As a result, some communities incorporated components of conservation planning into site plan review standards and other basic zoning ordinance requirements. Many good examples of the process are visible in the eastern United States.

The goal of conservation planning is to help the property owner achieve their goals for a site, without adverse impacts to the natural resources. In practice, this method is simple and has economic benefits as well as protecting natural resources.

Following the steps of conservation planning and conservation design results in many benefits to the community and property owner that more traditional approaches lack. For communities that encourage or require conservation planning it can enhance the "sense of community," save money by carefully locating infrastructure and using natural systems, protect or strengthen a tax base, and retain opportunities for resource-based jobs such as forestry and agriculture. For developers, conservation planning can make obtaining local and state permits easier, reduce project costs, and increase return on the investment.



## PURPOSE OF THE BOOK

In Michigan and across the country we continue to see rapid changes in our landscape. *Michigan's Trend Future Report* published by the Michigan Society of Planning Officials (1995) documented that we are using more and more space per person for housing. The number of dwellings built on an acre of land has decreased from about 5.5 to between 2.6 and 1.3 per acre in southeast Michigan over approximately 30 years. If trends continue, the report predicts that up to 2 million acres of land will be consumed to house Michigan's population in the next 20 years, even with the negligible projected population increase of about 12%.

Can our communities sustain this current pattern of development? If we develop at this density how will we pay to maintain the roads? What will the water quality of our lakes and rivers be? What will our communities look like? Although we don't have the answers to these questions, we believe that conservation planning can be an effective first step towards changing the pattern of how we develop and

## CONSERVATION PLANNING AND DESIGN BENEFITS

- Reduces development costs by efficiently locating infrastructure
- Protects or strengthens tax base
- Reduces permit fees and the need for permits
- Lots can sell faster and at a higher price
- Maintains resources for resource-based jobs
- Reduces pollutants to lakes, rivers, and wetlands
- Potentially increases property value
- Maintains or builds a sense of community
- Preserves options and opportunities for future generations
- Protects fish and wildlife habitat
- Protects valuable natural resources
- Preserves cultural and historical resources
- Protects open space and scenic views
- Spreads the value of the natural resources through the entire development
- Provides on-site recreation space

use land in our communities and have a positive impact on our natural and economic resources.

Through this manual, we hope to incorporate conservation planning as the common way for property owners and developers to create site designs for large and small scale developments and homes. This book is our attempt to lay-out how to do conservation planning in a step-by-step manner. Some steps are very simple, and others require research and potentially professional help.

Conservation planning will not solve all the land use issues and controversies in Michigan. However, we believe it is an imperative step towards finding a balance between future growth and resource protection. Conservation planning links old-fashioned common sense with new technology for fast-paced modern times. This manual offers an approach to develop land in a way that everyone wins—the developer, the buyer and the general public.

## HOW TO USE THIS BOOK

Any type of land use planning can benefit from taking the conservation approach. Conservation planning provides a strong base to determine what actions are needed to accomplish the goals for a property in a cost-effective manner without impacts to the property's resources. Conducting the first step of this process prior to purchase would be the most ideal.

The manual can be used as a workbook. The information is presented in a step-by-step manner using case studies to serve as examples. Although conservation planning can be done by an individual, county planners, consultants, engineers, resource managers, soil scientists, and others can provide assistance with many of the steps and other possible situations that may arise during planning (many of these resource people will provide help free of charge). If using this manual as a workbook, the following materials will be helpful: notebook, clipboard, access to photocopier, mylar or acetate sheets, ruler, highlighters, and a computer with Geographic Information System (GIS) capabilities.

The information in the manual is useful for all types of development projects. New as well as retrofitted developments can benefit from following this process. The resource inventory steps can also serve as a guide for assessing a property prior to purchase. ■

**B**efore beginning to develop a plan for a development site, it is extremely helpful to have a general understanding of the landscape. A site visit to the property is necessary. In fact, if you are prepared to do conservation planning, an initial site visit can be expanded to begin collecting the information for the resource inventory checklist.

It would be helpful to have a parcel map (to scale if possible) on a clipboard to begin mapping the features you find on the property. A parcel map shows the outside dimensions of the property and existing road access. Parcel maps are available at most city or county equalization offices. You can also find out the dimensions of your property from your deed or property title. Examples of property features to sketch are listed at the right.

### **Summary Step 1**

*First:* At an initial site visit, the following items should be observed and sketched, if possible:

- Location of property boundaries
- Plant cover type  
(e.g., pine forest, meadow, hayfield, concrete, etc.)
- Potential wetland areas
- Presence of water resources
- Potential environmental contamination areas
- Road access
- Utility access (power, sewer, water)
- Land use activities on adjacent properties
- Soil types (dig a small hole to check soils in a few different locations)
- General topography and drainage
- Sand dunes
- Floodplains
- Existing structures, if any
- Historical features
- Other obvious features of the property

Now is the time to begin researching the features of the property and add details to the map. ■

## **THE FIRST STEPS TO CONSERVATION PLANNING—THE RESOURCE INVENTORY**

Throughout this manual, the metaphor of a stairway is used to convey the steps in the conservation planning and design process. The manual is designed to take you up the stairway and stop you from tumbling down. The first step in conservation planning is to inventory the resources on the property. Inventorying the resources is perhaps the most challenging, important, and fun part of conservation planning. The inventory can be described as the foundation of the process. So let's begin!

## **CONDUCT INITIAL SITE VISIT AND CURSORY RESOURCE INVENTORY**

# **S T E P 1**

A soil survey is kind of like an x-ray, it reveals a significant amount of information about an area that is not visible to the eye. Almost every county in Michigan has a completed, or is in the process of completing, a soil survey developed by the Natural Resource Conservation Service (NRCS). Copies of these are available at local conservation districts for no or little fee. At first glance the soil survey may seem like it is written in a mystery code, but with a little exploration, the code is easily broken.

Using the soil map for Section 16 of Resort Township, Emmet County as an example, the following soil codes are displayed: Ca, ChA, EaB, EmB, EmC, EmD, EsE, Ey, KaB, Ma, and Rc. Each soil survey has an alphabetical listing of the soil codes and their official names, which allows us to identify the following types of soils in this section:

- Ca*, Carbondale muck
- ChA*, Charlevoix sandy loam
- EaB*, East Lake loamy sand, 0-6% slope
- EmB*, Emmet sandy loam, 2-6% slope
- EmC*, Emmet sandy loam, 6-12% slope
- EmD*, Emmet sandy loam, 12-18% slope
- EsE*, Emmet soils, 18-25% slope
- Ey*, Ensley sandy loam
- KaB*, Kalkaska sand, 0-6% slope
- Ma*, Made land (fill)
- Rc*, Roscommon mucky sand

Just by identifying the soil types present, we can identify potential sensitive environmental areas, areas with limitations for development, and areas well suited for development. For example, the areas where Carbondale muck is present is likely to be a wetland. The EsE, Emmet soils, 18-25% slope and EmD, Emmet sandy loam soils with 12-18% slope, are areas where limitations for development exist due to the steep slopes. The sandy loam and loamy sand areas with 0-6% slopes are areas that could potentially be best suited for development.

Soil surveys have their limitations. Soil surveys are mapped on a large scale, therefore the actual boundaries of different soil types may vary on the site. The accuracy of soil surveys varies greatly. Some have a high level of accuracy and others contain many mistakes. Soil surveys are excellent planning tools, but it does not replace an on-site assessment of the soils, slope, drainage, etc. Understanding the soils found on a property is a valuable and important step in conservation planning. Below is a detailed description of how to navigate a soil survey.

### **Summary Step 2**

*First:* Pull out the index map found inside the back cover of the county soil survey and identify which soil map or maps covers the area you want to inspect. Go to that soil map.

## **GEOGRAPHIC INFORMATION SYSTEMS: Conservation planning with computer technology**

Computers can help greatly with conservation planning. In Michigan, much of the information needed to proceed with the resource inventory is available in a computerized format. Using computer mapping programs, often referred to as a Geographic Information Systems or GIS, each step of information is entered as a separate layer. Layers are then compiled to create a map specific to each property. The map identifies the high priority resources, sensitive areas, and areas not suitable for development. It also shows areas that are suitable for development.

There are many advantages to using a GIS system to develop and map the resource inventory, including saving time, access newly computerized data, ability to create one map with multiple layers of information, plus many others. Computerized or digitized information is available for Michigan's roads, political boundaries, water resources, watersheds, and land use/land cover

## ASSESS SOILS USING SOIL SURVEY

# S T E P 2



Understanding the basics about the soils on your property is an important part of conservation planning, but there are limitations to soil surveys. They cannot identify every feature of a property, including small streams and topography.

Topographic maps show the elevation of the land (see drawing on page 9). They are produced by the U.S. Geologic Survey Division (USGS). They are inexpensive and can be purchased by mail and at some sporting goods stores. See Appendix A for specifics on how to order topo maps.

Reading a topographic map can be kind of tricky, but it gets easier with practice. Here are a few basic tips. The groupings and shapes of the elevation lines help to point out valleys, steep slopes, hillsides where scenic views may occur, low areas, and county drains, plus more. Topographic maps also show most water bodies, and many intermittent streams. The thin brown lines on the map indicate different intervals of elevation usually in 5 to 10 meters (approximately 15 to 30 feet). The thick brown lines will have the actual elevation in meters marked on it. Lines that are very close together indicate steep areas and areas with very few lines that are spread far apart are generally flat areas. Generally speaking, areas where slopes are over 25% should be strongly considered for conservation areas and development in these areas should be avoided. This is due to the high potential for soil erosion. Slopes between 15 and 25% require special

site planning and should also be avoided whenever practical.

The elevation lines and water bodies marked on topographic maps can be used together to determine drainage patterns or watershed boundaries. Topographic maps are useful for determining how a property area may influence or be influenced by runoff from neighboring areas.

Assessing the drainage patterns goes hand-in-hand with determining what watershed the property or study area is in. A watershed is the land area surrounding a lake or river that runoff from rain or snowmelt drains into. Knowing what watershed(s) a property or study area is in can help identify drainage patterns. For a large area it is also helpful to know the area of land in the watershed and what stretch of the watershed the area is in—headwaters, middle, or mouth. For example, a property near the headwaters of a stream may be less vulnerable to flooding than a property adjacent to the mouth of a stream, but it may be more sensitive ecologically. The watershed may be obvious from looking at a topographic map. If not, a watershed map can be obtained from a conservation district or watershed council.

Visualizing a three-dimensional property on a two-dimensional map is not always easy. It is important to note that the scale for topographic maps (1:25,000) is different from the scale of many soil surveys (1:20,000), making overlays difficult to do without a computer system. The USGS does have

## INVENTORY BASIC RESOURCES USING TOPOGRAPHIC MAPS

### S T E P 3

some of the topographic information digitized (in a computer readable format) which may be useful for very large properties. Check with your local planner.

### **Summary Step 3**

*First:* Obtain or borrow a topographic map of the study area.

*Second:* Survey the map to locate if the property has any of the following: water resources such as lakes, rivers, streams, wetlands, springs and drains; steep areas, especially areas that may not have been noted in the soil survey; high elevation areas (these may be important features in the community's landscape); valleys that may be prone to runoff during snowmelt and spring rains; roads; trails; old logging roads; railroad tracks and other features, such as gravel pits; boat access sites; and pipelines.

*Third:* Using the elevation lines, look for unique features of the area such as possible scenic views, valleys, or floodplains along any streams or rivers.

*Fourth:* Assess the drainage of the property using the topographic maps. Runoff flows from higher elevations to lower elevations. Are there properties

upstream of the study area that may contribute runoff to the site or does the study area currently contribute runoff to adjacent properties? Will construction on the property (i.e., house or driveway) affect the runoff on adjacent property?

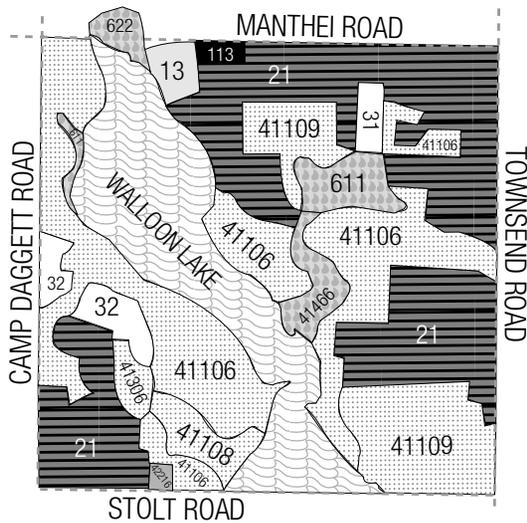
*Fifth:* Identify the watershed of the study area. This may be obvious if the property is adjacent to a relatively large lake or stream. If not obvious, consult local resources. ■



Topographic maps are mainly used to indicate elevations, including high and low areas on a property.



