

Improving Water Quality
Addressing Non-Point Pollution
Through Land Use Planning

Upper Grand River Watershed Initiative

Final Report

This report is intended to provide local governments with a variety of non-point source pollution issues that they may want to include within the next update to their land use plans and zoning ordinances.

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1 Introduction

In his article, Environmental Challenges: Storm water permitting requirements will soon be arriving in your town, George B. Davis points out that:

"... [non-point source water pollution] is a leading source of pollution of our streams, rivers and lakes. Development in urban and suburban areas results in a concentration of surfaces, such as streets, driveways, parking lots, lawns and construction sites, on which pollutants from human activities settle and remain until rain washes them untreated into waterways via storm sewer systems.

Common pollutants include salt, oil and grease from roadways; pesticides and fertilizers from lawns; chemicals, solvents, acids and sediment from construction sites; and general trash. If left uncontrolled, these polluted storm water discharges can seriously impact aesthetic values, discourage recreational use, contaminate drinking water supplies, interfere with habitat for fish, aquatic organisms, and wildlife, and otherwise threaten public health...."

Mr. Davis's article can be found online at www.mml.org. Just click on 'Publications' in the 'Member Services' box; 'Michigan Municipal Review' on the left-hand side of the web page; 'Archived Issues' under the header; 'August 1999' in the '1999' box; and 'Environmental Challenges: Storm water permitting requirements will soon be arriving in your town' under 'Featured Articles.'

An aim of the Upper Grand River Watershed Initiative is to address the issue of non-point source pollution. Good water quality contributes to a high quality of life for the residents of the watershed. Changes must be made to the way society manages land use in order to achieve the goal of improved water quality. There are three main components to land use change:

- education of the public, developers, and public officials
- public policy and regulation
- addressing existing problems (e.g., retrofitting existing development)

All of these components must be fostered and implemented in order to implement effective land use change. For the sake of simplicity, this report centers upon public policy and regulation.

1.1 Land Use Policy and Regulation

There are two main land use tools available to local governments: land use plans and zoning ordinances. Land use plans are used to establish local governmental policy. The zoning ordinance is the main regulatory document. It is utilized to implement the goals established within the land use plan. Local governments must also make other land use decisions. Those decisions must be based upon the goals of the land use plan as well. When pertinent, they should also be coordinated with the zoning ordinance. Table 1 illustrates that relationship.

Table 1
Land Use Planning

	<p>Land Use Plans</p> <ul style="list-style-type: none"> • Identify potential problems and opportunities • Establish goals and objectives based upon that information
	<p>Zoning Ordinances</p> <ul style="list-style-type: none"> • Establish zoning districts and their locations • Identify the land uses allowed in the districts • Establish development regulations
	<p>Other Land Use Decisions</p> <ul style="list-style-type: none"> • The extension of public services and utilities • Support/acceptance of proposed projects and programs • The development of other plans and ordinances affecting land use

1.2 Methodology

There are 39 local units of government in six counties with land within the Upper Grand River Watershed – 21 of the local governmental units are located in Jackson County, 9 in Ingham, 4 in Eaton, 2 in Hillsdale, 2 in Washtenaw, and 1 in Calhoun County (please see Table 2). The local governments include cities, villages, and townships, all of which have the responsibility of regulating land use.

The staff of the Region 2 Planning Commission (R2PC) reviewed and analyzed the land use plans and zoning ordinances of a number of local governments within Jackson and Hillsdale counties in order to examine the potential effect of those policies and regulations on non-point source pollution. Those counties were chosen because the R2PC has easy access to the land use plans and zoning ordinances of the local governments located within its service area. As Table 3 indicates, 2 villages were selected along with a mix of 9 rural and urban townships.

Please note that the majority of this report is comprised of that analysis. Most of the text is comprised of passages from those documents. Some of those passages are used verbatim – altered only to fit the context of the report. R2PC also added information when it was felt to be necessary (based upon professional opinion). Because it is a common practice to 'cut and paste' from other planning documents, no further effort to source the material within the body of the document has been made.

Table 2
Local Governments and Sub-watersheds

Sub-watersheds					
Spring Brook	Upper Grand River	Sandstone Creek	Portage River	Center, Grass & Wolf Lakes	Grand River Headwaters

Sub-watersheds					
Spring Brook	Upper Grand River	Sandstone Creek	Portage River	Center, Grass & Wolf Lakes	Grand River Headwaters

Calhoun County	X				
Clarence Township	X				

Eaton County	X	X			
City of Eaton Rapids	X	X			
Brookfield Township	X				
Eaton Township	X				
Hamlin Township	X	X			

Hillsdale County					X
Moscow Township					X
Somerset Township					X

Ingham County	X	X		X	
City of Leslie	X				
Aurelius Township	X				
Bunkerhill Township	X			X	
Ingham Township				X	
Lansing Township	X				
Leslie Township	X				
Onondaga Township	X	X			
Stockbridge Township				X	
Vevay Township	X				

Jackson County	X	X	X	X	X	X
City of Jackson			X			X
Village of Grass Lake					X	
Village of Parma			X			
Village of Springport	X					
Blackman Township		X	X	X		X
Colombia Township						X
Grass Lake Township				X	X	
Hanover Township			X			
Henrietta Township		X		X		
Leoni Township				X	X	X
Liberty Township						X
Napoleon Township					X	X
Norvell Township					X	
Parma Township	X		X			
Rives Township		X				
Sandstone Township	X	X	X			
Spring Arbor Township			X			
Springport Township	X					
Summit Township			X			X
Tompkins Township	X	X	X			
Waterloo Township				X	X	

Washtenaw County				X	X	
Sylvan Township				X	X	
Lyndon Township				X		

Figure 1
Upper Grand River Watershed Boundary and Municipalities

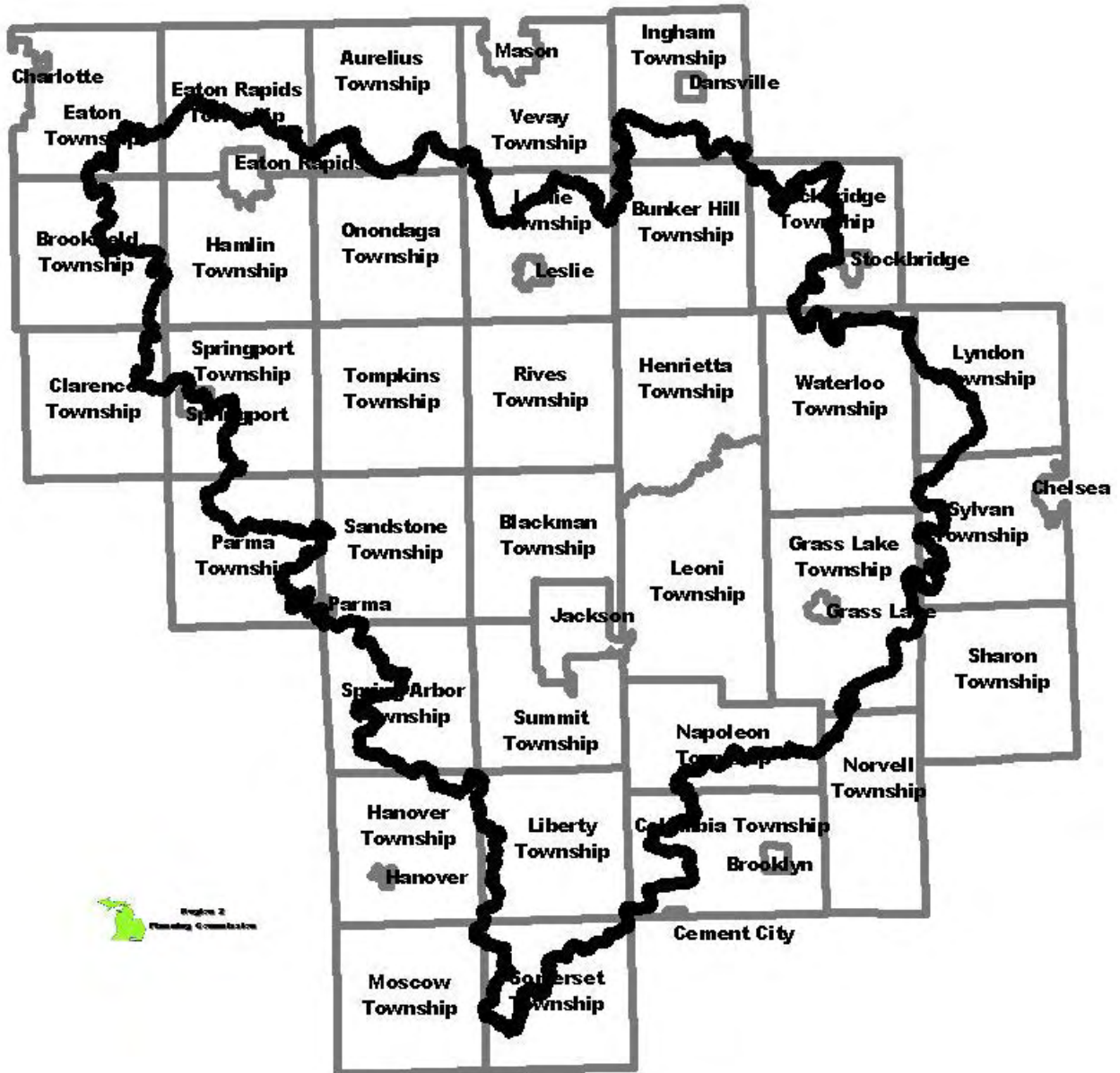


Table 3
Review of Local Governmental Land Use Plans (LUP) and Zoning Ordinances (ZO)

	LUP	ZO		LUP	ZO
Jackson County			Sandstone Township	X	X
Village of Parma	X	X	Springport Township	X	
Village of Springport	X	X	Tompkins Township	X	X
Blackman Township	X		Waterloo Township	X	X
Henrietta Township		X			
Leoni Township	X	X	Hillsdale County		
Rives Township	X	X	Somerset Township	X	X

This report is intended to provide local governments with a variety of issues that they may want to include within the next update to their land use plans and zoning ordinances. It must be remembered that the Upper Grand River Watershed covers a large and diverse area. Because of this, some of the suggestions made may not be applicable to all of the local governments within the watershed. Each local governmental unit will have to decide the validity of each suggestion for use within its jurisdiction.

The way the recommended actions are worded within the text of the report may strike some as too prohibitive or too permissive. Local governments should feel free to adapt the language according to their viewpoint. In order to be effective, each municipality must develop plans and ordinances that will be accepted by their constituents.

Municipalities may find it more effective to enact some of these suggestions at the county level. Groups of contiguous municipalities may also want to amend the same provisions into their plans and ordinances. The more uniformity there is among the various local governmental plans and ordinances within the same sub-watersheds, the more effective those policies will be. Local governments must decide what is best for them and the constituents they serve.

The report is essentially a compendium of ideas garnered from existing plans and ordinances. Because of this, ***all recommended language and standards must go through appropriate legal and technical review prior to implementation.***

The report contains the following sections:

- 2 Land Use Plans
- 3 Agriculture
- 4 Zoning Ordinances

Agriculture is an important component of many of the rural local governmental units within the Upper Grand River Watershed. Because of that factor, it will be addressed separately. It also provides a practical example of a bridge between land use plans and zoning ordinances.

1.3 Plan Opportunities and Deficiencies – A Summary Analysis of the Documents

- It is important to have up-to-date land use plans and zoning ordinances. As Table 4 indicates, of the 10 land use plans reviewed, only 4 of them have been passed/updated within the past five years. However, 7 of the 9 zoning ordinances reviewed were enacted/amended in that time period.