- Residential
- Industrial
- ▨ Cropland
- Vacant
- ▤ Upland Hardwoods
- ▥ Upland Conifers
- ▧ Walloon Lake
- ▩ Wetland Areas



MIRIS maps indicate land cover types, based on aerial photography. They are available on a state-wide basis.

Developing a plan for a property would not be complete without some understanding of the land use and vegetation (i.e., forest cover types). Combining the land use and forest cover type information with soils and inventory information from topographic maps results in a good basic resource map.

Land use and vegetation type information can be determined from aerial photo interpretation. The Michigan Department of Natural Resources (MDNR), Michigan Resource Inventory System (MIRIS) has done this for the entire state. The MIRIS data is based on aerial photos from 1978 and is available in maps or in a digitized format. It distinguishes 60 different land use classifications and vegetation types.

The MIRIS information is rather outdated, so it has limitations. It is currently being updated, but this effort, being done on a statewide basis, is expected to take a long time. Also, cover types on parcels less than five acres were not mapped by the MIRIS Program. It is possible to obtain current aerial photos for a small charge at local conservation districts and interpret them yourself. All sources of information should be scrutinized for accuracy. An on-site review should always be conducted for verification.

The MIRIS land use/cover information is most helpful for planning on large tracts of property. For small properties, a site visit and assessment of the vegetation types is usually necessary. Professional foresters and conservation district staff can often assist with developing vegetation maps for properties.

### Wetlands

Of the 60 land use/forest classifications in the MIRIS system, 12 describe wetland habitats. Wetlands are an important resource that offer many values to a property. Wetlands help protect water quality, protect

### Where are wetlands usually found?

Wetlands are typically found in depressions, the lowest portion of the landscape or adjacent to lakes, rivers, or streams. Landscape position, climate, and soil type all influence wetland formation. You can expect to find wetlands in the following places:

- In low areas with a high water table.
- On slopes where ground water breaks out as springs or seeps.
- Near rivers, streams, inland lakes, and the Great Lakes.
- In flat areas where clay type soils or bedrock close to the surface form an impervious layer that creates a “perched” water table.
- In abandoned ditches or stream channels.



Some wetlands are easy to identify. Others are not and may take an on-site investigation by a wetlands consultant to determine the wetlands type and boundaries.

## IDENTIFY LAND USE AND VEGETATION TYPES

# STEP 4

against flooding, and can prevent erosion. The fish and wildlife habitat and scenic beauty wetlands provide can increase the selling value of house sites nearby. Michigan has a variety of wetland types such as cattail marshes, tag alder or red maple swamps, bogs and many others.

If the land use/vegetation type maps indicate the presence of wetlands and there are hydric soils from the soil survey, it is recommended that you hire a consultant to conduct a wetland delineation. The MIRIS information provides large scale information about vegetation but it cannot be relied on to define the boundaries of a wetland. An on-site wetland delineation will determine the location, size, and type of wetlands on a property. The Michigan Department of Environmental Quality (MDEQ) will conduct a wetland assessment for a fee. They also have a list of wetland delineation consultants.

According to Michigan's wetland delineation methods, there are two primary indicators of wetlands: 1) The predominance of plants adapted for living in saturated conditions (hydrophytic, or wetland vegetation); and 2) The presence of water at or near the land surface throughout the year or for some portion of the year (wetland hydrology), which is commonly indicated by the presence of distinctive soils that develop under saturated conditions (hydric soils).

Federal wetland definitions and delineation methods differ slightly from state law. The primary difference between the state and federal methods is that the federal delineation method considers hydric soils to

be a separate required parameter on its own instead of an indicator of wetland hydrology.

Although regulatory definitions and delineation methods among agencies and those used by consultants are essentially the same, the actual "line" between upland and wetland is not always clear. This is understandable when you consider the variety of wetlands that occur in Michigan and that wetlands are ecosystems subject to natural influences that fluctuate (e.g., rainfall, temperature, or lake levels). State and federal agency staff sometimes disagree slightly on wetland boundaries. In addition, agency staff sometimes disagree with delineations conducted by consultants. Often the resolution of disputed wetland boundaries requires multiple site visits with both parties. It is important to remember that the state and federal regulatory agencies have the ultimate authority over boundaries of wetlands regulated by state and federal statute.

#### **Summary Step 4**

*First:* Obtain MIRIS land use/cover maps from local township, county, regional, or state planning agency. Some counties have very detailed forest information that includes the timber size and forest types. There may be a small fee to get a map with this information. Walk the property and sketch the different vegetation types or hire a forester to map forest types.

*Second:* Using the MIRIS code or other reliable source, list sensitive features such as wetlands, sand dunes, steep slopes, and floodplains.

*Third:* If you suspect that wetlands are present, have a wetland assessment done for the property.

*Fourth:* Using highlighters, mark on a map the sensitive areas, vegetative cover, and land uses. ■

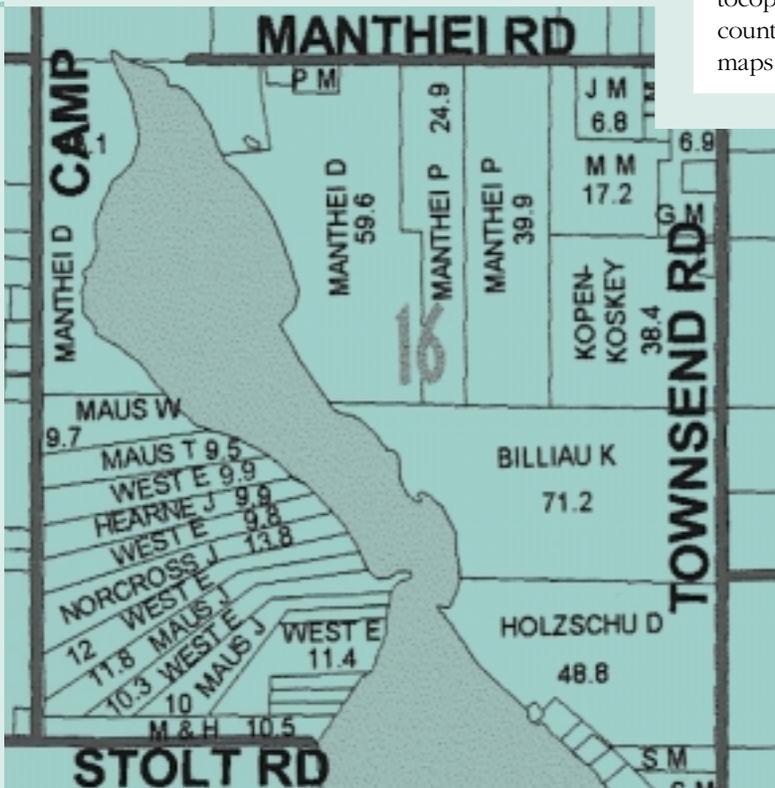
#### **Do I have a wetland on my property?**

Many property owners are confused about the technical definitions of wetlands. This is understandable given the variety of wetlands in Michigan and the fact that many wetland types look different than our traditional conception of a wetland (which is typically a cattail marsh). Below are a few questions that you can ask yourself about your land. A YES answer to any of the questions may indicate that you have a wetland on your property.

- Is the ground soggy underfoot, in the spring or all the time?
- Are there depressions where water pools on the ground surface during the spring or all the time?
- Do you avoid the area with heavy equipment for fear of getting stuck?
- Would you need to ditch the site to dry it out?
- Is the site in a depression that has a different vegetation community than the higher ground around it?
- Are there ground water seeps or springs present?
- Are fallen leaves black or very darkly stained and contain sediment deposits on their surfaces?
- Dig a hole. Is the soil gray, or contain bright red or orange mottles against a gray background?
- If farmed, is there crop stress due to excessive water?
- Does the soil survey for your county show the soil on your property to be hydric, poorly, or very poorly drained?



County plat maps are an excellent planning resource. Understanding who owns what land and the size of properties in an area is a key component to conservation planning. Knowing surrounding land ownership can be helpful for development projects of all sizes. This can help to identify potential land use conflicts and opportunities. The plat map information combined with the land use/vegetation information will show patterns of land development. Plat maps can be purchased from county offices for a small fee. They are copyright protected and permission must be obtained prior to making photocopies of any plat map. In addition, some counties have their plat maps digitized and the maps are available in a computer format.



Plat maps generally indicate who the owner of the parcel is and how much land is owned. Information for small parcels is not included.

### Summary Step 5

*First:* Obtain a plat map or digital plat information.

*Second:* Locate the property's relationship to county/state roads. A plat map may show more roads than the topographic map.

*Third:* Assess the properties surrounding the study area. Does it contain mostly large tracts of land in private or public ownership? Are there mostly small tracts and subdivisions? Are there state forests, parks, or other conservation lands in the area?

*Fourth:* Try to identify any potential conflicts between your goals and existing land uses in the area. Think long-term—what might this area look like in 10 years? If you live near state land, are you comfortable with the potential for people hunting or a timber harvest near your property? ■

## ASSESS LAND OWNERSHIP

# S T E P 5

In a hike through the woods it is a thrill to see a deer raise its white-tail and run away. It isn't such a thrill to see that deer eating the lettuce in your garden. Unfortunately, as development moves into rural areas, we replace wildlife habitat with homes and businesses. One of the goals of conservation planning is to minimize the impact on wildlife habitat, particularly for threatened and endangered species.

Greenways and wildlife corridors are innovative tools that link conservation areas together. Greenways can help communities protect wildlife habitat and also provide recreation opportunities such as hiking, biking, and ski trails. Establishing wildlife corridors and greenways will require looking at surrounding properties. Rivers and streams are natural corridors and important areas for wildlife. If your property has a stream, consider marking a buffer around the stream as a conservation area. Greenways and trails can be reserved for private use by property owners in the development only. They can also be linked to larger trail systems on public property.

### Threatened and Endangered Species

Threatened and Endangered Species are two terms commonly used to describe the status of plants and animals with regard to extinction. Often incorrectly used interchangeably, they have very specific and different meanings. Endangered means a species which is in danger of extinction throughout all or a portion of its range. Threatened means a species which is likely to become endangered soon.

There are many reasons to protect threatened and endangered species. Foremost is that everything is connected to something else. Loss of species results in unraveling of food webs, loss of biological diversity, and decreased ecosystem stability. Additionally, threatened and endangered species have aesthetic, commercial, recreational, scientific, educational, and historical values. Birdwatchers, photographers, and ecotourists derive great enjoyment (and spend a lot of money) trying for a glimpse of the earth's least common inhabitants. Chemicals derived from plants are the major or sole ingredient in one-fourth of prescription medications. When a species becomes extinct, a unique set of genetic material, whose use may presently be unknown, is lost forever.

The state and federal government each have a list of threatened and endangered species. If you own or are looking to buy a relatively large piece of property or a property with Great Lakes frontage, it is always wise to check if threatened and endangered species may be present on the property. Two sources to contact for information on threatened and endangered

species include the Michigan Natural Features Inventory or a biologist at any MDNR office. Contact information is listed in Appendix A. If any species are present on your property, restrictions may apply.

### Summary Step 6

*First:* Contact the local conservation district, a local environmental organization or a private wildlife consultant, to discuss wildlife habitat on the property. Inform the resource professionals of your goals and what information you have already obtained as part of the resource planning inventory. Ask if there is priority habitat in the study area, if there are any greenways or wildlife corridor protection programs in place, if there are any threatened or endangered species in or near the property, and how any of the planned activities may impact wildlife.

*Second:* Mark any wildlife habitat, corridors, greenways, or threatened and endangered habitat on the map as conservation areas. ■



The presence of wildlife on a property can greatly enhance its appeal and add to its marketability.

## IDENTIFY WILDLIFE HABITATS, CORRIDORS, AND PRESENCE OF THREATENED AND ENDANGERED SPECIES

# STEP 6

**G**round water is the source of drinking water for nearly 50% of Michigan residents. Ground water contamination is widespread in Michigan with thousands of contaminated sites. Conservation planning is useful for assessing past uses of the property and environmental contamination. Liability concerns and costly cleanups can make a site with past pollution problems less desirable. However, if a site has been officially cleaned up and removed from the federal and state list of contaminated properties, then it may be an excellent way to reuse a property. It can even serve as a good opportunity to rehabilitate the site.

Understanding past uses of the property will determine the likelihood of environmental contamination on a property. Contaminated soils and ground water from leaking underground storage tanks is one of the most common sources of environmental contamination. Farms, gas stations, and some auto repair sites

are likely to have had underground storage tanks which may have leaked. Past industrial sites could have had an on-site dump where toxic and everyday waste was disposed.

The first step to investigate if there is environmental contamination on the property is to ask the previous owner(s) how the property was used. If past owners are not available and the uses are unknown, it may be worthwhile to hire an environmental consultant to do a Phase I environmental assessment. A Phase I assessment generally includes research of past and present owners; research of public records; a physical inspection of the property; and recommendations. Hiring a consultant to do a Phase I environmental assessment shows that the new owner has shown “environmental due diligence” and should be entitled to the “innocent purchaser defense.” Both federal and state laws provide some protection of new buyers of contaminated property if the buyer has demonstrated

environmental due diligence or the minimum of a Phase I environmental assessment.