Table 4
Planning Document Dates of Publication

Passed/Amended	Land Use Plans	Zoning Ordinance
1997- 2002	4	7
1991 – 1996	2	1
Pre 1991	4	1

Practical experience leads the R2PC to believe that this is likely to be typical across the entire watershed. The Initiative should encourage all local governments to update their land use plans and zoning ordinances every five years. New state regulations mandate that land use plan be updated every 5 years. (It should also be noted that the most up-to-date documents might not have been available to R2PC staff at the time the documents were reviewed.)

- There needs to be a connection between a local government’s land use plan and zoning ordinance (as well as other policies, ordinances, and programs). In order to accomplish this in an efficient manner, the land use plan should be developed before the zoning ordinance. The R2PC reviewed both the land use plans and zoning ordinances of 8 local governments. Of those communities, 4 enacted a zoning ordinance after developing a land use plan.

Practical experience leads the R2PC to believe that this is likely to be typical across the entire watershed. The Initiative should encourage all local governments to update their zoning ordinances after updating their land use plans.

- The goals and objectives sections of land use plans reviewed include a wide variety of goals concerning environmental protection. Some of those goals are tied to quality of life objectives and open space and recreation preservation. Others are included under goals such as residential and industrial development.
- Zoning ordinances should include an environmental protection provision to the ‘purposes section.’ The purposes sections of some of the zoning ordinances reviewed often hint at or infer environmental protection, but do not come right out and state that purpose.

- Buffer strips were mentioned by at least one local unit of government as a way to reduce the visual and noise impacts that one land use can have on another. Those buffer strips could also be utilized as filter strips where land and water meet.
- The land use plans and zoning ordinances often make a connection between agricultural and open space preservation and natural resource protection. Although interrelated, those goals would be more effective if they were not so intimately linked. Separate districts should be created for agricultural preservation and open space preservation. One of the reasons for zoning an area for open space preservation would be natural resource protection. The main objective for agricultural districts should be the preservation of prime and unique farmland.
- Many of the zoning ordinances attempt to regulate ‘intensive livestock feeding operations.’ The Michigan Right to Farm Act, however, preempts this ability.
- The zoning ordinances reviewed list single-family detached homes as a permitted use by right in agricultural districts. This permitted right perpetuates sprawl. In order to curb sprawl, single-family homes could be reduced to a conditional use in agricultural districts.
- Land use plans that take the time/opportunity to educate readers about the impacts of development and the importance of environmental protection were more interesting to read. This practice should include identifying pertinent laws, web sites, and other sources. As a result they may be more likely to make an impact.
- A number of the zoning ordinances require information about the area surrounding the proposed site to be included in the information recorded on site plan maps. This information is very helpful to decision-makers. Some of the zoning ordinances also addressed certain aspects of the environment as part of a site plan review. This action is also helpful.
- Land use plans should include background information on the number of households served by central water and sewer systems –vs. – well and septic. This information can help local governments to establish appropriate density patterns.
- Follow-through from the land use plan to the zoning ordinance is often missing. Several local governments, however, included an implementation section in their plans.
- The effects that development can have on the health of lakes was included in the land use plan of at least one local government.
- The inventory of environmental features listed in land use plans should include environmentally sensitive corridors, ground water recharge areas, open space, wetlands, floodplains, and soils.
- There seems to be a movement to protect natural resources through large lot development. This well meaning practice can lead to greater land consumption. Open space developments and preserves may be better ways to preserve those resources.

2 Land Use Plans

Clean water is important. Land use plans can affect water quality both overtly and inadvertently through the policies they espouse and the types and form of development they project for the future. The staff of the Region 2 Planning Commission (R2PC) reviewed the land use plans produced by 11 local governments within Jackson and Hillsdale counties for the purpose of examining the potential effect of their policies on non-point source pollution. The following section summarizes those findings, which can be divided into the following categories:

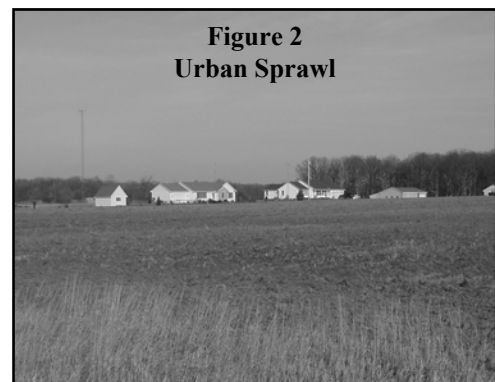
- Common Land Use Issues
- Goals and Objectives
- Specific Policy Guidelines
- Plan Implementation

2.1 Common Land Use Issues

In order to minimize the possible negative impacts of development, potential problems must be identified. The following is a listing of those potential issues that most of the municipalities within the watershed have in common. All of the issues impact the non-point source pollution. The list is not in any particular order (unless otherwise noted), nor is it intended to be exhaustive.

Sprawl. Perhaps the most important land use issue is the self-perpetuating problem of sprawl. The dispersed linear roadside nature of sprawl tends to land-lock agricultural parcels and open space, making the development of that land more costly. Sprawl results in a host of unintended problems such as (but not limited to):

- An increase in the percentage of land covered by impervious surfaces (e.g., wider roads and streets, large parking lots, and an increasing number of rooftops and driveways), increasing the quantity and quality of storm water runoff.
- The installation of sewer and water, (when needed) is often economically infeasible, causing environmental problems to be ignored and endangering public health.
- The abandonment of existing urban places where water and sewer and other essential services are already in place.



Revitalizing Urban Areas. An antidote to sprawl is the redevelopment of existing urban areas. By continually investing in existing urban areas – by making them attractive places to live and work – the pressure to develop rural areas may subside. This includes reintroducing natural features back into the urban environment. Those features can also be utilized to treat and store storm water runoff.

Floodplains. Floodplains serve as storage areas for flood waters during times of flooding. Structures within floodplains can be damaged during flooding and also impair the ability of the floodplain to store and absorb floodwaters. While current and future technological advances may make it feasible to develop in those areas, long term damage to the environment and the development itself still makes development undesirable.

- Municipalities should participate in the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program. Floodplain areas should be mapped as a part of that program. According to their website, flood maps "are the tool FEMA uses to determine the flood risk homeowners face. Prior to the enactment of the National Flood Insurance Program (NFIP), homeowners had no mechanism to protect themselves from the devastation of flooding and in many parts of the United States unchecked development in the floodplain was exacerbating the flood risk."
- At the very least, floodplains should be mapped (the 100 year floodplain is recommended.) Development within those areas should be limited and dispersed. Permitted land uses should be reserved for agricultural, recreational, and open space residential uses.
- Don't allow floodplains to be filled-in for development.

Information on FEMA's National Flood Insurance Program can be found online at www.fema.gov. Just click on the 'National Flood Insurance' button, which is located on the left-hand side of the web page.

Wetlands. Wetlands serve as storage areas for surface water runoff. They also filter groundwater. Wetlands provide habitat. Michigan currently regulates wetlands that are greater than 5 acres in size. The [city/village/township] may want to consider regulating smaller wetlands. In any case, wetlands should be identified, mapped, and protected.

Soils. The limitations that soil types have when it comes to supporting certain types of development must play an important role in the determination of development patterns within the [city/village/township]. For example, areas that have sandy or gravelly soils and which are situated adjacent to lakes or streams should not be considered suitable for intensive development due to the likelihood of phosphates and nitrates leaching into those bodies of water. Peat and muck soils (also known as histisols) are not suitable for septic systems. Because of this, development involving building should be restricted on peat and muck soils. The suitability of each soil type within the jurisdiction can be mapped for different types of development using the county soil surveys prepared by the Natural Resource Conservation Service (formerly the Soil Conservation Service) of the United States Department of Agriculture.

Soil Erosion. Soil erosion continues to be a problem, impairing the health of water bodies due to an increase in turbidity. Construction sites are a major contributor to soil erosion. Road and bridge erosion is also a concern. Each county has a soil erosion and sedimentation control officer. It is important that this individual be active in administering Part 91 – Soil Erosion and Sedimentation Control – of the Natural Resources and Environmental Protection Act. Municipalities may also want to pass a local soil erosion and sedimentation control ordinance.

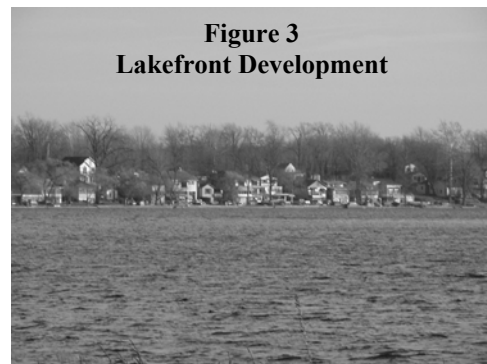
Part 91 – Soil Erosion and Sedimentation Control – of the Natural Resources and Environmental Protection Act is listed in the Michigan Compiled Laws as MCL 324.9101 - MCL 324.9123a. The law can be reviewed online at www.michiganlegislature.org/law. Just enter '324.9101' into the 'MCL Section' box under the 'Michigan Compiled Laws Information' heading and press the 'Go!' button. Use the 'Navigation' bar to access the different sections of the statute.

Lakes and Streams. The water quality of lakes and streams is dependent, in part, upon the type of development along its shores and banks. For example, effluent from septic systems can seep into water bodies, degrading water quality and the health of those in contact with it. Nutrient rich storm water runoff resulting from agricultural and lawn fertilization practices can accelerate eutrophication (the natural filling in of the water body).

Lakeshores are often very desirable for suburban development. Because lakeshore developments are often located away from urban centers, they are most likely served by wells and septic systems. This was less of an issue in the past when lake cottages were used seasonally. Conversion of those second homes into primary residences, however, can cause septic systems to fail.

Care must be taken to ensure that new residential development on the desirable land surrounding lakes and streams do not degrade the quality of those resources. Banks can become unstable because of vegetation removal. Unstable banks lead to mass wastage (e.g., creeping, slumping, slides), bank instability, stream migration, and the collapse of structures. Steps must also be taken to improve existing water quality. Included below are some potential tools:

- Delineate lake residential districts as a subset of the existing residential districts.
- Tighten up on the regulation of septic systems in those districts.
- Establish filter areas at appropriate places along lakeshores (e.g., low areas and other places where concentrated runoff flows into the water body).
- Construct municipal wastewater collection systems.



Industrial developments often located next to streams in the past. New industrial and commercial developments often create ponds and other impoundment areas into their designs for practical as well as aesthetic reasons (this practice should be encouraged). Care must be taken to ensure that new industrial and commercial development along streams and by ponds do not degrade the quality of those resources. Steps must also be taken to improve existing water quality. Included below are some potential tools:

- Tighten up on the discharge of gray water into streams and other impoundments.

- Establish filter areas at appropriate places along stream banks and by ponds (e.g., low areas and other places where concentrated runoff flows into the water body).
- Do not zone property for industrial uses unless central water and sanitary sewer systems serve it.

Water and Sewer. Central water, storm sewer, and sanitary sewer systems are often necessary to ensure that development in environmentally sensitive areas is benign. Those essential services also make more intensive development of an area feasible, possibly preserving other land from development. Conversely, water and sewer may have to be extended in order to ensure a quality water source for an area because of past poor development practices.

The provision of central water and storm and sanitary sewer systems can be used as a tool to guide development. They should not be extended to areas that a local government wants to preserve. Municipalities should also be careful of extending water lines without complimentary sanitary and storm sewer service. Increased development could necessitate the extension of sewer lines in the future, at an increased cost. In the meantime, that increased development could be harming water quality.