If an environmental assessment shows that the site is contaminated then a Phase II assessment may be warranted. A Phase II assessment includes soil and ground water testing to document the extent of the contamination problem and the estimated clean-up costs.

A property should also be assessed for ground water recharge areas. Ground water recharge areas are locations where significant amounts of rain and snow melt filter back into the ground to feed ground water or aquifers. Many ground water recharge areas have been identified as part of well head protection programs and this information may be available from county or regional planning agencies. In addition, a developed property with a well should have the basic bacteria and partial chemical analysis tests performed by the local health department.

### **Summary Step 7**

*First:* Interview the past property owners, neighbors, and, if appropriate, the realtor for information about the property’s past uses.

*Second:* Inspect the property for possible sources

## IDENTIFY GROUND WATER RESOURCES AND POSSIBLE ENVIRONMENTAL CONTAMINATION

# STEP 7

of contamination, such as fuel storage tank vents, pipes, platforms, floor drains, or evidence as a dump-site.

*Third:* If the property is for sale, review the seller's disclosure statement, which obligates the seller to disclose the existence of fuel storage tanks or other known problems.

*Fourth:* If environmental contamination is suspected, hire a reputable environmental consultant to do a Phase I environmental assessment.

*Fifth:* Contact the MDEQ Environmental Response Division and request information about environmental contamination sites near your property or within a mile of the study area. Mark these locations on one of your resource inventory maps. Also request information about any clean-ups that are ongoing or future clean-ups planned.

*Sixth:* Contact a local or regional planning office for information on potential ground water recharge areas. Mark these areas on your resource inventory maps.

*Seven:* If there are wells on the property, have the wells tested for bacteria and a partial chemical analysis. Water bottles for collecting a sample are available from the local health department. You send the sample, along with a small fee to Lansing for testing. ■



**The steps of conservation planning help assess past uses of the property including ones that may have caused environmental contamination.**





### **Sand Dunes and High Risk Erosion Areas**

Michigan's Great Lakes shoreline has the largest concentration of fresh water dunes in the world. These dunes and beaches on the sweetwater seas provide unique habitats for many threatened and endangered plants and animals. These special shoreline areas are also an important component of the tourism economy.

From a conservation planning perspective, it is important to know that dune areas are in a constant state of flux, being formed, transported, and eroded by wind and wave action. The process of sand erosion and deposition is the most fragile part of the dune system.

To protect these fragile areas, certain areas

have been designated as high risk erosion or critical sand dunes and are protected by law. In these identified areas extra requirements such as larger setbacks apply. The regulations may be administered by either the local unit of government or the Michigan Department of Environmental Quality. Only a small portion, 270 miles of the total 3,288 miles, of Great Lakes shoreline is protected by critical sand dunes regulations. This does not mean that other dune areas of the Great Lakes shoreline are not important habitats. Extra care and attention must accompany any project on Great Lakes property.

### **Floodplains**

The floodplain is the natural low area adjacent to surface water bodies that holds floodwaters. Floodplains slow the discharge, remove nutrients and sediments, and allow some percolation to ground water. Floodplains are also very productive wildlife habitat. When the floodplain is altered by development, sedimentation, and/or vegetation destruction, its ability to handle floodwaters is greatly reduced. Such changes in the floodplain aggravate flooding and subsequent flood damages, especially downstream.

Because of the important values of floodplains, a community may have special zoning or building code

IDENTIFY CRITICAL SAND DUNES, HIGH RISK EROSION AREAS, FLOODPLAINS, AND OTHER SENSITIVE ENVIRONMENTAL RESOURCES

S T E P 8

Critical sand dune areas occur on all Michigan's Great Lakes. Careful consideration must be given to any project associated with a dune ecosystem.

requirements. The U.S. Army Corps of Engineers and the U.S. Geological Survey Division have made official floodplain maps for many communities. In addition, many communities rely on flood resistant construction standards incorporated into the State Construction Code and Building Officials and Code Administrators (BOCA) National Building Codes which are enforced in about 80% of Michigan's communities.

## Waterfront Properties

Michigan is truly a water wonderland with borders on four of the five Great Lakes, more than 11,000 inland lakes, and thousands of miles of rivers and streams. In fact, almost anywhere you are in the state you are never far away from some form of water. Not surprising, riparian properties are also worth more on the real estate market. For conservation planning purposes there are many things to consider. Foremost is the presence of wetlands on the property (this is discussed in more detail in STEP FOUR).

Shorelines provide important habitat for many aquatic and land animals. The place where the water meets the land is called the littoral zone. Littoral zones are some of the most productive aquatic habitats. Recent scientific studies are beginning to document impacts on fish, frogs, salamanders, and birds from

damage to littoral zone habitat. Through conservation planning you can protect littoral zone habitat while still allowing access to water bodies. It is important to assess what the shoreline area is like for all waterfront property. You will want to check the property to see if there is a natural strip of vegetation along the shoreline. If so, how wide is it and what kind of plants are growing there? What is the bottom of the lake or river like, is it rocky, gravelly, sandy, or mucky? Are there plants growing in the water?

If the property has Great Lakes shoreline, then at a minimum the following items should be inspected: 1) evidence of changing lake levels; 2) presence of critical sand dunes; 3) evidence of shoreline erosion and erosion prevention structures on adjacent properties;

Flood-prone areas should definitely be noted as a limitation during the conservation design process.



4) presence of threatened or endangered species (there are many threatened and endangered plants that grow along Great Lakes shorelines); and 5) ordinances and laws that regulate activities on Great Lakes shorelines.

If the property is on a river, check with the local MDNR office to inquire if it has a state natural river designation. The purpose of a natural river designation is to protect the biological, scenic, or recreational values of a river through special zoning restrictions. Each natural river has its own committee with local representatives that review zoning requests. Even if the river does not have a natural river classification, local zoning may have stricter requirements for riverfront properties. Other things to assess on any stream or river property is where the floodplain is and if the property has any shoreline erosion.

All lakefront properties should be assessed to insure that suitable soils are present for a septic system and for shoreline erosion. There may also be special zoning restrictions for inland lake properties, including setback and greenbelt provisions.

## Summary Step 8

*First:* Contact your local zoning office for information and maps that show critical sand dunes, high risk erosion areas, and floodplains. Inquire about special regulations regarding these areas, as well as a parcel fronting on the Great Lakes or inland lake or stream.

*Second:* If the property is on a river or stream, contact the local MDNR office to check on natural river status and any special regulations. Also document the floodplains, inspect for erosion, map shoreline vegetation, and record bottom substrate.

*Third:* Mark on a map these important conservation areas. ■

There are many minerals mined in Michigan with: iron ore, oil and gas, peat, sand and gravel, cement, clay, shale, crushed stone, lime, and salt being the most important to Michigan's economy. Inventorying mining information is very important for conservation planning for two primary reasons. One reason is that you want to avoid potential land use conflicts from the industrial activities associated with mining. The second reason is that in order for mining to remain a viable industry in Michigan, it depends on having large tracts of land that are not developed into subdivisions or commercial areas. The two most common types of mining activities that at a minimum should be investigated are oil and gas extraction and sand and gravel mining.

In 1997, Michigan was the tenth largest producer of natural gas. Oil and gas production has occurred in 50 of Michigan's 83 counties. Oil and gas development activities are regulated by the Michigan Department of Environmental Quality and are virtually exempt from local land use laws, with a few exceptions. Since oil and gas resources are everywhere, it is very important to know if the mineral rights come with a property. It can also be helpful to learn if surrounding properties own their mineral rights. To find out more about oil and gas development in a particular area, contact the MDEQ Geological Survey Division staff. They can inform you of the number of permits and the formation (e.g., Antrim Gas or Niagran Oil) oil and gas companies are drilling by township or county.

Oil and gas development can be very disruptive and cause damage to natural

resources and infrastructure, particularly roads. If a property owner owns their mineral rights it can also be a significant source of income. Assessing ongoing oil and gas activities is an important step for conservation planning.

Sand and gravel are critical components of road construction, building foundations, driveways, and a myriad of other land development activities. Because of the rich gravel and sand deposits left by the glaciers 10,000 years ago, Michigan has an abundance of this important resource. However, gravel pits are not popular neighbors. Noise, increased truck traffic, dust, and visual blight are all attributes that can decrease the value of properties near gravel pits and the quality of life of those living near them.

Conservation planning can help to identify if there are any sand and gravel mines nearby. If you are planning to develop a

sand and gravel mining operation, conservation planning can help you find suitable locations and avoid potential environmental problems and conflicts with neighbors.

### **Summary Step 9**

*First:* Confirm ownership of the mineral rights. This is most often done as part of a title search. If the minerals have severed ownership, document the different owners.

*Second:* Inquire about any existing mining activity on the property.

*Third:* Check on oil and gas development activity in your area. Contact the Michigan Department of Environmental Quality District Office (ask for Geological Survey Division staff) nearest you for this information.

*Fourth:* Using the information gathered, determine the potential for oil and gas drilling on the property. If there is a high potential, research additional information on leasing minerals.

*Fifth:* Contact your local planning and zoning office to inquire about the location of gravel pits nearby. If there are, assess if they will impact the goals you have for the property. ■



Inventorying mineral resources on a property are important when planning to extract the resource and/or to help avoid potential land use conflicts.

## ASSESS MINERAL RESOURCES

# STEP 9

The interrelationship of nature and culture is as old as human-kind. Identification of significant cultural and historic resources is an integral step in conservation planning and design. As such, a resource inventory would not be complete without an assessment of the property's cultural and historic resources. Initial contacts to learn if a property has any cultural or historic significance include present and past owners; city, county, and regional planning officials; tribal offices; and local historical societies. In addition, the State Historic Preservation Office, Michigan Department of State; and the Michigan Historic Preservation Network (a statewide nonprofit organization) are state level sources of information.

Recognized cultural resources may be designated at one or more levels. At the local level, some communities have created locally designated historic districts. These can be either urban or rural districts, and could include buildings, structures, sites, objects, or cultural landscapes. At the state level, the State Historic Preservation Office maintains the State Register of Historic Sites, and official listing of historic resources in Michigan. And at the federal level, two programs exist: the National Register of Historic Places (the federal government's listing of significant historic resources), and the National Landmarks Program (resources designated as the country's most significant resources).

Cultural resource questions you may want to ask include:

- What historic features does the property have? (These might include buildings, out-buildings, foundations, burial sites, fence rows, walls, gardens, vegetation, and roads.)

- Who was the first property owner, and what was the succession of subsequent owners?
- Was or is the property used for any Native American ceremonial or public or quasi-public purpose?
- During what period were the significant features created, or later substantially altered?
- Is alteration of significant features subject to any restrictions as the result of designation by a local historic district commission or State Registry Program?
- Are there scenic views from public roads, waterways, or railways that border or bisect the property?
- Is the property part of a scenic roadway or route that is an asset of the property?
- What are the community's sentiments towards the property?

Based on the specifics of an individual property, there may be many other questions that need to be addressed as well. Assessing the cultural significance of a property is an increasingly important con-



sideration. As more old structures are replaced by new, and as the density of development increases, consideration of a community's cultural heritage is an essential process for maintaining a connection with our past, and creating a continuum into the future. Knowing the history of a property may not result in any changes to your development plans, but it can enhance your understanding and appreciation of the land.

**It could also be an important economic consideration. Buildings listed, or deemed eligible for listing, on the National Register of Historic Places may take advantage of a 20% investment tax credit if rehabilitated for income producing purposes. And all buildings 40 years or older qualify for a 10% investment tax credit if rehabilitated for a commercial use.**

### **Summary Step 10**

*First:* Contact sources to inquire about historic significance of the property.

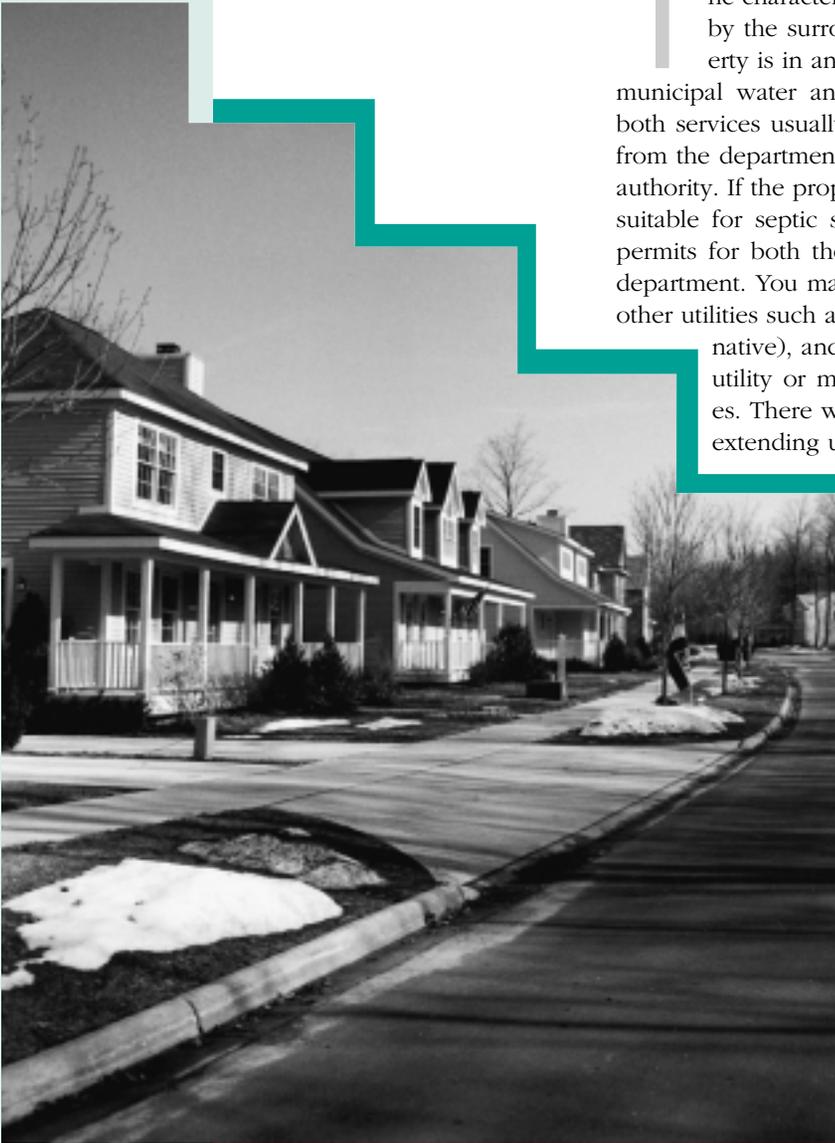
*Second Two:* Evaluate the significant cultural resources on the property, and determine if there are any requirements or restrictions which must be considered.

*Third:* Document significant cultural and historic features of the property on your resource inventory map in order to integrate them as assets into the development plan. ■

Noting historical and cultural sites and understanding their level of significance helps develop an appreciation of the land and evaluate potential uses for the property.

## IDENTIFY CULTURAL AND HISTORIC RESOURCES

# STEP 10



The character of a property is greatly influenced by the surrounding infrastructure. If the property is in an urbanizing area, is there access to municipal water and sewer services? Connections to both services usually require approval and tap-in fees from the department of public works or the managing authority. If the property is in a rural area, are the soils suitable for septic systems and wells? You will need permits for both these services from the local health department. You may also want to check for access to other utilities such as electrical power, gas (or an alternative), and cable television through the local utility or municipality supplying these services. There will most likely be fees assessed for extending utility lines to your property.

Existing road access to the property will also have to be assessed. Are there public or private roads abutting the property? If it's a public road, it will be necessary to obtain an

access permit from the county road commission. If it's a state highway, you will also need a permit and may be responsible for installing tapering lanes, curb cuts, culverts, or other road improvements. If it is a private road, you will need permission from the property owners along that road, or a homeowners association to access that road.

Proximity to other nearby natural resources and community areas such as parks, greenways, trails, lakes, rivers, and ski areas are also important features to consider. Perhaps the conservation areas on your property can be linked to others off the site.

### **Summary Step 11**

*First:* Mark existing roads on the parcel map. Begin to assess where a road would be proposed to connect from your property. Consider safe sight distances, slope and other existing curb cuts. Obtain the driveway permit from the appropriate authority.

*Second:* If the property is in an urbanizing area, check with the department of public works about the availability and fees for sewer and water hook-ups. If in a rural area, check for septic and well permits with the local health department. Plan the physical location for these features.

*Third:* Contact the appropriate authority for installation fees concerning other utilities such as electric, gas (or alternative), cable television, as well as others.

*Fourth:* From the research results, compile your notes and map preliminary locations for roads, septic and wells or sewer and water hook-ups, as well as other desired utilities. ■

MAPPING INFRASTRUCTURE—ROADS, WATER, SEWER, UTILITIES

**S T E P 1 1**

Michigan has more than 1,800 units of government and many of these have adopted zoning ordinances pursuant to state law.

Zoning ordinances establish land use regulations for activities such as housing, farming, commerce, industry as well as others. The goal is to protect property values; avoid land use conflicts; and maintain the public health, safety, and welfare. To determine the zoning requirements for your property, call or visit the appropriate zoning office. The planner or zoning administrator is the primary source for obtaining accurate zoning information.

It is important that you do not rely on others for this purpose. It is a good idea to get zoning information in writing. Ask for copies of pertinent pages of the zoning ordinance when you

visit the zoning office. Knowing what zoning district a property is in and the ordinance's requirements is critical for conservation

planning. Are the land use activities you have planned for the property

allowed in the local zoning ordinance? What are the setback requirements from property lines? If the intended use is residential, how much density is allowed? In addition, most zoning ordinances have special restrictions for waterfront properties. Farm and other resource-based uses may have special restrictions as well.

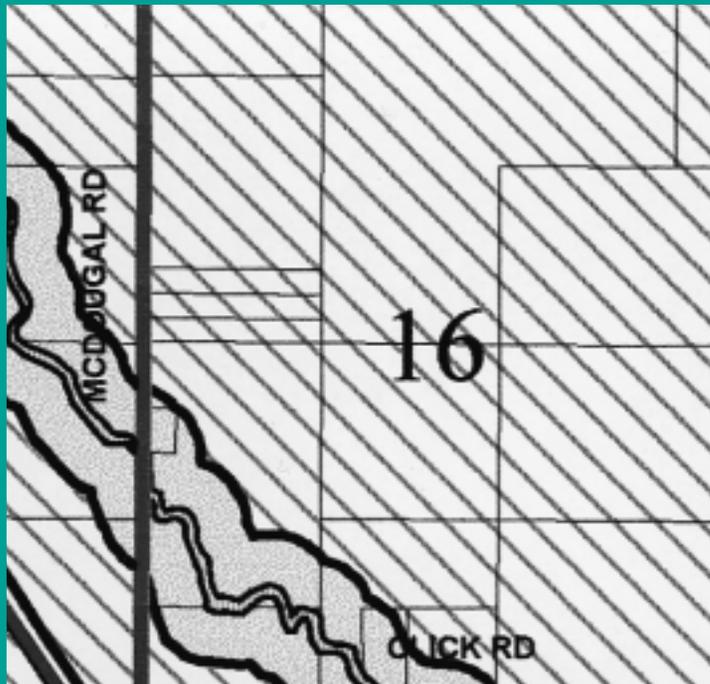
Many communities are modifying their zoning ordinance to include incentives and different regulations to preserve open spaces and to protect natural resources. Others are interested in doing so, but often their ordinance has not been updated to support or encourage development patterns to meet these goals.

It is important to learn about the zoning prior to making any decisions about how your project may look. Quite often a landowner will have grandiose plans in mind for their property, just to find out that the zoning ordinance does not allow it. We have listed this as one of the last steps in the resource inventory, because knowing the other information is helpful before meeting with the local planning department. However, determining the zoning of a property can also be accomplished as one of the first steps to ensure the use you have in mind fits the zoning requirements. Researching the zoning of a property is a vital step in the conservation plan.

### Summary Step 12

*First:* Contact your local zoning office (city, township, or county) to determine what zone the property is in, what restrictions there are such as setbacks, height restrictions, density levels, etc.

*Second:* Compare the zoning regulations with your goals and the results of the conservation plan. ■



#### ZONING DISTRICTS

-  Farm Forest
-  Scenic Resource

A zoning ordinance describes what uses are allowed on a property. A zoning map such as this tells the boundaries of established land use districts.

## EVALUATE ZONING

# STEP 12

A significant amount of information can be gathered without even stepping foot on the property. Most likely you will have visited the property many times. If you are doing most of the resource inventory from another town or state, this is the time to schedule a site visit. There is no better way to investigate a site and confirm the information gathered than a site visit. Perhaps the historic barn that was on the property has fallen to the ground, or beaver activity on a nearby stream has created a wetland that wasn't shown on maps.

In particular, check the soils (especially where septic systems may be used), natural features, and existing buildings. Develop a separate list of items that need to be checked on the site.

Another way to document features of the property is to photograph them. As they say, “a picture is worth a thousand words.” Photographs will help you remember certain aspects of a property and may help when collecting information for the resource inventory. Photos will definitely be helpful when it comes to putting the information together.

## PUTTING THE INFORMATION TOGETHER

Now that you have gathered more information than you thought imaginable about a property, it's time to put it all together. How do your goals for the property compare to the property's assets and limitations. Can intensive uses be clustered in areas where soils are capable of handling septic systems? Can points of interest be developed around cultural or historic resources? Can identified limitations and natural resources serve as conservation areas to enhance the development?

For your convenience, a checklist of the steps in doing a site inventory has been developed. You will find it in Appendix B. ■

## CHECKLIST OF RESOURCE INVENTORY STEPS

- Step 1  Conduct initial site visit and resource inventory
- Step 2  Assess soils using soil survey
- Step 3  Inventory basic resources using topographic maps
- Step 4  Identify land use and vegetation
- Step 5  Assess land ownership
- Step 6  Identify wildlife habitats, corridors, and presence of threatened and endangered species
- Step 7  Identify ground water resources and possible environmental contamination
- Step 8  Identify critical sand dunes, high risk erosion areas, floodplains, and other sensitive environmental resources
- Step 9  Assess mineral resources
- Step 10  Identify cultural and historic resources
- Step 11  Mapping infrastructure—roads, water, sewer and utilities
- Step 12  Evaluate zoning
- Step 13  Conduct a follow-up field visit to check inventory

## CONDUCT FOLLOW-UP FIELD VISIT TO CHECK INVENTORY

# S T E P 1 3



# CONSERVATION DESIGN PART TWO

**W**hat is conservation design? Conservation design incorporates all the information collected during the resource inventory and designs a plan for it. Using a conservation-based design takes natural resources into consideration, while still providing for development of the property to occur. Whether creating a single family house site, or a site with multiple uses, conservation design techniques can help to maximize the value of a property and protect resources.

Conservation design achieves a dual purpose by: protecting resources and creating an economically profitable development. It typically uses one-half (or less) of the buildable land for house sites and streets. It is described as density neutral, meaning the number of units allowed by zoning is not increased or decreased. Conservation design encourages a wiser use of the resources on the property.

## **BENEFITS OF CONSERVATION DESIGN**

Traditional developments are typically comprised of only two main elements — lot lines and roads. This method is limiting both environmentally and economically. Current patterns of development have resulted in a significant loss of valuable natural resources. More than 50% of the state's wetlands have been destroyed and productive farmland is disappearing at an alarming rate of 10 acres per hour. The economic opportunities associated with conservation design development far outweigh traditional developments.

Traditional subdivisions can limit the use of a property. With conservation design,



each owner has their own lot, but they also share ownership of a larger parcel containing the conservation elements. In this way, the potential use of the conservation area is maximized for the use of all property owners within the development. Larger conservation areas can be reserved for use by the developer to continue forestry or agricultural uses. Other conservation areas can be set aside for open space, recreational opportunities, and/or wildlife viewing areas.

Finally, we know that traditional developments do not maximize economic return to the developer. Conservation design developments with amenities such as nature trails, wooded areas, wildlife vistas, and open meadows are in higher demand and fetch a higher price. It is worth the extra effort to conduct a thorough resource inventory and develop a conservation design. The environmental and economic benefits are transferred to the developer, future property owners, and the community.

## **Potential Lower Costs**

There are many costs to developing, marketing, and selling property. Engineering and construction costs for roads, surveys, permit fees, excavation and regrading, and vegetation removal are just a few of the costs associated with creating and selling a new development. Conservation design can help reduce some of those costs:

### ***Reduce permit fees and needs for permits***

Identifying sensitive resources such as wetlands, steep slopes, floodplains, and critical sand dunes and incorporating them into conservation areas reduces the need for permits and expensive engineering to build in these environmental areas. It also reduces the complications, additional time, and extra steps associated with the need to obtain these special permits.

### ***Reduce road and utility costs***

A traditional development typically has larger, more dispersed house sites. This results in more paved surfaces, more runoff, expensive stormwater collection and treatment, and inefficient layout of utilities. With conservation design, the amount of road surface is reduced. It avoids areas that are costly to build roads in such as wetlands, ravines, low lying areas, and streams. With less road surface, there will be less stormwater runoff to manage. Since the location of utilities is tied in a major way to the road layout, conservation design encourages a more efficient layout of utilities such as sewer, water, gas, electric, and cable. A reduction of road distance and utility lines will save on future maintenance costs. Conservation design contributes to an overall reduction in site development and maintenance costs.