Municipalities may want to consider the following:

- Include background information on the number of households that depend on water and sanitary sewer -vs.- well and septic.
- Enterprises that use a lot of water should dispose of water in a sanitary sewer or on-site in some type of detention/filtration system before entering a storm sewer, stream, or body of water.

Illegal Dumping and Littering. Illegal dumping and littering can have an effect upon water quality. Runoff and floodwaters can pick up trash and other contaminants when flowing through discarded materials, whether it is the occasional candy wrapper, an old refrigerator, or a hazardous substance. Municipalities may want to consider enacting littering and dumping ordinances through which fines can be levied upon violators.

Tourism. Nature based tourism is becoming increasingly important. Everything that can be done to protect and enhance the unique environmental features of the watershed will help to attract tourists to the area. Those tourists, however, will also impact the watershed. Steps must also be taken to protect the watershed from the negative environmental impacts of tourism.

2.2 Goals and Objectives

A goal of the Upper Grand River Watershed Initiative is to manage water quality and quantity prior to its discharge from the watershed. In order to meet this goal, it is important to develop land use plans acceptable to the general citizenry and the business community. The goals and objectives sections of local land use plans should include goals that promote the health of the watershed while still allowing for new investment. Watershed goals and objectives should be

included in the general goals. To be truly successful, however, they should also be included in other categories.

Listed below are some examples of goals obtained from the land use plans reviewed for this report. Municipalities may want to adopt some of them into their own land use plans. The repetitive nature of the section is intentional. A wide variety of goals are included in order to address issues throughout the entire watershed. Some of them may not be applicable for your municipality. None of them should be adopted verbatim. They should be altered to fit within the context of the community's plan.

2.2.1 General Goals. General statements about environmental protection should be included in the goals and objectives portion of a land use plan because they lend credence to more specific goals and objectives.

- Protect and preserve the natural resources/features of the [city/village/township].
- Preserve and conserve the abundance and quality of the many natural resources with which the [city/village/township] is blessed and acknowledge resulting limitations to development.
- Encourage the protection and preservation of the [city/village/township]'s natural resources for the purpose of maintaining the quality of the local environment.
- Provide adequate safeguards to minimize the negative impacts of development on roads and other civic infrastructure, adjacent land uses and the environment.
- Maintain and enhance the character of the community through land use policies that protect the environmentally sensitive features which remain in the [city/village/township].
- Use the resources of the [city/village/township] to:
 - Promote the highest degree of public and environmental health, safety, efficiency, and well being for all areas of the community.
 - Increase the opportunities of its people.
- Lands that are sensitive to development, that have scenic value in the [city/village/township], that offer recreational opportunities, or that contribute in a critical manner to the local or regional drainage system, the ground water system, or the wildlife system should be protected and preserved wherever possible.
- Require new development proposals to conform to the environment instead of altering the environment to conform to the proposed development.
- Areas identified as environmentally sensitive on the soils, wetlands, and floodplain maps should be preserved from incompatible and unnecessary urban development.
- The soils in the area should be capable of supporting the proposed development. At a minimum the county soil survey should be referenced. A more comprehensive analysis may be needed for certain projects, however.
- Areas located within designated "Flood Hazard Areas" on the floodplain map should be discouraged for the purpose of development.
- Encourage the protection of the [city/village/township]'s groundwater resources.
 - Encourage proper maintenance of on-site septic systems.
 - Regulate the above ground storage of hazardous substances and underground storage tanks.

- Development is to be encouraged only where the possibility of polluting the water resources is minimal in order to protect public health.
- Illegal dumping should be discouraged.
- Certain development should be prohibited in delineated wellhead areas.

2.2.2 Essential Services. The provision of essential public services can be a powerful tool in shaping the development patterns within a community.

- Delay approving future annexations of the [city/village] until essential services can be upgraded to serve the new area.
- Encourage new housing development in neighborhoods only after essential services have been upgraded to meet the additional demand.
- The [city/village/township] shall require new development to have adequately engineered water, sanitary sewer and storm water sewer systems in place. Those systems must have the capability to handle the projected flows from the new development.
- The [city/village/township] should evaluate and amend its site plan review process to ensure that new development does not overload its water, sanitary sewer, and storm water sewer systems.
- Discourage uses with high essential service capacity requirements until water and sanitary sewer and storm sewer systems are upgraded.
- The [city/village/township] should develop minimum standards for storm water management that would be required for all new development.

2.2.3 Protection of Open Space and Natural Resources

Natural resource protection, recreation, and the protection of open space are often tied together. While often compatible, they are all important enough goals to be considered separately.

Natural Resource Protection

Effective natural resource preservation goals concentrate on the preservation of those resources for environmental reasons.

- Preserve unique features, wetlands, woodlands, and wildlife habitats by restricting development to areas that can tolerate such activity without environmental conflicts.
- Preservation of watershed areas, marshlands, and woodlands by discouraging building and development unless sufficient physical features are present to ensure that such building or development can function without damage to the environment.
- Lands that are environmentally sensitive should be protected and preserved for their natural assets, which are valuable to the community's present and future well being.
- Encourage the preservation of areas identified as environmentally sensitive from incompatible and unnecessary urban development.
- Encourage only low residential densities in environmentally sensitive areas.
- Encourage the preservation of wetlands.
- Inform [city/village/township] residents about the value of wetlands and the need to obtain the pertinent permits prior to dredging or filling any protected wetland.

- Require that the proper state and federal permits have been obtained prior to the issuing of local permits for developing in a wetland.
- Explore the use of the zoning ordinance and other land use policies in regulating the development of wetlands.

Open Space Protection and Recreation

Ties between open space preservation and recreation and the protection of natural resources are still very important. Open space protection can help to curb urban sprawl and the effects that phenomena can have on the watershed. Recreational facilities can also be used to educate the public about the importance of natural resources.

- Protect wetlands and floodplains within the [city/village/township] for educational and outdoor recreational uses.
- Encourage development of recreational lands in areas having environmentally sensitive characteristics, as long as those features are not harmed.
- Provide and protect open space and recreational opportunities for current and future needs.
- Attempt to connect recreation areas whenever possible with open space corridors to provide a network of recreational and natural enjoyment areas.
- Preserve existing recreational lands and provide for new recreational lands, appropriately located, to meet the changing needs of the community.
- Encourage development of recreational lands in areas accessible to area neighborhoods and the [city/village/township] population at large.
- The [city/village/township] shall encourage developers of rural areas to utilize the Planned Unit Development and the Cluster Development options for purpose of preserving open space.

2.2.4 Residential Development

Goals can be constructed which allow for the continued development of residential neighborhoods (where appropriate) while still protecting the environment. These goals should address on-site and community-wide essential services.

- Encourage new residential development to be clustered in subdivisions and neighborhoods located where appropriate community services and utilities can be feasibly provided.
- Encourage the development of a variety of housing types and subdivision design that will promote an efficient use of space and preserve environmentally sensitive areas.
- New subdivision development should be encouraged in areas where adequate utilities and services exist or can feasibly be extended.
- Provide alternatives such as cluster development in moderate and medium density areas.
- Encourage the subdivision of land so as to provide for a reasonable degree of choice in housing location. At the same time, however, discourage the over-subdivision of land beyond the market demand and before areas are provided with necessary services (i.e., central water, sanitary sewer, and storm sewer systems) to compliment concentrated residential development.
- In areas not served by central sanitary sewer and water systems, encourage residential growth in areas with soils that are suitable for septic systems.

- Protect floodplains, marshlands, and other unsuitable soils from residential encroachment, but utilize the scenic potential of these areas in residential site design.
- Encourage new residential development to be clustered in subdivisions and neighborhood areas located near appropriate utilities (e.g., central water, sanitary sewer, and storm sewer systems) or where those supportive services may be feasibly provided to promote efficient utilization of land and discourage dispersed strip development.
- Encourage the development of a variety of housing types and subdivision design that will promote an efficient use of space, and preserve the integrity of rural areas.
- Single-family and two-family subdivision developments should be encouraged in areas where adequate services exist or will be extended in the near future.
- Subdivision development should be encouraged in areas adjacent to existing subdivision developments having central sewer (e.g., storm and sanitary) and water services in order to allow for the expansion of those services.
- Encourage the development of residential areas to meet population increases, while conserving prime and unique agricultural and environmentally sensitive lands.
- Encourage low-density residential developments on sites having good physical characteristics including those conducive to on-site sewage disposal, appropriate soils, slopes, and water table.
- Low-density residential development should be located on sites having good physical characteristics, including those conducive to onsite sewage disposal, appropriate soils, slopes, and water tables.
- Multiple-family residential developments should be encouraged to locate in areas having adequate soils for development, available municipal or central water and sewer (e.g., storm and sanitary) as well as adequate recreation and transportation facilities and services, and should be located where compatibility with other land uses can be assured.
- High density residential land uses such as mobile home parks, and multiple-family developments should be in areas having or expected to have necessary services and facilities including major roads and central sewer (e.g., storm and sanitary) and water facilities.

2.2.5 Commercial Development

Intensive commercial development (i.e., big box, stores, shopping plazas and malls, etc) can have a negative impact upon the environment. It is also important, however, to the economic health of the watershed.

- Encourage the development of a variety of commercial businesses clustered in commercial areas that will diversify the local economy, provide a stable tax base, and protect the local environment from degradation
- Encourage intensive commercial development to locate in well-planned locations where these uses can be clustered and assure a high degree of compatibility with surrounding land uses.
- Mandate the installation of storm water management facilities that will mitigate the additional runoff caused by intensive commercial development (e.g., parking lots, roofs, etc.).
- Encourage industrial development in areas where soils are suitable and potential for groundwater contamination is minimized.

- Encourage the location of intensive commercial uses where sufficient infrastructure can support these uses.

2.2.6 Industrial Development

Industrial development tends to have negative impacts upon the environment. It is also important, however, to the economic health of the watershed.

- Encourage the development of light and clean industry clustered in industrial parks that will diversify the local economy, provide a stable tax base, and protect the local environment from degradation
- Encourage industrial development to locate in well-planned locations where these uses can be clustered and assure a high degree of compatibility with surrounding land uses.
- Encourage industrial development in areas where soils are suitable and potential for groundwater contamination is minimized.
- Encourage the location of industrial uses where sufficient infrastructure can support these uses.
- Favor uses that do not pollute the air, soil, water, or are offensive to neighboring land uses because of noise, sight, or odor.
- Encourage the location of industrial activities in areas of compatible land uses and where major thoroughfares, rail service, and sewer and other public facilities can serve such activities, preferably in or near existing developed areas.
- Encourage industrial development in areas that are not environmentally sensitive.
- Industrial land uses should relate to the overall character of the community and to its specific land use patterns, and should provide employment in locations readily accessible to regional transportation facilities, in areas having compatible land uses, and in areas having or expected to have appropriate utilities.
- Encourage industrial development in areas having or expected to have facilities and services.
- Encourage the development of industrial uses to diversify the local economy and to provide a stable tax base for the [city/village/township], at locations that will allow the quality of the local environment to be maintained.
- Industrial areas should be encouraged in sections of the [city/village/township] where a high degree of compatibility with surrounding land uses can be assured.
- Encourage industrial development in areas where soils are suitable and potential for groundwater contamination is minimized.

2.3 Specific Policy Guidelines

Goals and objectives can be further refined by developing policy guidelines for certain policies on which your [city/village/township] wishes to concentrate. These guidelines may be utilized by the planning commission in the development of the future land use and zoning maps as well as when reviewing zoning requests and other proposals. A wide variety of goals are included in order to address issues throughout the entire watershed. Some of them may not be applicable for your municipality. None of them should be adopted verbatim. They should be altered to fit within the context of the community's plan.

2.3.1 Land Use Intensity. Guidelines governing the intensity of land use are dependent on the natural capability of the land to support various degrees of development.

- Locate less intensive land uses (e.g., low-density residential development, agricultural activities, and recreational land) where natural resource conditions are least capable of supporting development and existing low-density land use patterns exist. In order to be competitive, farms should be located in areas with better soils.
- Locate medium intensity uses (e.g., medium-density residential with complementary local commercial, office, public and quasi-public uses) where natural resource conditions are moderately capable of supporting development, adequate roads are available, and existing medium density land use patterns exist.
- Locate high intensity uses (e.g., high-density/intensity residential, office, industrial, and general commercial) in areas with relatively direct access to major thoroughfares and expressways, existing medium- to high-density land use patterns, and natural resource conditions most capable of supporting development.

2.3.2 Natural Resource Capability. All development should be mandated to respect the following natural characteristics and constraints:

Wetlands. Protection of wetlands is essential in order to preserve water quality, stabilize storm water runoff, recharge groundwater and provide fish and wildlife habitat. Wetland types include marshes, swamps, and bogs.

- The highest priority should be for the preservation of wetlands in their natural state.
- Wetlands should be identified and delineated by the [city/village/township] and then protected by local ordinance (in addition to existing state and federal regulations).

It is important to define what a wetland is (along with set criteria) before they are mapped. One way to define wetlands is to utilize USGS topographic maps, the county soil survey, aerial photographs, and other materials. Examine those materials for the following characteristics, which identify the presence of wetlands:

- The presence of shallow groundwater (as opposed to a 'perched' water table) on the surface, all or part of the year.
- The presence of soils with high organic content clearly different from upland soils.
- The presence of plant species adapted to wet soils, surface water, and/or flooding.

USGS maps can be ordered online at <http://mapping.usgs.gov>. Just click on the 'USGS Topographic Maps' button on the left-hand side of the web page.

- The boundaries and the significance of specific wetland areas must be determined at the time of development review. Three aspects of wetland protection should be recognized in reviewing proposed development within and in proximity to wetlands.
- The wetland area itself.
- The adjacent fringe or buffer area.
- The remainder of the watershed which drains into and out of the wetland area, beyond the fringe or buffer area.

Woodlands. The conservation of woodlands is imperative to the absorption of storm water runoff as well as for other environmental and aesthetic reasons.

- Development in and around wooded areas should be planned, constructed, and maintained so that the maximum numbers of healthy trees and other native vegetation may be preserved.
- The objective should be to preserve native trees rather than to rely on removal and subsequent mitigation by replanting. Managed forestry should be considered essential.

Slopes. Existing topographic conditions are important to the function of the watershed. They should be made an integral component of land use planning and design.

- The primary objective should be preservation of the natural land contours, rather than severe alteration through mass grading.
- Careful preservation of slopes is necessary in order to reduce erosion, maintain stability, and control amounts and velocities of runoff.

Groundwater Protection and Recharge. Groundwater recharge areas restore water levels in aquifers and supply water to lakes, rivers, streams, and private drinking water sources. Because of the reliance on individual wells in part or all of many municipalities, preservation and protection of groundwater resources is important.

- Recharge areas should be mapped. It is important, however, to define what a groundwater recharge area (along with set criteria) is before they are mapped.
- Since recharge areas extend beyond the boundaries of the [city/village/township], regional cooperation is needed to effectively manage groundwater conditions.
- Recharge areas are best preserved as open space, and/or confined to low-density uses, to maintain as much permeable surface as possible. Land grading should be controlled to retain natural water holding characteristics of the land. Vegetation essential to preservation of the water holding characteristics should be preserved, and enhanced, where necessary.
- Recharge areas should be protected from pollution by rigorously controlling all uses which discharge wastes into the hydrological cycle. Especially critical for monitoring are uses which handle hazardous materials which might leak or spill.
- The vulnerability of an area can be determined by three main factors: soil type, depth to aquifer and general aquifer condition and type. Sandy soils offer considerably less protection from surface impacts than heavier clay soils. Confined aquifers are safer than unconfined ones. Through a better understanding of the nature of groundwater, more effective protection measures are possible. [Cities/Villages/Townships] must have a working knowledge of this information in order to make good land use decisions.
- [Cities/Villages/Townships] must also contend with hidden sources of soil and groundwater contamination from such things as landfills and aging septic systems.
- Shallow injection wells should be prohibited.

Drainage. The protection and renovation of slopes, woodlands, and wetlands within the watershed, as well as the wise management of land use and development are essential to maintaining the quantity and quality of storm drainage.

- Natural vegetation and topographical features along and within streams and other waterways should be preserved and/or restored.
- Uses should be restricted to those that represent no danger of topographical disturbance to the corridor, degradation of water quality, increased runoff, sedimentation, or stream channel alteration. Adequate buffer/filter strips should be installed between existing uses and the drainage channel.
- Surface water runoff should not exceed the rate that occurs under existing, undeveloped conditions. Control of runoff prevents overloading of streams and long-term erosion from uncontrolled, high velocity discharges. Retention and detention ponds can be used to regulate the rate of runoff.
- Agricultural, commercial and industrial, and residential practices should respect stream corridors and waterways, and the natural drainage and runoff patterns associated with them.
- Do not grade property to prevent the natural flow of water onto your property.

2.3.3 Residential Land Use. Residential densities are dependent on the capability of the natural resource base and availability of public services. Existing residential neighborhoods will be preserved by preventing the intrusion of incompatible land uses and disruptive traffic patterns. Residential land use is broken down into four density classifications:

- **Very Low Density Residential.** Very low residential densities should be planned for those portions of the [city/village/township] with prime and unique agricultural lands and other open space, wetlands, and/or major wooded areas, in order to preserve the function they provide in maintaining a healthy ecosystem.
- **Low Density Residential.** Low residential densities should be planned for areas compatible with existing low-density development and capable of accommodating additional development (due to natural resources and the level of essential public services). The maintenance of low densities in those areas is intended to provide for the continued preservation and health of open spaces and natural areas.
- **Suburban Residential.** Suburban residential densities should be planned for areas with existing medium density development and moderately capable of supporting additional development without impairing the health of natural resources.
- **Urban Residential.** Urban residential densities should be planned for areas considered most capable of supporting additional development due to current and/or potential availability of essential public services and natural resource conditions.

2.3.4 Open Space and Environmental Preservation. Significant assets of the [city/village/township] include the availability of quality unimproved, informal open spaces, including wetlands, streams, and wooded sites. Every effort should be made to enhance and preserve those assets for their environmental benefits as well as for outdoor recreational functions.

- Intergovernmental cooperation between [the city/village/township], neighboring units of government, and county, regional, state and federal authorities is essential to the development of recreation systems which balance the preservation of open space and environmental amenities and the provision of active recreation programs and facilities.

- The role of the [city/village/township] should be to encourage the preservation of unique features and woodlands by ordinance and to encourage private developers to preserve their most unique lands in proposed developments.

2.3.5 Sanitary Sewer and Water. The extension of sanitary sewer and water facilities should be limited to areas where existing population densities and natural resource conditions indicate they are necessary to assure the public health, safety and welfare of the community. Cost of implementation, maintenance, and repairs of municipal utilities should be borne by benefiting property owners.

2.3.6 Lake Area Development. Nutrient loading of lakes is a serious byproduct of lakeside residential development. An increase in nitrogen and phosphorus, for example, spurs the growth of aquatic plants such as algae and bacteria (a process known as eutrophication), which lead to the following conditions:

- Increased rate of basin infilling by dead organic matter.
- Poor water clarity.
- A shift in the composition of fish species to rougher types such as carp.
- The presence of unpleasant odors which lead to a decline in the recreational value of the lake.

Municipalities should educate the general public about those conditions in order to garner the support needed to implement the policies and projects necessary to prevent/address (fix) them.

2.3.7 Impervious Surfaces. More buildings, parking lots, roads, and other types of development covering the land in a watershed result in increased storm water runoff. Increased storm water runoff results in changes to the morphology of the river or stream (e.g., erosion and scouring) and more flooding. The additional runoff also carries more pollutants. Municipalities may want to identify the amount of impervious surfaces within the different sub-watersheds in their boundaries. This baseline information can be used to measure the effect future land use decisions will have upon the river or stream.

2.4 Plan Implementation

The land use plan provides the broad framework within which the [city/village/township] will guide future land use and development activities that ensure reasonable and orderly growth. Implementation of this plan will require the ongoing efforts of elected officials, planning commissioners, boards of appeal members, neighboring municipalities, and the citizenry. The effectiveness of the plan is dependent upon the diligence with which its goals, policies, and long-range land use recommendations are acknowledged.

Specific tools and strategies are available to the [city/village/township] for implementation of the Land Use Plan and its policies. Those tools must be enacted and/or reviewed and updated to meet the environmental objectives of the Land Use Plan. Those tools include – but are not limited to – the following:

- **Primary Local Ordinances.**
 - **Zoning.** Ordinances should include the formulation of provisions to allow for flexibility in development that may produce positive environmental results. For example, there seems to be a movement to protect natural resources through large lot development. That mandate, however, can have the unintended effect of increasing sprawl. A flexible approach to large-lot developments will also include the following alternatives to large-lot zoning:
 - **Open Space Residential Zoning.** Landowners are allowed to cluster development on small parcels with common open space areas. Using this development option allows developers to build on small size lots without increasing the density established by the zoning district. Conservation easements are used to assure that future land use in the open space areas of the development remain in their natural state. Recent changes to the state enabling legislation mandate the inclusion of this tool in all zoning ordinances.
 - **Planned Unit Developments.** Allows for flexibility of land uses allowed and density bonus incentives for good design. The environment should be a part of PUD reviews and industrial site plans.
 - **Subdivision Control.**
 - **Land Division Ordinance.**
 - **Site Plan Review.** Updates to those processes may include the mandate to review all new development. Municipalities may want to delegate the environmental review of site plans to an environmental review board separate from the planning commission.
 - **Building Code Provisions.** This should include the process and requirements for the issuance of a building permit. (See Appendix B.)
 - **Adoption of other Ordinances.** Including but not limited to:
 - **Wetlands Floodplains, and/or Woodlands Preservation**
 - **Soil Erosion and Sedimentation Control.** Soil Erosion and Sedimentation Control plans should be required for every proposed development prior to the issuance of a building permit.
 - **Sewage/Septage Ordinances and/or the Sanitary Code.** Evaluate quality of existing septic tank systems and the need for regulation and the investment in public facilities.
 - **Ground and Surface Water Protection.** A wellhead delineation study is needed.
 - **(Roadside) Dumping Ordinances**
 - **Storm Water Management**
 - **Private Road Standards**
 - **Best Management Practices.** Develop, identify, and distribute best management practices. Tie them to ordinance requirements.
 - **“Development Guide” Information Handbook.** Publish an informational handbook on development guidelines aimed at the development community that explains the "Why" as well as the regulation.
 - **Capital Improvements and/or Planning Expenditure Program.** Develop a capital improvements program (CIP) and/or a planning expenditure program which fund the projects and environmental planning initiatives called for within the land use plan. These plans are usually cover five-years and are updated annually. Those annual updates should include a

progress report on the completion of the projects and initiatives included in the Plan and what needs to be done to complete them.

- **Other Tools/Initiatives**

- Cooperative efforts with adjacent communities and other agencies
- Public/private acquisition of easements and/or property for view sheds, greenways, etc.
- Millages or special assessments to finance desired improvements
- Training (initial and continuing) for elected and appointed officials in water quality
- Make sure the Soil Erosion and Sedimentation Control Officer in your county is active.