### ***Conservation areas versus golf courses, tennis courts, and pools***

It is interesting to note that 40% of the people who buy housing on a golf course

do not play the game. Accessibility to scenic views and proximity to open space is the attraction to buyers. Conservation developments do not normally incorporate expensive amenities such as golf courses, tennis courts, pools, and club houses. Instead they build on the amenities that preservation of the natural environment can offer such as: wetlands which afford views of special plants and birds, park-like views of open meadows, and deer yards for catching a glimpse of wildlife. These amenities increase the value of the property and the quality of life for those who live nearby without adding high development and maintenance costs.

### **Improved Permit Experience**

The Advisory Committee guiding the writing of this document, repeatedly pointed out one of the biggest advantages conservation planning and design offers is the ability to make the permitting process go faster and smoother. In some instances, certain permits can be eliminated all together. Navigating the local, state, and federal bureaucracies for permits is a daunting task. How can conservation planning and design improve the government permit process?

#### ***Smoother permit process***

One of the easiest ways to make the permit process go more smoothly is to take areas that would require special permits for construction activities and include them as part of the conservation area—thereby avoiding significant portions of the permit process. This is particularly true for sensitive areas such as wetlands, critical sand dunes, and high risk erosion areas.

#### ***Faster permit process***

If a special permit is needed for the project, the information collected in the resource inventory will provide background needed for permit applications and to support your position for the permit. For example, if there is no way to avoid crossing a stream with a new road which would require an Inland Lakes and Streams permit, the results of the resource inventory will help you document that all other alternatives have been explored and the “best” place for the crossing has been researched.

Regardless of whether a special permit is needed,

### **Affordable Housing**

Conservation design concepts are fairly new in the housing market and have been primarily used for high-end housing. The Advisory Committee guiding this project identified this current limited market for conservation design as a concern. The need for conservation design developments to be available for a variety of housing markets was discussed at every meeting.

In fact, the lack of good quality, affordable housing was identified as a potential source of resource damage, particularly in rural areas. Lot splits continue to occur at a rapid pace throughout Michigan and development spreads quickly to rural areas without a concentrated effort to protect open space or important natural and cultural resources.

Conservation planning and design must not be limited to expensive, exclusive neighborhoods. Presently, the market is strong for young families, empty nesters, and seniors. We hope that developers will heed this call and make conservation oriented subdivisions available for all levels of consumers in the near future.

completing the resource inventory will help speed up other required permit processes such as zoning and soil erosion. Traditionally, developers spend much time and money on engineering and surveys in the absence of conducting a resource inventory. Therefore when they get to the public hearing process, they are married to these plans. There is very little room for flexibility. This sometimes causes angry neighbors and tabling decisions for months.

Conversely, with conservation design, the resource inventory is completed first and is incorporated into the design. The developer can prove he/she has complet-

ed the homework. The benefit is there is a tendency for much less resistance from the public and the planning commission.

### **Economic Returns**

Compare the bottom line of a traditional development versus a conservation design and the conservation design will have many more advantages. Developments with conservation areas are selling faster and at a higher price than properties in more traditional subdivisions. There is also greater demand for properties with access to natural areas.

#### ***Property value appreciation***

Properties that have access to natural areas and scenic views will be worth more than those that don't. As growth and development continues in Michigan, properties that have a connection to the natural landscape will become more and more valuable. We need only look at our own history for the proof. Great Lakes and inland lake property was affordable and available throughout the state just 20 years ago. The availability of lakefront property has diminished and the values have increased dramatically. Now the hot real estate market is what's considered “second tier” properties which have scenic views of lakes.

Although we cannot look into the crystal ball to see visions of the future real estate market, we feel confident that properties that have natural features as amenities will gain more in value than those that do not. A long term study in Amherst, Massachusetts proves that the value of conservation design developments appreciate more in value than the traditional subdivision counterpart. In this study, two subdivisions built at approximately the same time, with very similar houses sold for almost the same price, with the same density (about two units per acre). The only major difference between the two developments is that homes in the first were located on half-acre lots with little or no open space. Homes in the second development were built on quarter-acre lots with 36 acres of open space, including mature woodlands, trails, a large meadow, a pond and beach, a picnic area, a baseball diamond, and tennis courts that also could be used for basketball. After 20

years, the homes in the second development sold (on average) for \$17,000 or 13% more than their counterparts in the first development where the lots were twice as large. This 13% differential is attributable to the neighborhood open space amenities, with all other aspects being nearly equal (*Lacy 1991; Arendt 1994, 1996*).

### **Marketing**

The housing market varies greatly throughout Michigan. In much of Michigan there are key features that many consumers are looking for in housing: privacy, access to the outdoors, and for many—a rural setting. America Live Inc., a San Francisco based firm that interviews between 80,000 to 100,000 consumers a year, primarily for the real estate industry, found that consumers are putting an increasingly high premium on interaction with the outdoors through the inclusion of wooded tracts, nature paths, and wetlands. In other words, natural features are becoming more and more important to the consumer. This is not surprising, as one need only look at real estate ads to see the emphasis placed on properties that are adjacent to public land or a nature preserve, or other natural features such as scenic views and proximity to trails. A property with a large conservation area has many positive selling points. From a consumer's point of view, it's a bargain to be able to buy a house on a smaller lot that has access to a large conservation area without the expense of purchasing and paying taxes on the larger acreage.

*Selling nature:* When it comes to housing, nature sells. Scenic views, lake access, trails, or other natural features make the property much more attractive.

*Bargain for the consumer:* As mentioned above, you can market the sale of a one acre lot in a conservation design development as one acre plus the 40 acres of conservation area for the cost of just one acre.

*Value appreciation:* Property value appreciation can also be used as a marketing tool. On average, people live in a house for a shorter period of time than they used to. This makes the appreciation value of a house more important. Since homes in conservation design developments appreciate at a higher value, this adds a boost to marketing.

*Building a community:* Although conservation

designs will vary greatly depending on the natural characteristics, most will also possess a sense of community. Conservation designs that incorporate trails, walkways, and village greens connect more than just the conservation areas, they help to connect the residents. Conservation designs bring people back to nature and neighbors, things consumers are beginning to expect and demand from their living space.

### **Environmental Stewardship**

We have already explored the fact that conservation design benefits more than the developer and consumer by protecting significant natural and cultural resources. This is one of the main goals of conservation design, and it is an advantage for the nearby neighbors and the entire community as well.

Environmental stewardship of private properties is a legacy of conservation design that we can leave to our children and grandchildren.

### **REGULATION OVERVIEW: FEDERAL, STATE, AND LOCAL**

One of the main purposes of land use regulations is to help protect property rights. Zoning ordinances protect residential areas from incompatible uses. Wetland regulations help to protect the public interest in the natural functions that wetlands provide, such as: their ability to prevent flooding and erosion; provide wildlife habitat; and protect water quality. Anyone who has built a single family home or developed a large site knows these regulations are important, but they provide numerous hoops to jump through. Although the regulations may seem like a hassle, the extra effort they require will help protect your property in the future as the surrounding properties change hands.

We will not attempt to describe all the federal, state, and local ordinances that affect land development, but instead focus on the most critical regulations for conservation design and the public comment process.

Navigating the sometimes rocky waters of regulation can be tricky. The best place to start is from the local level, then address the state and federal regulations. Having completed a thorough resource invento-

ry will ease the process. You will have the information to apply for the necessary permits at your fingertips. In addition, by following the conservation design steps, you may eliminate the need for certain permits.

Local permits that will most likely be required include: zoning, building, soil erosion and stormwater, and sanitary and well (or permission to hook-up with local water/sewer). For zoning, you will need to determine what local government has zoning authority, either city, village, township, or county. Building permits are generally handled by counties or larger townships. Conservation districts or the local government often enforce soil erosion and stormwater regulations. The health department enforces the sanitary code which requires permits and sets standards for locating and designing septic systems. They also regulate the drilling of wells. If the property is in a sewer area or a public water system, permission from the municipality or sewer authority that manages the wastewater and wells will be necessary. There may be other special local regulations for historic districts, critical sand dunes (these can be locally enforced), or wetlands.

The primary state regulations that are likely to effect a conservation design project are environmental regulations. Some of these include wetlands, inland waters, critical dunes, floodplains, endangered species and stormwater regulations. Depending on the size of the project, the Michigan Department of Public Health could require permits for drinking water supplies. The land division act and site condominium act may also influence the number of lots you can subdivide on your property and management of shared ownership areas such as the conservation area.

In Michigan, the main federal law relating to waterfront property management is Section 404 of the Clean Water Act. This program regulates wetlands that are contiguous or within 1,000 feet of a Great Lake, dredging bottom lands of the Great Lakes, or projects that involve major discharges of fill into wetlands anywhere in the state. Administered by the U.S. Army Corps of Engineers, any activity that involves filling a wetland that meets those criteria requires a joint permit from the Corps and MDEQ. Pursuant to Section 10 of the

## Key Regulations that Impact Property Development

### Local Regulations:

- zoning
- building codes
- soil erosion and stormwater control
- wetlands
- inland lakes and streams
- septic system or hook-up to local sewer well or hook-up to local water line
- sand dunes or high risk erosion
- floodplains
- overlay zones (*shoreline, conservation district, etc.*)
- historical district

### State Regulations:

- land division act
- site condo act
- wetlands
- inland lakes and streams
- ground water (*for wastewater beyond 10,000 gallons per day*)
- soil erosion
- stormwater
- sand dunes or high risk erosion
- floodplains
- endangered and threatened species

### Federal Regulations:

- wetland permits-U.S. Army Corps of Engineers
- construction/filling Great Lakes-U.S. Army Corps of Engineers
- endangered and threatened species-U.S. Fish and Wildlife Service
- stormwater -US Environmental Protection Agency

Rivers and Harbors Act of 1899, the Corps also regulates filling and construction of any structure (including breakwalls and docks) on, in, or over bottomlands of the Great Lakes.

### Confused?

If you are having a difficult time determining who has authority over certain regulations and haven't been able to get assistance at the governmental level, search out resources such as the environmental organizations

or environmental consultants. They are very familiar with regulations and may be able to offer suggestions or direct you elsewhere for more assistance.

Remember the goals of conservation design are to protect natural resources as well as design an economically viable development. If you find that you need to apply for numerous environmental permits, it may be necessary to revisit the results of the resource inventory. It may be possible to reduce the need for certain permits and offer greater protection for the environmental areas of the property. In turn, the environmental areas will become marketable assets for the development.

### Public Comment

Many regulations, such as wetlands, ground water discharge, and zoning have requirements allowing for written public comment and public hearings. These features may seem like an additional burden, particularly since they may bring out conflict and controversy.

The public comment opportunities are not ideal. By the time hearings are held, it is most likely that significant amounts of time and money have been spent on surveys, engineering, and site plans. In other words, you have courted, become engaged, and planned the wedding for that property all before presenting it to the planning commission and the public for comment. When public comments disagree with your plans, it is like someone at a wedding objecting to the marriage—it seems a little late.

From the neighbor, planning commission, or environmental organization's point of view, the public comment period is the first legal opportunity they have to learn about the project, voice their opinion, and share potentially helpful information about your project and that property. There usually isn't any opportunity prior to the legal comment period for open communication about the project to occur.

It is recommended that if you are planning a large project it would be to your benefit to contact potentially interested organizations and neighbors to share your goals and intentions for property development prior to engaging in the permitting process. An informal face-to-face meeting can bring all the concerns out in the open and give you an opportunity to explain the results

of the resource inventory and the proposed conservation design. Understanding neighbors' concerns from the beginning may be extremely helpful in the planning process. In fact, they may be able to provide valuable information about the history of the property or important natural features. This definitely requires more work on the developer's part, but in the long run it may reduce the work and effort that may have been needed to mitigate controversy and receive permits.

It is also wise to schedule a pre-application meeting with the planning commission and/or planning department staff to discuss the results of the resource inventory and your potential plans. Many planning commissions have informational meetings in addition to their regular meetings. At the informational meetings the atmosphere is usually more informal and no decisions are made. Just as with the neighbors and local organizations, planning commissioners may be able to provide you with very useful information that will strengthen your resource inventory and conservation design. A preapplication conference with State and Federal regulators is also recommended — even if it's just in the form of a phone conversation.

Land use and proposed changes in land use can become very emotional issues. Clear, honest communication can channel these emotions in a positive way to get clearance for your project. There are no guarantees that using conservation planning and design and meeting with local interests will make your project progress without any hurdles. This process will hopefully make the hurdles lower and decrease the number you may need to jump over. Time and money saved can be a positive result in the long run.

## CREATING A CONSERVATION DESIGN

There are many different approaches to developing a conservation design. We have selected a sound and relatively simple technique developed by Randall Arendt, of the Natural Lands Trust in Media, Pennsylvania, that uses four basic steps to put together a conservation design. The four steps include: 1) identifying conservation areas; 2) selecting house sites; 3) aligning roads and trails; and 4) drawing lot lines.

## STEP ONE: IDENTIFYING CONSERVATION AREAS

The first step is to identify the conservation areas of the property using the mapped information produced during the resource inventory. The amount of area to be set aside should be a minimum of 50% of the buildable property and should include the priority resources for your conservation area. Wetlands, steep slopes, floodplains, sand dunes, and other regulated areas should automatically be included in the conservation area.