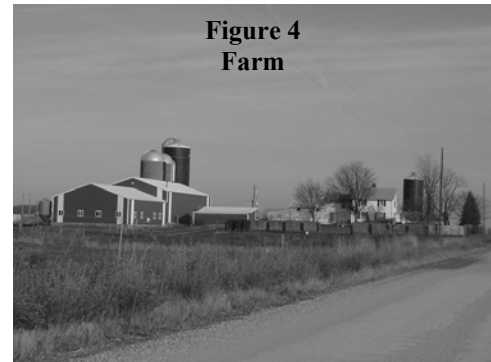
It should be noted that this list of strategies does not pretend to be definitive. These strategies are the most common and feasible options currently available. As new legislation and court actions occur it is entirely possible that new options will become available, while some existing options may be altered or eliminated entirely.

The land use plan must be flexible in design and adaptable to changing circumstances without weakening its established goals and policies. The effective implementation of the plan will require long-term cooperation and effort on the part of [city/village/township] officials and staff, developers, landowners, and citizens. An informed and involved citizenry is, therefore, essential to the success of the plan. In addition, the plan should be reviewed and updated (if necessary) every five years.

Please refer to Appendix C for online examples of some of these implementation tools.

3 Agriculture

Agriculture is an important component of many communities. The impact that evolving and evermore intensive farming practices have on the environment, however, is of great concern. Local governments have taken many approaches to agricultural regulation. Of particular interest are "animal livestock facilities." The Michigan Right to Farm Act, however, preempted those efforts.



3.1 The Michigan Right to Farm Act

The Michigan Right to Farm Act (Public Act 93 of 1981), according to the Michigan Department of Agriculture website, was enacted to "provide farmers with protection from nuisance lawsuits. This statute makes it very hard for local governments to enact any environmental protections that would negatively impact farming operations." Section 4 (6) of the statute states:

Beginning June 2, 2000, except as otherwise provided in this section, it is the express legislative intent that this act preempt any local ordinance, regulation, or resolution that purports to extend or revise in any manner the provisions of this act or generally accepted agricultural and management practices developed under this act. Except as otherwise provided in this section, a local unit of government shall not enact, maintain, or enforce an ordinance, regulation, or resolution that conflicts in any manner with this act or generally accepted agricultural and management practices developed under this act.

The online synopsis of the Act defines "certain farm uses, operations, practices, and products; to provide certain disclosures; to provide for circumstances under which a farm shall not be found to be a public or private nuisance; to provide for certain powers and duties for certain state agencies and departments; and to provide for certain remedies for certain persons." It includes the following sections:

- Short title.
- Definitions.
- Farm or farm operation as public or private nuisance; review and revision of practices; finding; conditions.
- Recovery of costs and expenses.
- Property subject to disclosure
- Contents of statement.
- Investigation of complaints involving farm or farm operation; memorandum of understanding; generally accepted agricultural and management practices; unverified complaints; applicability of other statutes; preemption of local ordinance, regulation, or resolution; ordinance proposed by local unit of government; generally accepted agricultural and management practices for site selection and odor controls at new or expanding animal

livestock facilities; advisory committee; manure management plan; duties of department; definitions.

The Michigan Right to Farm Act is listed in the Michigan Compiled Laws as MCL 286.471 - MCL 286.474. It can be reviewed online at www.michiganlegislature.org/law. Just enter '286.471' into the 'MCL Section' box under the 'Michigan Compiled Laws Information' heading and press the 'Go!' button. Use the 'Navigation' bar to access the different sections of the statute.

3.1.1 Generally Accepted Agricultural and Management Practices

Public Act 93 of 1981, according to the Michigan Department of Agriculture website, also "authorizes the Michigan Commission of Agriculture to develop and adopt Generally Accepted Agricultural and Management Practices (GAAMPS) for farms and farm operations in Michigan. These voluntary practices are based on available technology and scientific research to promote sound environmental stewardship and help maintain a farmer's right to farm." GAAMPS listed on the Department's website include the following:

- Manure Management and Utilization
- Pesticide Utilization and Pest Control
- Nutrient Utilization
- The Care of Farm Animals
- Cranberry Production
- Site Selection and Odor Control for New and Expanding Livestock Production Facilities

The Generally Accepted Agricultural and Management Practices (GAAMPS) can be accessed on the Michigan Department of Agriculture's website which is located online at www.michigan.gov/mda. Just click on the following buttons: 'Farming,' 'Environment,' and 'GAAMPS,' which are located in the upper left-hand corner of the webpages. The box listed 'Jump to a category . . .' can be used to jump to any one of the six GAAMPS.

3.1.2 Procedure for Investigating Complaints

The Michigan Right to Farm Act established a procedure for the Department of Agriculture to follow when investigating complaints against farms or farm operations. That procedure is summarized below. (The procedure should be followed, however, as stated in the statute).

- All complaints involving a farm or farm operation, including, but not limited to, complaints involving the use of manure and other nutrients and surface water or groundwater pollution shall be investigated.
- An on-site inspection of the farm or farm operation will be conducted within 7 business days of receipt of the complaint by the Department.
- The [city/village/township] and the county shall be notified of the complaint (all notifications are to be in writing).

- If the Department finds that the person responsible for a farm or farm operation is using generally accepted agricultural and management practices, it shall notify that person, the complainant, and the [city/village/township] and the county of this finding.
- If the Department identifies that the source (or potential sources of the problem) was caused by the use of other than generally accepted agricultural and management practices (GAAMPS), it shall advise the person responsible for the farm or farm operation that necessary changes should be made to resolve or abate the problem and to conform with generally accepted agricultural and management practices. If those changes cannot be implemented within 30 days, the person responsible for the farm or farm operation shall submit an implementation plan, including a schedule for completion of the necessary changes to the Department.
- When a follow-up on-site inspection is conducted to verify whether those changes have been implemented, the Department shall notify the [city/village/township] and the county of the time and date of the follow-up on-site inspection and shall allow a representative of the [city/village/township] and the county to be present during the follow-up on-site inspection.
- If the changes have been implemented, the Department shall notify the person responsible for the farm or farm operation, the complainant, and the [city/village/township] and the county of this determination.
- If the changes have not been implemented, the Department shall notify the complainant and the [city/village/township] and the county that the changes have not been implemented and whether a plan for implementation has been submitted.
- Upon request, the Director shall provide a copy of the implementation plan to the [city/village/township] and the county.

3.2 Local Land Use Planning and Zoning Techniques

The impact that the Michigan Right to Farm Act has on the ability of a local unit of government to regulate agricultural practices highlights the need to separate the regulation of agriculture from other uses as much as possible. Open spaces and natural features are often placed in agricultural zones/districts within local land use plans and zoning ordinances. Agricultural land could be separated from significant open spaces and natural features in policy documents and ordinances. This action helps to preserve and enhance the agricultural and open space and natural feature protection aims of a municipality. The county soil survey can be utilized to identify areas of prime and unique farmlands.

Agricultural Zoning Districts

It is recommended that the following provisions be reviewed and adapted for amendment into the Agricultural District of a community.

Statement of Intent. This district is composed of areas of the [city/village/township] suited to active agriculture. The regulations governing this district are designed to preserve farmland and farm dwellings.

- All farm and farming operations are allowed within this district as long as they adhere to the generally accepted agricultural and management practices.
- The [city/village/township] will take advantage of the opportunities provided to it by the Michigan Right to Farm Act:
- The [city/village/township] will be participate in follow-up on-site inspections by the Michigan Department of Agriculture to verify whether the changes recommended by the Department have been implemented.
- If an implementation plan is required by the Department of Agriculture, the [city/village/township] request a copy.

Conditional Uses.

- Single family homes as long as one of the occupants of the home is involved in the cultivation of the land. The density shall be one dwelling unit per 40 acres. (Municipalities need to set a maximum density for themselves – the lesser the density, however, the more effective land preservation is.)

4 Zoning Ordinances

A source of clean water is important to obtaining a high quality of life. Zoning ordinances affect water quality both overtly and inadvertently through the development regulations they mandate and the placement of permitted and conditional uses allowed within the municipality. The staff of the Region 2 Planning Commission (R2PC) reviewed the zoning ordinances of 9 communities within Jackson and Hillsdale counties for the purpose of examining their potential effect on water quality. The following report summarizes those findings, which can be divided into the following categories:

- Definitions
- Zoning Districts
- Supplemental Regulations for Districts
- Conditional or Special Land Uses
- Planned Unit Developments
- Condominiums/Apartments
- Site Plan Review

4.1 Definitions

In order to minimize confusion, it is important to define the terms used in a zoning ordinance. This section contains a number of terms used in the remainder of this report. Local governments may want to amend their ordinances to include pertinent terms. (Make sure that the definitions in your regulatory documents are in agreement.)

Active Recreation Facilities. Sports fields, gymnasiums, playgrounds, multi-purpose non-motorized trails, motorized trails and other similar facilities.

Central Sanitary Sewer System. A sanitary sewer system furnished from a central location or plant, but not including septic tanks, by any person duly authorized to furnish such a system in accordance with federal, state, or local regulations.

Central Water System. A water supply system furnished from a central location or plant by any person duly authorized to furnish such a system, in accordance with federal, state, or local regulations.

Farm. (As defined in the Michigan Right to Farm Act.) The land, plants, animals, buildings, structures, including ponds used for agricultural or aquacultural activities, machinery, equipment, and other appurtenances used in the commercial production of farm products.

Farm Operation. (As defined in the Michigan Right to Farm Act.) The operation and management of a farm or a condition or activity that occurs at any time (as necessary) on a farm in connection with the commercial production, harvesting, and storage of farm products, and includes, but is not limited to:

- Marketing produce at roadside stands or farm markets.
- The generation of noise, odors, dust, fumes, and other associated conditions.
- The operation of machinery and equipment necessary for a farm including, but not limited to, irrigation and drainage systems and pumps and on-farm grain dryers, and the movement of vehicles, machinery, equipment, and farm products and associated inputs necessary for farm operations on the roadway as authorized by the Michigan Vehicle Code (MCL 257.1 to 257.923).
- Field preparation and ground and aerial seeding and spraying.
- The application of chemical fertilizers or organic materials, conditioners, liming materials, or pesticides.
- Use of alternative pest management techniques.
- The fencing, feeding, watering, sheltering, transportation, treatment, use, handling and care of farm animals.
- The management, storage, transport, utilization, and application of farm by-products, including manure or agricultural wastes.
- The conversion from a farm operation activity to other farm operation activities.
- The employment and use of labor.

Farm Product. (As defined in the Michigan Right to Farm Act.) Those plants and animals useful to human beings produced by agriculture and includes, but is not limited to, forages and sod crops, grains and feed crops, field crops, dairy and dairy products, poultry and poultry products, cervidae, livestock, including breeding and grazing, equine, fish, and other aquacultural products, bees and bee products, berries, herbs, fruits, vegetables, flowers, seeds, grasses, nursery stock, trees and tree products, mushrooms, and other similar products, or any other product which incorporates the use of food, feed, fiber, or fur, as determined by the Michigan commission of agriculture.

Generally Accepted Agricultural and Management Practices (GAAMPS). Voluntary practices based on available technology and scientific research to promote sound environmental stewardship and help maintain a farmer's right to farm. GAAMPs include the following:

- **Manure Management/Utilization.**
- **Pesticide Utilization/Pest Control.**
- **Nutrient Utilization.**
- **Care of Farm Animals.**
- **Cranberry Production.**
- **Site Selection Checklist.**

Log onto the Michigan Department of Agriculture's website to view the GAAMPS – <http://www.michigan.gov/mda>.

Hazardous Substances. Any hazardous substances as defined by state and federal agencies, including but not limited to, hazardous chemicals, flammable and combustible liquids, hazardous materials, and hazardous waste as defined by state and federal regulatory agencies and laws. Sources include, but are not limited to:

- PA 188 of 1965, the Michigan Hazardous Substances Act (MCL 286.451 - 286.463) – www.michiganlegislature.org/law
- Michigan Department of Environmental Quality – www.michigan.gov/deq
- Michigan State Police – www.msp.state.mi.us

Junkyard. A structure or parcel of land where junk, waste, discard, salvage, or similar materials such as old iron or other metal, wood and lumber, glass, paper, rags, cloth, leather, rubber, bagging, cording, barrels, or containers. This includes autos and other inoperative machines, structural steel materials, and other equipment. It also includes establishments where those materials are bought, sold, exchanged, stored, baled, packed, disassembled, or handled for any 30 consecutive days. This should include the storage of inoperable vehicles and other white trash (i.e., appliances, etc.) on land with a primary use other than junkyard.

Kennel. The land and/or structure where five or more cats, dogs, and/or other small domesticated animals are boarded. (Municipalities must codify the maximum number of animals allowed as they see fit.)

Michigan Right To Farm Act (MCL 286.471 - 286.474). Public Act 93 of 1981 was enacted to provide farmers with protection from nuisance lawsuits. The statute authorizes the Michigan Commission of Agriculture to develop and adopt Generally Accepted Agricultural and Management Practices (GAAMPs) for farms and farm operations in Michigan.

Mobile Home Park. A tract of land prepared and approved according to the procedures in this ordinance and state law to accommodate mobile homes on rented or leased lots.

Person. An individual, corporation, partnership, association, or other legal entity.

Planned Unit of Development (PUD). A form of development usually characterized by the flexible application of zoning district regulations and unified site design for a number of housing units, clustering buildings, providing common open space and a mix of building types and land uses. It permits the calculation of densities over the entire development, rather than on an individual lot-by-lot basis. It also refers to a process, mainly revolving around site plan review, in which the [city/village/township] will have considerable involvement in determining the nature of the development.

Quarry. Any pit, excavation, or mining operation for the purpose of searching for or removing from the premises any earth, coal, rock, sand, gravel, clay, stone, slate, marble, or other non-metallic mineral in excess of fifty (50) cubic yards in any calendar year, but shall not include an excavation preparatory to the construction of a structure or public highway.

Riding Academy. Any establishment where horses are kept for riding, driving, or stabling for compensation or incidental to the operation of any club, association, ranch, or similar establishment.

Site Plan Review. A review by the [planning commission/zoning board] and the [city council/village council/township board] of certain buildings and structures that can be expected to have a significant impact on natural resources, traffic patterns, and on adjacent land use.

4.2 Zoning Districts

Different land uses create different non-point source pollution concerns. Those concerns should be addressed. The following listing addresses those issues by land use.

4.2.1 Agricultural and Open Space Districts

Many zoning ordinances create a single district for agriculture and open space. This action recognizes the often-complementary environmental benefits of preserving open space and agricultural land. There are enough differences, however, to justify the separation of these districts under the general heading of agricultural and open space districts.

- The main aim of agricultural districts should be to preserve valuable agricultural land – environmental protection is an important, but secondary outcome.
- Open space districts are aimed at environmental protection and the preservation of important natural features.

Agricultural District

Please see the section on 'Agriculture and Water Quality'

Open Space District

Statement of Intent. This district is composed of areas of the [city/village/township] well suited to open space, passive recreational, and extremely low-density residential land uses. The regulations governing this district are designed to retain lands that are environmentally sensitive or provide for the recreational pursuits of township residents. Permitted land uses are generally those in support of public interests of open space, environmental protection and education, and recreation.

The conditional uses allowed should be limited and based at least in part on their potential impact upon ground and surface waters.

Developments should also be maintained in an environmentally responsible fashion:

- Maintain appropriate filtration strips along the shorelines of bodies of water (i.e., lakes, streams, and wetlands, etc.).
- Limit the amount of impervious surfaces (i.e., parking lots, roofs, drives, etc.).
- Maintain on-site essential services such as wells and septic tanks to ensure that ground and surface water is not polluted.

4.2.2 Residential Districts

The primary purpose of residential districts is to house the population of the [city/village/township]. The main difference between the different residential districts is the density of development allowed and the essential service requirements for new developments.

Rural Residential District

Statement of Intent. The district is intended to permit single family residential uses on large lots in order to conserve and protect natural features, and the rural character of the [city/village/township]. It also minimizes the demand for public utility services and infrastructure by limiting the district's population density. (Municipalities need to set a maximum density for themselves – the lesser the density, however, the more effective land preservation is.)

Suburban Residential District

Statement of Intent. This district is intended to permit single family residential uses at higher densities than the rural residential districts.

- The district shall be located in areas where there is central water and sanitary sewer service.

Multiple Family Residential Districts

Statement of Intent. This district is intended to allow for multiple family dwellings at a higher density than single family developments.

- The districts shall be located in areas where there is central water and sanitary sewer service.

Mobile Home Park District

See the Section on 'Conditional or Special Land Uses'

4.2.3 Commercial Districts

The primary purpose of commercial districts is to service the population of the [city/village/township]. The main difference between the different commercial districts is the size of the service area.

'Neighborhood' and 'Community' Commercial Districts

Statement of Intent. This district is designated to service the daily and weekly household or personal needs of abutting residential neighborhoods.

- 'Neighborhood' and 'community' commercial establishments should be served by the same essential services as the homes in the abutting neighborhoods (i.e., if any of the

homes in the surrounding neighborhoods are served by water and sewer, so should the businesses.)

- Commercial establishments or plazas without water and sewer service or compatible onsite utilities should not exceed 10,000 square feet (just a guess – municipalities must set this threshold for themselves).

'Central' and 'General' Commercial District

Statement of Intent. This district is designated to service the household or personal needs of the entire community and its surrounding area.

- Adequate central water and sanitary sewer systems should serve all 'central' and 'general' commercial establishments.

4.2.4 Industrial Districts

The primary purpose of industrial districts is to provide suitable space for industrial uses. The main difference between the different industrial districts is the intensity of the industrial operation. These standards, however, should be applied to all industrial districts.

- In order to prevent loose materials from blowing into adjacent properties and impairing water quality, all storage of goods, supplies, or material shall be within an enclosed building. (At a minimum, a fence, tarpaulin or obscuring wall of no less than six (6) feet should be required around the stored material.)
- The emission of gases, smoke, dust, dirt, and fly ash shall in no manner be unclean, destructive, unhealthful, hazardous, or deleterious to the general welfare. Such emission shall be in strict conformance with all applicable State and County health laws as pertaining to air pollution, water pollution, and smoke abatement.
- Retention and/or detention ponds to handle the increased runoff from parking lots. (The [city/village/township] could enact an ordinance codifying this regulation).

4.3 Supplemental Regulations for Districts

This section of a zoning ordinance is comprised of regulations that may or may not apply to all zoning districts. It is a good place to add non-point source pollution regulations.

4.3.1 District Area, Yard, Height, and Bulk Regulations

Each local government develops this section as it sees fit based upon a wide variety of issues and concerns. There is too much variability to make any concrete recommendations. The following guidelines, however, might prove helpful.

The availability of essential services such as central water and sanitary sewer systems should have an effect upon the allowable density of development in order to protect ground and surface water and the health of the people who utilize those resources (see Table 5).

Central water and sanitary sewer systems do not have to be municipally owned or operated. Technology is continually evolving that will allow for private and/or communal utilities to serve developments. If public services are available, however, hookup should be required.

**Table 5
Determining Minimum Lot Sizes and Widths**

<i>Is the property —</i>	<i>Smaller/ Narrower</i>	<i>Bigger/ Wider</i>
Served by central sanitary sewer and water systems?	YES	NO
<i>For properties without those services, is the parcel —</i>		
Adjacent to or nearby surface water (e.g., pond, lake, stream, wetland, etc.) or a groundwater recharge area?	NO	YES
Comprised of poor soils in relation to water percolation and drainage?	NO	YES

4.3.2 Floodplains

- Land within the 100-year floodplain should be reserved for agricultural, recreational, and open space residential uses.
- Structures, parking lots, and other impervious surfaces should be limited in floodplain areas because of the potential damage to those structures during flooding and the resultant impairment of the floodplain to absorb floodwaters. The construction of residences and primary commercial and industrial buildings should be prohibited.
- The location and boundaries of the 100-year floodplain should be determined by reference to the U.S. Natural Resource Conservation Service, the U.S. Corps of Engineers, or other official authority.

4.3.3 Lakeshores, River and Stream Banks, and Wetlands

- The contamination of any public waters within the [city/village/township] is expressly prohibited. The diversion or obstruction of any public waters within the jurisdiction is expressly prohibited without the written approval of the [city council/village council/township board].
- No person shall alter, change, transform, or otherwise vary the edge, bank, or shore of any lake river, stream, or wetland except in conformance with the following:
 - PART 301 – Inland Lakes and Streams – of the Natural Resources and Environmental Protection Act (MCL 324.30101 to 324.300113).
 - A site plan shall be submitted to the [zoning board/planning commission]. This does not relieve the applicant from complying with requirements of other regulatory agencies.
- No structure shall be placed within fifty (50) feet of a lake, river, stream, or wetland. (Each local government must make its own decision as to the width (based on legally defensible reason)). Some local governments are beginning to use the height of the climax trees native to the area (multiplied by some factor) as the standard.

- A buffer and/or filter strip should be constructed based on stream width and depth, depth of canopy, and relative position of the sun along the course of the stream. Larger 'bubbles' of filter strips should be installed at the points where concentrated amounts of runoff enter a body of water (e.g., low areas) in order to improve water quality. The filter strips should be wide enough to provide adequate shade and filtration for the protection of fisheries and wildlife in other areas.

4.3.4 Outdoor Storage and Waste Disposal

- Any hazardous substances used or generated by medical procedures and/or examinations shall be stored in accordance with all applicable state and federal regulations. Additional measures must be taken to ensure that the accidental leakage or discharge of those materials will not pollute the water table. Notification of the [city/village/township] is required when spills occur.
- All vehicles placed in a storage yard shall be drained of all liquids and oil and the waste materials shall be disposed of in a proper manner so that no unintentional discharges into the soil or groundwater shall occur. All batteries shall be removed from all stored vehicles and disposed of in a proper manner.
- A pollution incident prevention plan shall be required to be submitted to the county health department and given written approval before a building permit can be issued.
- All salvage operations and storage area shall be conducted wholly within an enclosed building or within an enclosed area..

4.3.5 Sanitary Sewage

- Septic tanks or privately operated central sanitary sewer systems must meet standards and specifications prescribed by the county health department and the Michigan Department of Environmental Quality. A letter or document of approval from both levels of government must be submitted by the proprietor to the [city/village/township].
- Disposal of sanitary sewage from septic tanks, cesspools or dry wells shall have the written approval of the property owner and shall adhere to applicable best management practices. Notification of the [city/village/township] is also required.

4.3.6 Storm Water Management

Storm water management standards can be divided among several different concerns:

Drainage

- The [city/village/township] should develop minimum standards for storm water management that would be required for all new development:
- If a limited outlet is available, detain a 50 year storm with a 1 hour duration
- If no outlet is available, retain a 100 year storm with a 3 hour duration
- All storm water management systems shall be built to federal, state, county and municipal standards.

- A letter or document of approval from the county drain commissioner shall be submitted by the proprietor to the [city/village/township] when county drains are included in the proposed plat.
- All thoroughfares shall provide for storm drainage in accordance with the standards and specifications prescribed by the [city/village], the county road commission, or the Michigan Department of Transportation (depending upon who owns and maintains the roadway).