Each site has its own unique resource areas. Identify all resources that need protection that were discovered in the resource inventory. The priority of these may vary depending on the geographic location. For example, forested areas are limited in Southern Michigan and should most likely be protected. Mark the conservation areas on a map of the property to guide you through the next steps.

*Priority Resources to Automatically Include in Conservation Area:*

- wetlands
- high risk erosion areas
- steep slopes
- critical sand dunes
- habitat for threatened and endangered species

*Important tips for determining conservation areas:*

- Wildlife habitat, corridors, and greenways. Investigate the land surrounding your property to assess if you can connect your conservation area to another conservation area or public land on an adjacent property. This will provide more access to land for potential buyers and also help to protect valuable wildlife habitat and corridors.
- Remember to protect scenic views inside and outside of the development. Investigate views from the road and existing and potential views from the property.
- Try to keep the conservation area together rather than having 10 acre parcels in each corner. This will maximize the environmental values of the conservation area and, most likely, provide more assets to the overall design.
- It is ideal if each home site touches one conser-

## Community Resources

Determining how many people and what organizations to contact to share your preliminary development plans for a property will vary depending on the size and type of the project. If you are not familiar with the area, Chamber of Commerce offices often have a listing of community service and nonprofit organizations. If the property has waterfront features or other important natural resources, you may want to contact local environmental groups or lake associations for resource inventory information and to share your plans early in the process. Informal meetings one-on-one or in small groups would be advisable over a large meeting.

Approaching potential adversaries as potential resources allows conflicts to be brought out in a “safe” environment that fosters communication and problem solving. Public meetings and comment periods generally do not provide this type of atmosphere. Here are a few suggestions of groups that may be helpful to contact: Historical Societies; Local Native American Tribes; Environmental Organizations; Lake Associations; Property Owners Associations; Watershed Councils; Outdoor Sporting Associations.

vation area on at least one lot line and preferably two. It enhances the value of each lot as well as the entire subdivision, if this objective is achieved.

## STEP TWO: SELECTING BUILDING LOCATIONS

Determine how many building sites will be possible based on the number of acres of “buildable property” and the number of units allowed per acre by zoning density requirements. To determine “buildable proper-

ty” subtract the number of acres of unbuildable property, i.e., wetlands and other conservation areas, from the total number of acres. It is important to know if on-site septic systems and wells will be needed. The septic systems can be located on individual lots, or on community property. Consider suitable locations for the house sites in relation to the identified drainfield area. If there is a shared drainfield this should be drawn on the map.

Using the map, identify the remaining areas of the property that are not conservation areas. Begin drawing house structures so they will be adjacent to, or have a view of, a conservation area. It is ideal if every house is adjacent to a conservation area on at least one side, preferably two.

Make photocopies of the base map to try different placements for the houses. Don't be afraid to experiment. This is the creative stage of conservation design. There is probably more than one way to achieve the goals of conservation planning and design by protecting resources on the property and realizing economic benefits.

## STEP THREE: ALIGNING ROADS AND TRAILS

The next step is to identify suitable locations for the roads and trails. A major benefit to conservation design is that it often results in shorter road length than a typical “cookie cutter” subdivision. This can result in a substantial savings in development and maintenance costs.

After determining potential house sites, placing the roads is as simple as connecting the dots. Avoid locating roads where they will have to cross wetlands, streams, or wildlife corridors whenever possible. Consider following the natural topography with curving roads, single loaded roads (see sidebar on page 29) and scenic vistas in the design where possible.

When locating trails, think about where obvious access should occur. Again, each home site should have access to a trail, and this trail should connect to the conservation areas on the site. In terms of trail use, these pathways may be used by people as well as animals. Trails provide a welcome and safe transportation

alternative, where residents can experience nature and avoid roadways primarily intended for vehicles.

#### **STEP FOUR: DRAW LOT LINES**

Usually this is the first step in designing a development, but for conservation design it is the last step. After identifying the conservation areas, the houses, and the roads and trails in suitable locations, draw in the appropriate lot sizes based on zoning requirements. Consult with the local zoning administrator for details. It may be necessary to apply for a variance or special use permit for reduced lot sizes. The important fact is that the overall density of the development will not violate zoning density requirements.

The examples on pages 30-33 illustrate the conservation design process for two different sites.

#### **MANAGEMENT OF CONSERVATION AREAS**

Potential buyers of homes in the development will want to be assured that the shared spaces herein being referred to as conservation areas will be protected and will not be sold or developed in the future. In order to accomplish this objective, it is necessary to use one of the following ownership options: individual ownership; donation to a land trust or other non-profit organization; deed restrictions by homeowner associations; common ownership by association; conservation easements in cooperation with a land trust; municipal ownership; or combinations of the above. Determining ownership decides who is responsible for maintenance, liability, and property taxes of the conservation areas. The following discussion outlines the benefits and limitations of each option.

##### ***Conservation Easement with Land Trust***

This is one of the most preferred methods of protecting conservation areas because it offers complete and final protection in perpetuity. One of the main goals of land trusts is to obtain land and conservation easements for land protection purposes. Donating the land to a land trust is an effective way to provide long-term protection of the property and financial benefits to the property owner. With a conservation easement the property will remain private, unless otherwise

#### **Conservation Design Leadership**

Trying something new and presenting an innovative approach such as conservation design presents some challenges. Change on all levels is not easily embraced by many people. Conservation planning and design techniques will definitely seem like a “change” from the typical approach most local governments are used to. In fact, you may be introducing the local planning commission to the concepts and ideas behind conservation planning and design. Understanding this may be very helpful in realizing that there may be a learning curve for the local officials on this topic. You may need to share information, such as this manual, with the planning commission. It may help to bring in a speaker or official from a nearby municipality that has worked with conservation design to help promote it.

specified. Most land trusts are private, nonprofit organizations and often require a contribution to cover their costs for monitoring and maintaining the easement. Land trusts have experience and expertise managing natural areas and establishing easements and are often a good choice to own title to the land or hold a conservation easement.

Easements are a preferred method because the restrictions are held in perpetuity with the title of the property. It is difficult to modify easements. Changes require agreement from all co-holders and must retain the spirit of the original agreement. Land trusts and local governments typically hold easements and will periodically monitor the property to insure protection of the land.

##### ***Donation to Conservation Organization***

Donation of conservation areas to a qualified conservation organization offers permanent protection of

the land. It is one of the most effective ways to protect natural areas in perpetuity. Conservation areas can be described separately from the rest of the property. The title for those areas are transferred to the qualified non-profit organization or governmental agency for protection purposes. There may be distinctive tax benefits to the landowner. A donor's gift may be tax deductible. Each land donation has different tax advantages for different individuals, depending on your financial situation. A donation can take the form of: an outright donation, a bargain sale, donation with a reserved life estate or a bequest. A tax attorney or accountant should be consulted in each case.

As with donation of land, there are tax benefits associated with the granting of a conservation easement. The grantor may be eligible for tax deductions based on the value of the easement as a charitable contribution. This is determined by the amount by which the market value of the property is reduced. In addition, development restrictions that come about as a result of a conservation easement may also result in reducing property taxes.

##### ***Deed Restrictions/Homeowners' Associations***

This is the most common approach, but it has secondary preference to using a conservation easement or outright donation. With this type of ownership, conservation areas are drawn on the original site plan/survey documents. Deed restrictions are recorded in the county register of deeds office. Each buyer is then automatically subject to the deed restrictions upon purchase of property. There may be maintenance fees levied by the homeowner's association for common use of conservation areas within the development. The homeowner's association has the authority to place liens on properties of members who fail to pay membership dues. Conservation design developments commonly require lower dues than traditional subdivisions because they incorporate minimal facilities, which require less maintenance, i.e. trails and wildlife viewing platforms versus pool and clubhouse.

Using a deed restriction is not as effective as a conservation easement for conservation area protection and should only be used if no other method is avail-

able. Deed restrictions are often violated, are seldom enforced, and are more easily modified than conservation easements. It can be effective if used in combination with other protection measures.

#### **Ownership by Municipality or Other Public Agency**

Selling or transferring ownership of the conservation area to a local government may be desirable. This ownership method allows for linkages with public greenways, trail systems, hiking/bikepaths, wildlife corridors, etc. In addition, it is recommended that an easement is placed on the property to retain its use in perpetuity.

#### **Ownership by Individual landowner**

The original landowner/developer can retain ownership of all or part of the conservation area for uses such as farming or forestry. A conservation easement should be placed on the property to insure that it will be protected under future ownership changes.

#### **Combinations**

It is not unusual for a combination of the above property protection arrangements to be used. For example, existing tilled areas may be retained by a farmer. Other conservation areas as well as the farmed area may be protected by a conservation easement agreement between the individuals in cooperation with the local land trust. The local municipality can also be made a part of the agreement to ensure that they are aware of the arrangement, agree with it, and can be a part of the enforcement of it.

#### **Effect on Taxes**

Regardless of who is the owner of the easement, property taxes will most likely be reduced due to the restrictions on the use of the property. There may be significant tax deductions to the buyer, the seller or both. It will depend on each individual's personal financial situation. It is imperative that an accountant or tax attorney be consulted. It would also be advantageous to inquire with the local township assessor to discover exactly how the taxes will be assessed. Each township may handle this differently.

## **GETTING APPROVAL FOR A CONSERVATION DESIGN**

Communities in Michigan are beginning to adopt provisions in their ordinances to allow and encourage conservation designs. However, with more than 1,800 units of government, and because conservation design is a fairly new concept, there are many that do not. As part of the resource inventory, the zoning of the property must be evaluated to determine the restrictions and allowable activities. Conservation design regulations may or may not be a part of the ordinance. If not, it is possible that the conservation plan may fit in under planned unit development provisions, open space subdivision regulations, as a special use in some zoning districts, or other sections of the zoning ordinance. You will need to meet with the local planner for guidance on how this fits with existing regulations. Again, it may be necessary to apply for permission to reduce lot sizes. The important point is that overall density of the development must meet zoning requirements.

If there are no alternatives for you to use, request that the municipality incorporate provisions for conservation design subdivisions into their zoning ordinances. Prepare to be involved in the process. It is helpful for the municipality to have an example in mind when a document such as this is being drafted. Maybe your development can become that example.

Hopefully your local government will embrace the concepts and work cooperatively with you. The extra effort will be worth it. If you encourage a local government to adopt sound conservation design provisions you will make the permitting process easier in the future and also help to protect the community's important resources.

## **CONCLUSION**

Gifford Pinchot defined conservation as "...the application of common sense to the common problems for the common good." Conservation planning and design is a common sense approach for protecting impor-

## **Road Options**

*Single loaded roads (houses on one side of the road):* Roads that have houses on one side of the road, called single loaded roads, can be very valuable from a conservation and marketing point of view. Single loaded roads provide visual and physical access to conservation areas and increase the value of the homes on them, which have a scenic view rather than a view of a neighbor's yard or house.

*Road Curves:* It is best to avoid long straight stretches of road. Roads with curves provide more visual interest and can help slow down traffic.

*Street and Trail Connections:* If possible, try to connect streets with other streets on adjoining properties. This is often avoided so properties can be marketed as self-contained neighborhoods. Having the connections to adjacent neighborhoods can strengthen the sense of community in an area. It also provides more than one road for emergency vehicles and public services.

*Scenic Views:* Consider the views from the roads. If designed properly, views from the road can set the entire tone for a development by highlighting the beauty of the natural features on a site. Also consider the impact the road may have on views from adjacent properties.

tant community resources and developing land. It will not solve all of a community's land use problems, but it is a step in the right direction. We hope that the information in this book has inspired you to conduct a resource inventory and implement a conservation design for your property. If you do, please let the Tip of the Mitt Watershed Council know if the book was helpful. Improving our communities, protecting natural resources and providing homes in beautiful settings can all be accomplished with conservation planning and design. ■

EXAMPLE 1

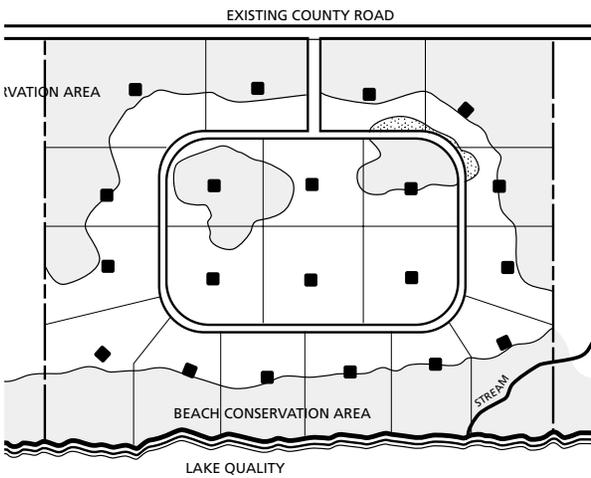
**SITE DESIGN FOR SMALL SCALE PROJECTS**

*Parcel Description*

Site is a total of 10 acres. Zoning allows half acre sites. Therefore 20 units are allowed. Site is bordered by a county road to the north and a lake to the south. The site has one ridge line, but is mostly level terrain.

**YIELD PLAN**

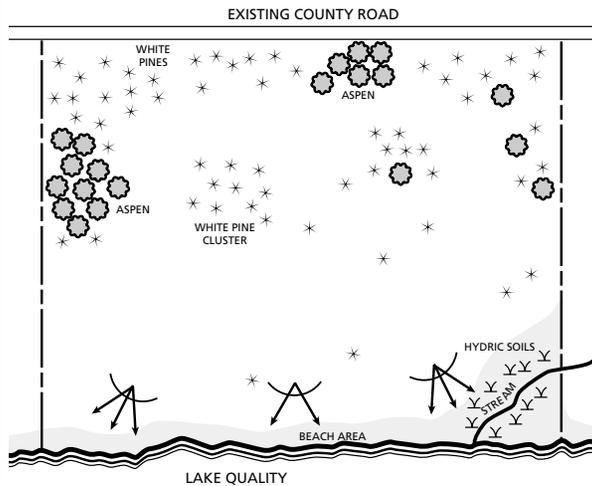
Shows 20 lots. Traditional subdivision design shows grid layout. Main elements are lot lines, roads, and houses. Demonstrates little regard for on-site resources.



YIELD PLAN

**CONSERVATION AREAS**

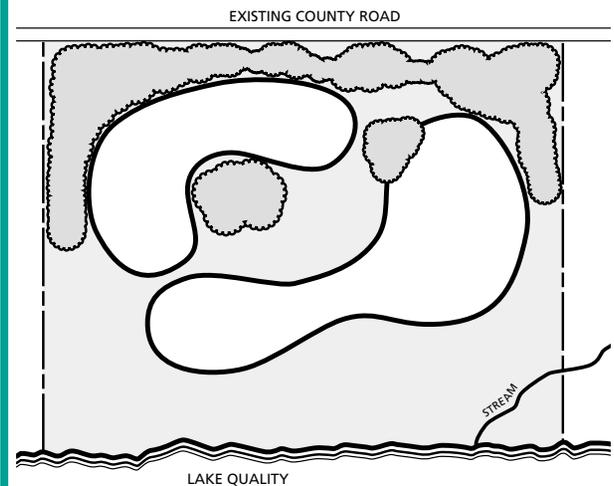
Results of the resource inventory include: Forest resources including stands of white pine and aspen. Hydric soils along the stream banks and adjacent to the lakeshore. Sand beach area and scenic views located along waterfront. Rural views of property from roadside are also a resource. Water resources include the lake and stream.



CONSERVATION AREAS

**POTENTIAL DEVELOPMENT AREAS**

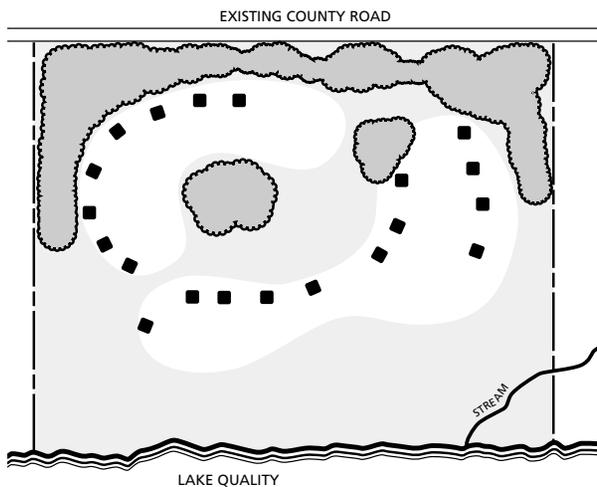
Development areas outlined in heavy black lines exclude all conservation resources identified in the resource inventory. The sensitive soils along stream bank and lakeshore are areas not well suited for development. Retaining trees is a high priority. Scenic views along roadside as well as lakeshore add to rural image. Avoiding subdivision of the lakeshore area provides the opportunity for all property owners in the development to have access to the lake, consistent with lake access provisions, increasing the value of all sites rather than a few.



POTENTIAL DEVELOPMENT AREAS

### POTENTIAL HOUSE SITES

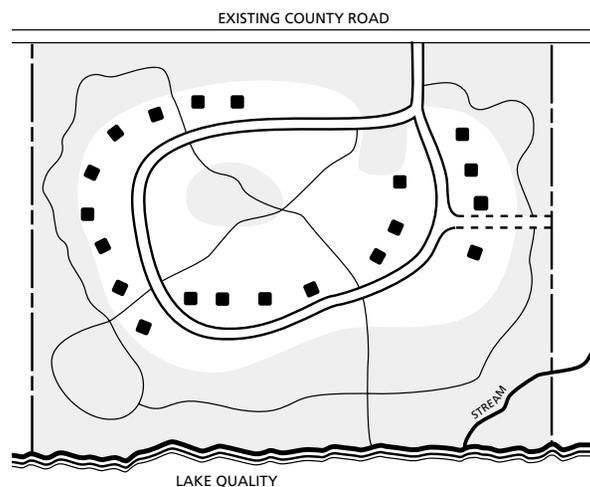
House sites were selected to maximize the environmental features of the property without destroying them. Many houses were placed along the ridge to provide scenic views of the lake. The remainder of the house sites were placed at the edge of the treeline, providing a variety of landscapes for each house site. All houses have lake views and all residents have access to the lake, for low impact uses such as swimming, picnicking, or walking. The number of boats and size and number of docks are regulated by the local funneling ordinance, zoning code, and other applicable laws.



POTENTIAL HOUSE SITES

### POTENTIAL ROADS AND TRAILS

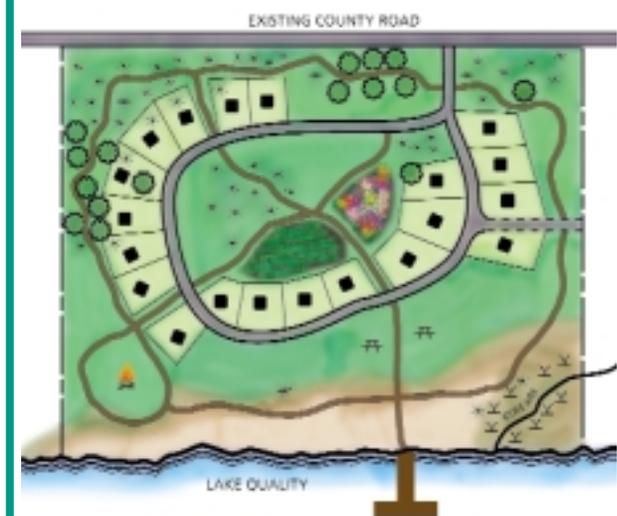
Connecting the house sites is the easiest way to find possible road alignments. This example uses one road that connects as a loop. The road is single loaded, meaning only one side of the road has development. Single loaded roads offers better views for each house site and increases privacy. A future connector road to link with an adjacent property is indicated. The connector road may also serve as an access route for emergency vehicles. The natural resource features such as the lake, stream, and forested areas are easily highlighted by trails that connect the homeowners to the resources and to each other. The trails provide an area to take a hike, walk a dog, and for children to play safely without using a public road or driving to another site.



POTENTIAL ROADS AND TRAILS

### DRAW LOT LINES

The last step is to draw in the lot lines. Approximately 5 acres out of the total of 10 are common conservation areas to be used by all residents of the development. The lot lines are drawn for parcels that range from about 10,000 to 12,000 square feet. The result is a conservation design that respects the natural resource base, while providing home sites in a natural setting. Homeowners have individual private lots, plus access to common areas including: the beach, the stream, the trails, picnic grounds, the forested areas, and community gardens. Socializing with friends and neighbors and many recreational opportunities are offered in close proximity to home, without driving in the car. One common boat dock limits destruction of shoreline area from individual docks.



DRAW LOT LINES

## EXAMPLE 2

### SITE DESIGN FOR LARGE SCALE PROJECTS

#### Parcel Description

Site is a total of 120 acres. It is traversed by a steep ridge line. For purposes of calculating allowable density, a 2 acre minimum is used. A figure of 10 acres for the steep slopes is subtracted from the total to get the net buildable area. Zoning allows 55 units on the site. The site has historical, farm, and forest resources. It is bounded by existing county roads to the west and south, and a nature preserve to the northeast.

#### YIELD PLAN

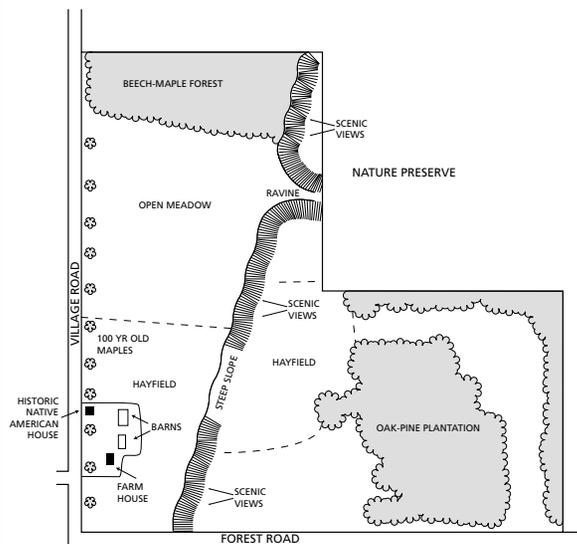
Shows 55 lots. Depicts a conventional grid pattern or layout consisting of lot lines, roads, and houses. Lot lines are drawn without regard to the resources on the site.



YIELD PLAN

#### CONSERVATION AREAS

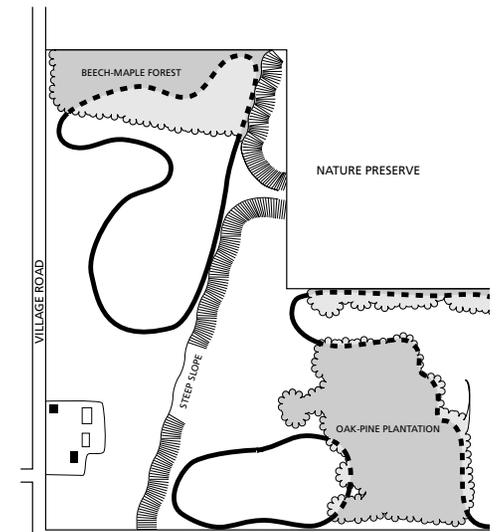
Results of the resource inventory include: steep slopes between 25-45%, an existing farmhouse and two barns, a historic Native American house, an oak pine plantation, two hay fields, a row of 100-year-old maple trees lining the county road to the west, scenic views on top of the ridge and along all road sides, a deep ravine, abundant wildlife habitat and adjacent conservancy land.



CONSERVATION AREAS

#### POTENTIAL DEVELOPMENT AREAS

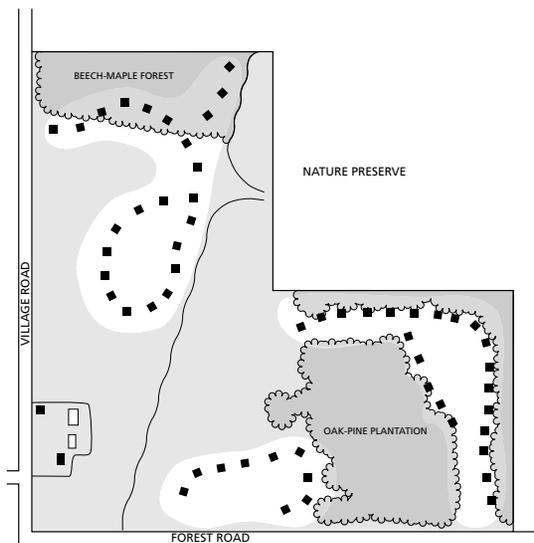
Development areas outlined in heavy black lines exclude all conservation resources listed in the resource inventory. The steep slope area is not well suited for development. The oak pine plantation can be used for trails, and the forest resource will be managed for timber. The farmhouse, the historic Native American house, and the out buildings will be retained as is. The complex of existing buildings are surrounded by a hay field, a cash crop for the farmer. This farming activity can continue in the future. A second hayfield up on top of the bluff will also be retained. The meadow and line of maple trees will co-exist with the new development, helping to maintain a rural roadside image as well as provide wildlife habitat.



POTENTIAL DEVELOPMENT AREAS

## POTENTIAL HOUSE SITES

Providing the same number of lots from the yield plan, 55 house sites were selected within the area identified as developable from the previous step and in such a way to be as close as possible to the resource areas. Instead of ignoring the resource base as in the yield plan, the resources are identified and, for the most part, are protected and now become assets for the development.