Drainage Easements

- Drainage easements shall conform substantially to the lines of any natural watercourse, drainage ditch, channel or stream.
- Easements shall be of adequate width for the particular conditions of the site.
- Open drainage easements should be constructed of natural materials which encourage absorption of storm water runoff and which also impede the velocity of the runoff.

Private Roads

- Private roads should incorporate drainage and erosion control in their design.
- Drainage plans shall show that runoff shall be conveyed to existing water courses or water bodies via a retention or detention pond system that will slow the velocity of the runoff and improve the quality of water entering the water courses.
- Underground crossroad drainage shall be provided where the proposed right-of-way crosses a stream or other drainage course. Necessary culverts and treatments shall be provided in accordance with the specifications of the county drain commission.
- The discharged water shall not be cast upon the land of another property owner. The county road commission prior to the issuance of a permit shall approve connection to roadside ditches within public road rights-of-way.

Off-Street Parking Areas

- Parking lots and off-street loading spaces shall be constructed of materials that will have a dust-free surface resistant to erosion. The paving of parking lots, however, significantly increases storm water run-off and create a potential for flooding and/or soil erosion. (Municipalities may want to consider allowing little-used parking lots to be utilized as retention ponds)
- Parking lots and loading spaces shall be drained so as to prevent drainage to abutting properties.
- Retention and/or detention ponds are required to handle the increased runoff from parking lots. (Municipalities could enact an ordinance codifying this regulation.)

Other Hard Surfaced or Impervious Surfaced Areas

- Driveways, patios, roofs, and other hard surfaced or impervious surfaced structures should incorporate drainage and erosion control in their design.

- Retention and/or detention ponds are required to handle the increased runoff from hard surfaced areas. (Municipalities could enact an ordinance codifying this regulation.)

4.3.7 Water System

Each lot or unit shall be served by an adequate public or private water supply. Private sources of water shall be subject to the standards and specifications of the county health department. Written approval of private water supplies shall be submitted to the [city/village/township].

4.4 Additional Development Standards

Some land uses are so potentially disruptive that additional requirements are often mandated before permission is granted. The following development standards are beneficial to water quality.

4.4.1 General development standards for conditional or special land uses

The following development standards should be applied to all conditional or special land uses:

- The use shall be served adequately by essential public facilities and services such as highways and streets, police and fire protection, drainage structures, and refuse disposal. If not, the persons responsible for the establishment of the proposed use shall provide adequately any such services.
- The use shall not create excessive additional requirements at public costs for environmental protection or remediation.
- The use shall not be hazardous to adjacent properties. Nor shall it involve activities, uses, materials or equipment which will be detrimental to the environment or the health, safety, or welfare of persons or property through the excessive production of traffic, noise, smoke, odor, storm water or gray water runoff, fumes, glare, or dust.
- Protect the natural environment and conserve natural resources and energy.
- The development should follow the existing topography of the land as much as possible. Care must be taken to ensure that storm water runoff is not increased when the terrain is altered.
- Filtration strips shall be maintained along the shoreline of lakes and streams and wetlands.
- Water runoff offsite cannot be increased because of the development.
- The [city/village/township] shall be copied on any reports the operators/developers are required to submit to state and/or federal regulatory agencies during the construction and operation of the development.
- The applicant must show that the proposed special land use shall not result in a probable impairment, pollution, and/or destruction of the air, water, or other natural resources, or the public trust therein.
- All roads, driveways, parking lots, and loading-unloading areas shall be paved, watered, or chemically treated so as to limit the nuisance caused to adjoining lots and public roads by wind borne dust. No applications that impair water quality and/or quantity, however, shall be employed.

- Single family dwellings and/or any accessory structures shall be located at least fifty (50) feet from any designated floodplain or wetland.
- No cutting of natural climax trees within one tree height from any water course.

4.4.2 Development standards applied to specific conditional uses

Other development standards are directed at a specific conditional or special land use. The following development standards are organized by land use:

Active recreation facilities

- Trails for use by motorized vehicles and bicycles shall be designed to limit erosion and its resultant impact on water quality.

Automobile repair and service stations

- Oil, gas, and other hazardous substances used to service and/or repair motorized vehicles shall be stored, administered, and disposed of in accordance with state and federal regulations.
- Additional steps shall be taken to ensure that those materials do not infiltrate into ground and surface waters.

Automobile washes

- Gray water cannot be directly discharged into ponds, lakes, streams, wetlands, or other water bodies.
- Gray water cannot be discharged directly into the public storm water sewer system.
- The use of detention and/or retention ponds may be used to regulate the release of gray water.

Cemeteries and golf courses

- The application of fertilizers on cemeteries and golf courses should not contribute to the eutrophication of ponds, lakes, and/or streams.

Hospitals and medical clinics

- Any hazardous substances used or generated by medical procedures and/or examinations shall be stored in accordance with all applicable state and federal regulations. Additional measures will be taken to ensure that the accidental leakage or discharge of those materials will not pollute the water table.
- Methods used to transport hazardous substances shall not leak or discharge onto public rights-of-way or discharge on public or private property. If leaks or discharges occur, they

shall be cleaned up according to state and federal laws and regulations. The [city/village/township] will be notified of any leaks or discharges.

Junk yards

- All roads, driveways, parking lots, and loading/unloading areas within any yard of a junkyard shall be paved, oiled, watered, or chemically treated so as to limit the nuisance caused to adjoining lots and public roads by wind borne dust. It should also be determined that the treatment chosen to limit dust shall not impair water quality.
- All vehicles placed in the storage yard shall be drained of all liquids and oil and the waste materials shall be disposed of in a proper manner so that no unintentional discharges into the soil or groundwater shall occur. All batteries shall be removed from all stored vehicles and disposed of in a proper manner.
- A pollution incident prevention plan shall be required to be submitted to the county health department and given written approval before a building permit can be issued.
- All salvage operations and storage areas within junkyards shall be conducted wholly within an enclosed building or within an enclosed area. Runoff from that storage area will be detained onsite and allowed to filter through the soil.
- Notification of the [city/village/township] is required when spills occur.

Kennels and stables

- The [kennel/stable] shall be established and maintained in accordance with all applicable state, county and [city/village/township] sanitation regulations.
- The premises shall be kept so that animal waste is disposed of in an expedient, sanitary manner and to eliminate odor and insect problems.
- There shall be proper sewage/septage facilities on site, including an adequately sized holding tank for waste materials with minimum yearly pumping maintenance. If public central sanitary sewer service is available, hook-up is required.
- Methods used to transport animal waste shall not leak or discharge onto public rights-of-way or discharge on public or private property without the owner's account and in adherence with any applicable regulations and laws. The [city/village/township] shall be notified of the incident.

Mobile home parks

- Every mobile home park or subdivision shall be served by a central water supply system and a central sanitary sewer system – onsite or connected to a public utility.
- All mobile homes within such parks shall be suitably connected to sewer and water services provided at each mobile home site, and shall meet the requirements and be approved by the county health department.
- All central sanitary sewer facilities, including plumbing connections to each mobile home site, shall be constructed so that all facilities and lines are protected from freezing, from bumping or from creating any type of nuisance, health hazard, or environmental damage.

- Storm drainage facilities shall be so constructed as to protect the residents of the mobile home park as well as the property owners adjacent to the park.
- Any method used for the disposal of garbage and trash shall be approved by the State and inspected periodically by the county health department.
- Any fuel oil and gas storage shall be centrally located. All fuel lines shall be underground and so designed as to conform to the [city/village/township] building code and any state code that is found to be applicable.

Open space residential and planned unit developments

- The design of the development should respect wooded areas and floodplains which are important to the recharge of aquifers and which help to absorb flood waters.
- The common open-space, common properties, individual properties, and all other elements shall be so planned that they will achieve a unified environmental scheme, with open spaces and all other elements in appropriate locations, suitably related to each other, the site, drainage, and surrounding land.

Quarries – mining and extractive operations

- All roads, driveways, parking lots, and loading-unloading areas within a quarry operation shall be paved, oiled, watered, or chemically treated so as to limit the nuisance caused to adjoining lots and public roads by wind borne dust. It should also be determined that the treatment chosen to limit dust shall not impair water quality.
- The removal, processing or storage shall not be conducted as to cause the pollution by any material of any surface or subsurface, watercourse, or body outside the lines of the lot on which such use shall be located.
- Such removal, processing or storage shall not be conducted as to cause or threaten to cause the erosion by water of any land outside of the lot or of any land on the lot so that earth materials are carried outside of the lines. Such removal shall not be conducted as to alter the drainage pattern of surface or subsurface waters on adjacent property, and that in the event that such removal, processing, or storage shall cease to be conducted it shall be the continuing responsibility of the owner or operator thereof to assure that no erosion or alteration of drainage patterns, as specified in this paragraph, shall take place after the date of the cessation of operation.
- The operator of the mining operation shall file with the Planning Commission and the Zoning Inspector a detailed plan for the restoration of the land once the mining operation is finished. The plan shall include the steps that shall be taken to conserve topsoil; proposed and final landscaping; and the location of future roads, drives, drainage courses, and/or other contemplated improvements.

Sanitary landfills

- The proposed landfill must comply with the county solid waste plan and any state and/or federal regulations.

Self-storage facilities

- The storage of any toxic, explosive, corrosive, flammable, or hazardous material is prohibited.
- All roads, driveways, parking lots, and loading-unloading areas shall be paved, oiled, watered, or chemically treated so as to limit the nuisance caused to adjoining lots and public roads by wind borne dust. Those applications shall not impair water quality.

Veterinary clinics and hospitals

- The veterinary clinic or hospital shall be established and maintained in accordance with all applicable state, county and [city/village/township] sanitation regulations.
- The premises shall be kept so that animal waste is disposed of in an expedient, sanitary manner and to eliminate odor and insect problems.
- There shall be proper sewage/septage facilities on site, including an adequately sized holding tank for waste materials with minimum yearly pumping maintenance.
- Methods used to transport animal waste on shall not leak or discharge onto public rights-of-way or discharge on public or private property without the owner's account and in adherence with any applicable regulations and laws.

4.5 Planned Unit Developments

Planned Unit Developments (PUD) can be utilized for the long-term protection and preservation of natural resources and natural features of a significant quantity and/or quality, where such benefit would otherwise be unfeasible or unlikely to be achieved without application of the planned unit development regulations.

- General Design Standards:
 - To the maximum extent feasible, the development shall be designed so as to preserve the natural resources and natural features.
 - Thoroughfare, drainage, and utility design shall meet or exceed the standards otherwise applicable in connection with each of the respective types of uses served.
- PUD requests must go through the site plan review process.

4.6 Condominiums/Apartments

- A person, firm or corporation intending to develop a site condominium project shall provide the following information with respect to the project:
 - Whether or not a community water system is contemplated
 - Whether or not a community septic system is contemplated
- Condominium/Apartment requests must go through the site plan review process.
- Developers must develop a storm water management program

4.7 Site Plan Review

4.7.1 Standards for Review

- The use shall not be hazardous to adjacent property, or involve uses, activities, materials, or equipment which will be detrimental to the health, safety, or welfare of persons or property or the environment through the excessive production of ground and surface water pollution.
- The use shall be adequately served by essential public facilities and services, or it shall be demonstrated that the person responsible for the proposed use shall be able to continually provide adequately for the services and facilities deemed essential to the use under consideration.
- The use shall not place demands on public services and facilities in excess of current capacity.
- The applicant shall provide proof of approvals by all county, state and federal agencies having jurisdiction over improvements (including but not limited to the county road commission, county drain commissioner, county health department, the Michigan Department of Natural Resources, Michigan Department of Environmental Quality, and the U.S. Environmental Protection Agency). The [planning commission/zoning board] shall not approve a final site plan until each county, state or federal agency, having such jurisdiction has approved that portion of the site plan that is subject to its jurisdiction.
- The developer shall file with the [city/village/township] a performance bond payable to the municipality and conditioned on the faithful performance of all requirements contained in the approved site plan. The amount of the required bond which will reflect the anticipated cost of restoration shall be fixed upon written certification of the zoning inspector that the restoration is complete and in compliance with the restoration plan.