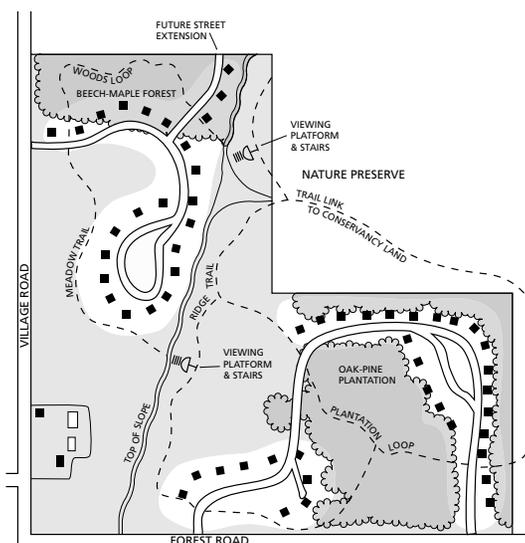
POTENTIAL HOUSE SITES

## POTENTIAL ROADS AND TRAILS

Roads are drawn by connecting the house sites. Roads are single loaded to afford privacy, scenic views, and allow better access to conservation areas for all homesites.

Trails on the property were designed to connect all the ecosystems on the property. The beech-maple forest, the meadow, the hayfields, the ridge, and the pine-oak forest are all accessible with a connecting trail. Along the top of the ridge, two platforms provide filtered viewing areas across Village Road. Erosion of the steep slope is prevented by directing foot traffic to the stairways.

Trails offer passive recreation as well as a safe, convenient place to enjoy nature without having to use a car. In addition, the trail connects with trails on the adjacent land (which is a nature preserve) owned by the local conservancy.



POTENTIAL ROADS AND TRAILS

## DRAW LOT LINES

Lot lines are added as the last step. Lot sizes range from 10,000 to 12,000 square feet. Lots, along with roads comprise about 50% of the development. This leaves about 50% of the property reserved for conservation areas including a woodlot which can still be managed for timber production and two hayfields which can continue to be farmed. Conservation areas serve multiple purposes such as wildlife habitat and passive recreation opportunities. The resulting conservation design offers a plan that respects natural resources, while providing a place for private homesites in a natural setting.



DRAW LOT LINES

## FEDERAL AND STATE RESOURCE AGENCIES

# APPENDIX A

### FEDERAL AGENCIES

#### U.S. Army Corps of Engineers

Detroit District, Regulatory Branch  
P.O. Box 1027  
Detroit, MI 48231-1027  
Phone . . . .313.226.2218  
Fax . . . . .313.226.6763

#### U.S.D.A. Natural Resource Conservation Service

Call this main office for information regarding district offices within Michigan.  
1405 S Harrison Road, Room 101  
East Lansing, MI 48823-5243  
Phone . . . .517.337.6701  
Fax . . . . .517.337.6905

#### USGS Maps

To order by phone call  
1.800.435.7627  
For digital maps on CD visit website  
[mcmc.web.er.usgs.gov/drg/](http://mcmc.web.er.usgs.gov/drg/)  
For other products and information visit  
[edc.www.cr.usgs.gov/webglis/](http://edc.www.cr.usgs.gov/webglis/)

### STATE AGENCIES

#### Michigan Department of Environmental Quality

P.O. Box 30473  
Lansing, MI 48909-7973  
[www.deq.state.mi.us](http://www.deq.state.mi.us)  
The Michigan Department of Environmental Quality manages the State's environmental regulations. The following MDEQ Divisions may be helpful for conservation planning and design activities include: Land and Water Management (wetlands permitting), Environmental Response, Surface Water Quality, Drinking Water and Radiological Protection, and Environmental Assistance. Contact your local office for assistance.

#### Marquette MDEQ Office

1990 US-41 South  
Marquette, MI 49855  
Phone . . . .906.228.6561

#### Baraga and Crystal Falls MDEQ Office

1420 US-2 West  
Crystal Falls, MI 49920  
Phone . . . .906.875.6622

#### Escanaba MDEQ Office

6833 Highway 2, 41 & M-35  
Gladstone, MI 49837  
Phone . . . .906.786.2351

#### Ishpeming MDEQ Office

1985 US-41 West  
Ishpeming, MI 49849  
Phone . . . .906.485.1031

#### Newberry MDEQ Office

RR #4, P.O. Box 796  
Newberry, MI 49868  
Phone . . . .906.293.5131

#### Gaylord MDEQ Office

P.O. Box 667  
Gaylord, MI 49735  
Phone . . . .517.731.4920

#### Cadillac MDEQ Office

120 W. Chapin  
Cadillac, MI 49601-2158  
Phone . . . .231.775.3960

#### Mio MDEQ Office

P.O. Box 939  
191 S. Mt. Tom Road  
Mio, MI 48647  
Phone . . . .517.826.3211

#### Bay City MDEQ Office

503 N. Euclid, Suite 1  
Bay City, MI 48706  
Phone . . . .517.684.9141

#### Grand Rapids MDEQ Office

350 Ottawa, N.W.  
Grand Rapids, MI 49503  
Phone . . . .616.456.5071

#### Livonia MDEQ Office

38980 Seven Mile Road  
Livonia, MI 48152  
Phone . . . .313.953.0241

#### Shiawassee MDEQ Office

10650 South Bennett Drive  
Morrice, MI 48857  
Phone . . . .517.625.4600

#### Plainwell MDEQ Office

P.O. Box 355  
Plainwell, MI 49080  
Phone . . . .616.685.6581

#### Jackson MDEQ Office

301 East Louis Glick Hwy  
Jackson, MI 49201  
Phone . . . .517.780.7900

#### Michigan Department of Natural Resources

P.O. Box 30028  
Lansing, MI 48909  
[www.dnr.state.mi.us](http://www.dnr.state.mi.us)

The following MDNR Divisions may be helpful for conservation planning and design: Fisheries, Forest Management, Real Estate (computer mapping), and Wildlife. Contact your local office for assistance.

#### Real Estate Division Michigan Resource Information System

(MIRIS) Maps  
Phone . . . .517.241.2254

#### Upper Peninsula Field Headquarters

1990 US-41 South  
Marquette, MI 49855  
Phone . . . .906.228.6561

#### Baraga MDNR District Office

US-41 North, P.O. Box 440  
Baraga, MI 49908  
Phone . . . .906.353.6651

#### Crystal Falls MDNR District Office

1420 Highway US 2-West  
Crystal Falls, MI 49920  
Phone . . . .906.875.6622

#### Escanaba MDNR District Office

6833 Hwy 2, 41, & M-35  
Gladstone, MI 49837  
Phone . . . .906.786.2351

#### Newberry MDNR District Office

309 West McMillan Avenue  
Newberry, MI 49868  
Phone . . . .906.293.5131

#### Lower Peninsula MDNR Field

Headquarters  
P.O. Box 128  
Roscommon, MI 48653  
Phone . . . .517.275.5151

#### Gaylord MDNR District Office

1732 West M-32  
P.O. Box 667  
Gaylord, MI 49735  
Phone . . . .517.732.3541

#### Cadillac MDNR District Office

8015 Mackinaw Trail  
Cadillac, MI 49601  
Phone . . . .231.775.9727

#### Mio MDNR District Office

191 S. Mt. Tom Road  
P.O. Box 939  
Mio, MI 48647  
Phone . . . .517.826.3211

#### Bay City MDNR District Office

503 N. Euclid Avenue, Suite 1  
Bay City, MI 48706  
Phone . . . .517.684.9141

#### Grand Rapids MDNR District Office

350 Ottawa, NW  
Grand Rapids, MI 49503  
Phone . . . .616.456.5071

#### Southeast Michigan MDNR District Office

38980 Seven Mile Road  
Livonia, MI 48152  
Phone . . . .313.953.0241

#### Shiawassee MDNR District Office

10650 S. Bennett Road  
Morrice, MI 48857  
Phone . . . .517.625.4600

#### Plainwell MDNR District Office

621 North 10th Street  
P.O. Box 355  
Plainwell, MI 49080  
Phone . . . .616.685.6851

#### Jackson MDNR District Office

301 Louis Glick Hwy  
Jackson, MI 49201  
Phone . . . .517.780.7900

#### Michigan Natural Features Inventory

P.O. Box 30444  
Lansing, MI 48909-7944  
Phone . . . .517.373.1552

#### State Historic Preservation Offices

717 West Allegan  
Lansing, MI 48919-1800  
Phone . . . .517.373.0511  
Fax . . . . .517.335.2727

## RESOURCE INVENTORY CHECKLIST

# A P P E N D I X B

PLEASE FEEL FREE TO PHOTOCOPY THIS CHECKLIST FOR YOUR OWN USE.

### STEP 1- Conduct Initial Site Visit Resource Inventory

Check the property for the following items, marking on a map or aerial photo if available:

- Property boundaries
- Plant types (e.g., pine forest, meadow, hayfield)
- Potential wetland areas
- Presence of water resources
- Potential environmental contamination areas
- Road access
- Utility access (e.g., power, sewer, water)
- Land use activities on adjacent properties
- Soil types (dig a small hole to check soils in a few different locations)
- General topography and drainage
- Sand dunes
- Floodplains
- Existing structures
- Historical features
- Other obvious features of the property

### STEP 2- Assess Soils Using Soil Survey

Using the NRCS soil survey as a guide:

- Identify soil types on the property
- Highlight soils with limitations such as hydric (wetlands), prime farmland, unsuitable for septic systems

### STEP 3- Inventory Basic Resources Using Topographic Maps

- Water resources (lakes, rivers, streams, springs, wetlands)
- Steep slopes
- Scenic views
- Floodplains
- Runoff concerns
- Identify watershed that the property is in

### STEP 4- Identify Land Use and Vegetation

Using MIRIS maps or other resources, identify:

- Forest types on the property
- Sensitive areas (wetlands, sand dunes, steep slopes, floodplains)
- Wetland delineation conducted (recommended if wetlands are likely on the property)

### STEP 5- Assess Land Ownership

Using a plat map, check the following:

- Proximity and access to state, county, and local roads
- Surrounding land uses, state, private, large or small tracts, farm or residential, etc. Potential conflicts

### STEP 6- Identify Wildlife Habitats, Corridors, and Presence of Threatened and Endangered Species

- Contact MDEQ wildlife biologist for threatened and endangered animals
- Contact Michigan Natural Features Inventory for information on threatened and endangered plants and animals (send a letter with detailed description of property, address listed in References)
- Record any wildlife sightings
- Identify possible wildlife corridors, greenways, and habitats on the map

### STEP 7- Identify Ground Water Resources and Possible Environmental Contamination

Check the following:

- Research past uses
- Inspect the property for possible sources of contamination
- Review sellers disclosure statement
- If needed, conduct Phase I, Environmental Assessment
- Contamination on adjacent or nearby properties
- Test drinking water wells
- Identify ground water recharge areas

### STEP 8- Identify Critical Sand Dunes, High Risk Erosion Areas, Floodplains, and Other Sensitive Environmental Resources

Check with local zoning office for:

- Critical sand dunes
- High risk erosion areas
- Floodplains

If property is on a river or stream check:

- Natural river status and regulations
- Floodplains
- Streambank erosion
- Presence and type of shoreline vegetation
- Type of substrate on river bottom

### STEP 9- Assess Mineral Resources

Check the following:

- Ownership of the minerals
- Existing mining activity
- Potential for oil and gas development
- Contact local zoning for sand and gravel mining operations

CONTINUED

### STEP 10- Identify Cultural and Historic Resources

Contact sources to inquire about significant historic or cultural resources on the property

- Mark on the map

### STEP 11- Mapping Infrastructure— Roads, Water, Sewer, Utilities

- Check with local governments on sewer, water hook-ups and fees
- Contact other utilities electric, gas, etc.
- Identify suitable areas for roads, septic and wells, or other utilities

### STEP 12- Evaluate Zoning

- Contact local zoning office
- Zoning district and requirements
- Other zoning tools
- Compare zoning with project goals for compatibility

### STEP 13- Conduct Follow-Up Field Visit to Check Inventory

Confirm the following:

- Soil types/slope
- Topography

- Land use and vegetation
- Land ownership
- Wildlife habitats, corridors,
- Environmental contamination/ground water
- Sensitive environmental resources--critical sand dunes, high risk erosion, and floodplains
- Mineral activity (oil, gas, sand, or gravel)
- Cultural resources
- Infrastructure--roads, septic, sewer, water mains or well, other utilities
- Zoning district
- Determine suitability for project goals

### PART TWO: Site Design

#### Map conservation areas identified in the resource inventory

- Check density allowed in zoning
- Identify suitable building areas
- Set aside 50% of the property for open space, recreational uses,
- Identify house sites
- Identify roads
- Draw lot lines

## REFERENCES

This listing includes some valuable publications that provide valuable information for implementing conservation planning and design techniques.

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Yaro, Robert D., Randall Arendt, Harry Dodson, Elizabeth Brabec. *Dealing With Change in the Connecticut River Valley: A Design Manual for Conservation and Development*, Lincoln Institute of Land Policy and Environmental Law Foundation, Amherst, MA, 1990

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