4.7.2 Developments requiring a site plan

The following developments shall be required to submit a site plan, because of their potential impact upon surface and ground water quality.

- Conditional or special land uses.
- Planned unit development
- Condominiums/apartments
- Developments that will alter the edge, bank, or shore of any lake, river, stream, or wetland.
- Developments that use, generate, handle, or store hazardous substances.

4.7.3 Required Data on Site Plan Maps

The following maps should be required:

- vicinity map
- site plan

Vicinity maps shall show the following information:

- The location of all private water supply wells within a one-mile radius of the property.
- The location of existing drainage courses and associated bodies of water (including wetlands), on and off site and their elevations within a one mile radius of the property.
- Adjacent properties and their existing use.

Site plans shall show the following information:

- Existing topography with a maximum contour interval of two feet, both on the site and beyond the site for a distance of 100 feet in all directions.
- A grading plan, showing finished contours at a maximum interval of two feet, correlated with existing contours so as to clearly indicate required cutting, filling and grading.
- Location of natural resource features, including woodlands and areas with slopes greater than 6 percent (1 foot of vertical elevation for every 6 feet of horizontal distance).
- Streams, rivers, lakes, drains, flood plains, and wetlands.
- Existing man-made features such as buildings, structures, high tension towers, and pipelines
- Soil characteristics of the parcel to at least the detail provided by the county soil survey.
- Well sites
- Septic systems and other wastewater treatment systems. The location of the septic tank and the drainfield (soil absorption system) should be clearly distinguished.
- Existing utilities such as water and sanitary sewer lines (including pump stations), water main hydrants, bridges, culverts, and drains.
- Storm water control facilities and structures including storm sewers, swales, retention and detention basins, drainage ways, and other facilities, including calculations for sizes.
- location of easements
- Storage, loading, and disposal areas for chemicals, hazardous substances, salt, and fuels.
- trash receptacle pad location and design
- If the proposed development is not to be served by public sewer and water systems, a site report (in a form acceptable to the county health department) shall be submitted as described in the rules of the State of Michigan Department of Public Health. If available, such report shall also include boring and percolation test data for a representative portion of the development.

All maps should include the following information:

- The scale; north point; boundary dimensions, date, and map maker.

4.7.4 Letters of Recommendations

Letters of recommendation needed from the following agencies:

- Road Commission
- Health Department
- Drain Commissioner

4.7.5 Final Site Plan Review Criteria

Final site plans will be reviewed based upon these criteria:

- It provides for proper development of roads, easements and public utilities and protects the general health, safety, welfare and character of the [city/village/township].
- It meets the requirements and standards for grading and surface drainage and for the design and construction of storm sewers, storm water facilities, parking lots, driveways, water mains, sanitary sewers as determined by [city/village/township] engineers and set forth in the [city/village/township]'s design and construction standards.
- The grading of the property does not prevent the natural flow of water onto it.
- Natural resources will be preserved to the maximum extent possible in the site design by developing in a manner which will not detrimentally affect or destroy or pollute natural features such as lakes, ponds, streams, wetlands, steep slopes, groundwater and woodlands.
- The proposed development will not cause soil erosion or sedimentation off site.
- Storm water management systems and facilities will preserve the natural drainage characteristics and enhance the aesthetics of the site to the maximum extent possible, and will not substantially reduce or increase the natural retention or storage capacity of any wetland, water body or water course, or cause alterations which could increase flooding or water pollution on or off site.
- Wastewater treatment systems, including on-site septic systems, will be located and designed to minimize any potential degradation of surface water or groundwater quality.
- Sites which include storage of hazardous materials or waste, fuels, salt, or chemicals, will be designed to prevent spills and discharges of polluting materials to the surface of the ground, groundwater, or nearby water bodies.

Appendix A References

Land Use Plans

- Village of Parma Land Use (July 28, 1980)
- Village of Springport Land Use Plan Community Development Goals (June 4, 1997)
- Blackman Township Land Use Plan (July 10, 1995)
- Leoni Township Master Plan (1996)
- Rives Township Land Use Guide (March 31, 1977)
- Sandstone Township Master Future Land Use Plan (June 22, 1998)
- Somerset Township Comprehensive Community Land Use Plan (Revised 1997)
- Springport Township Land Use Plan (Date Unknown)
- Tompkins Township Land Use – 2000 (September 3, 1980)
- Waterloo Township Master Plan (Revised June 13, 2000)

Zoning Ordinances

- Village of Parma Zoning Ordinance (April, 1999)
- Village of Springport Zoning Ordinance (2/7/2000)
- Henrietta Township Zoning Ordinance (May 29, 2001)
- Leoni Township Zoning Ordinance (Revised March 26, 2001)
- Rives Township Zoning Ordinance (April 2, 2001)
- Sandstone Township Draft Zoning Ordinance (June, 1999)
- Somerset Township Zoning Ordinance (Amended March 17, 1999)
- Tompkins Township Zoning Ordinance (2/6/1990)
- Waterloo Township Zoning Ordinance With Land Development Regulations (Amended, May 17, 1994)

Online Sources

- www.fema.gov -- FEMA's National Flood Insurance Program.
- <http://mapping.usgs.gov> – USGS maps
- www.michiganlegislature.org/law – Michigan Compiled Laws (including: Part 91 – Soil Erosion and Sedimentation Control – of the Natural Resources and Environmental Protection Act, Michigan Right to Farm Act, Michigan Hazardous Substances Act)
- www.michigan.gov/mda, Michigan Department of Agriculture (Generally Accepted Agricultural Management Practices (GAAMPS))
- www.michigan.gov/deq, Michigan Department of Environmental Quality
- www.msp.state.mi.us, Michigan State Police

Appendix B

Building Inspection Checklist

If a municipality does not want to enact a local soil erosion and sedimentation control ordinance, the addition of certain water quality provisions to the building inspector's checklist may be the preferred alternative. At a minimum, the following items should be included on the building inspection checklist:

- Graded or filled areas on the site must be encircled with properly installed silt fencing, excepting points of egress (i.e., driveways, etc).
- Driveways, and any other points of egress from the site, must be "topped" by a minimum of 20 feet of crushed stone or slag – as measured from the pavement (i.e., asphalt, concrete, gravel, etc.) of a roadway – in order to prevent the mud from being tracked onto the road(s).
- Silt socks must be placed in any catch basins to be constructed on the site, and any catch basins immediately downstream from the site.
- A Soil Erosion Permit must be acquired prior to any earthmoving activity being undertaken.

Prior to issuing an Occupancy Permit, require the architect or builder to certify the following:

- The requirements of [list pertinent municipal and/or county storm water management policies here] have been met or exceeded (if pertinent).
- The site plans have been reviewed and approved by the [place the name of your county here] County Drain Commissioner.
- Approvals have been obtained from the [place your county name here] County Health Department for a well and septic system (if pertinent).

In addition to the standard items required on a site plan (i.e., exact location and dimensions of all buildings and their distance from each property line and each other, scale, north arrow, etc.), the location of the following should also be mandated:

- Graded or filled areas.
- Driveways and any other points of egress.
- Catch basins to be constructed on the site and any catch basin(s) immediately downstream.
- Well and septic system (if pertinent).

These minimum requirements should be applied to all building permit applicants, regardless of the size of the proposed project.

Appendix C Online Resources

The following websites provide background information on non-point source pollution issues:

- **Rouge River National Wet Weather Demonstration Project, Improving Community Storm Water Management – A Summary Guide of Ordinances for River Rouge Communities, <http://www.wcdoe.org/rouge/river/pdfs/stormwater/sr17.pdf>**

The document provides background information on, and suggestions for, the development of a storm water ordinance (or a series of ordinances) covering:

- Controlling Storm Water Quantity and Quality
 - Soil Erosion and Sedimentation Control
 - Managing Septic Systems
 - Protecting Wetlands
 - Maintaining Vegetative Buffer Zones and Stabilizing Streambanks
 - Floodplain/Watercourse: Maintaining Docks and Other Water Dependant Structures
 - Establishing Wildlife Corridors
- **NEMO, <http://nemo.uconn.edu/publications/pubs.htm>**

NEMO – “The Nonpoint Education for Municipal Officials Project is an educational program for local land use officials that addresses the relationship of land use to natural resource protection.” The website provides a wide variety of fact sheets, videos, technical papers, and other resources that address nonpoint source pollution issues.

The following websites provide model ordinances that can be adapted for your jurisdiction:

- **Carl Vinson Institute of Government – Water Management Planning – Publications and Reports, <http://www.cviog.uga.edu/water/publications/>**

The Water Management Planning page of the Institute’s website provides a link to a report entitled “Protecting Streams and River Corridors: Creating Effective Local Riparian Buffer Ordinances,” <http://www.cviog.uga.edu/water/publications/protecting.pdf>. Although the report is aimed at communities in Georgia, where buffers are mandated in state law, it is designed to help a local community to craft buffer ordinances that is appropriate for its jurisdiction. The report is also aimed at limiting the claims of property ‘takings.’ It is also scientifically based. A model ordinance for developing a fixed width riparian buffer is contained in the report.

- **The River Network, <http://www.rivernet.org/>**

The River Network – Helping People Understand, Protect and Restore Rivers and their Watersheds – supports grassroots river and watershed conservation groups. The web page,

http://www.rivernetwork.org/library/librivissbuf_rvsp98tech.cfm, provides “Technical Factors for Riparian Buffer Information Through Local Ordinances.” The web page, http://www.rivernetwork.org/library/librivissbuf_ordinances.cfm, provides a number of “on-line resources and model ordinances to help you establish policies that will protect existing riparian buffers in your watershed.”

- **The Storm Water Manager’s Resource Center**, <http://www.stormwatercenter.net/>

The Stormwater Manager's Resource Center (SMRC) “is designed specifically for stormwater practitioners, local government officials and others that need technical assistance on stormwater management issues.” The website provides **30 model ordinances**. (Just click on ‘Ordinance Selector’ on the home page.)

The following websites provide information on other tools:

- **Center for Watershed Protection**, *Site Planning Model Development Principals*, http://www.cwp.org/22_principles.htm,

“The twenty-two model development principles [displayed on the web page] provide design guidance for economically viable, yet environmentally sensitive development. Our objective is to provide planners, developers, and local officials with benchmarks to investigate where existing ordinances may be modified to reduce impervious cover, conserve natural areas, and prevent stormwater pollution. These development principles are not national design standards. Instead, they identify areas where existing codes and standards can be changed to better protect streams, lakes and wetlands at the local level. The development principles are divided into the three following areas:

- Residential Streets and Parking Lots (Habitat for Cars)
- Lot Development (Habitat for People)
- Conservation of Natural Areas (Habitat for Nature)”

- **Low Impact Development Center Inc.**, *Low Impact Development (LID) Urban Design Tools*, <http://www.lid-stormwater.net/>

The website “has been developed through a Cooperative Assistance Agreement under the US EPA Office of Water 104B(3) Program in order to provide guidance to local governments, planners, and engineers for developing, administering, and incorporating **Low Impact Development (LID)** into their aquatic resource protection programs. LID technology is an alternative comprehensive approach to stormwater management.” (Just click on ‘Enter Interactive Design Page Here’ on the home page.)