

ENVIRONMENTAL CONDITIONS

Much of Genoa Township still retains a rural or natural character. The western and northeastern portions of the Township contain some agricultural uses. There is an abundance of natural features including lakes, woodlands and rolling terrain, which make an important contribution to the quality of life in the Township. Retention of these rural/natural resources is of primary importance to many residents.

In terms of development, these features provide both constraints and opportunities. Natural features have a significant influence on future land use patterns for the Township in conjunction with other factors such as existing land use, infrastructure, market factors, transportation and community regulations.

The natural environment is a critical element of the physical basis upon which the Township develops. The various components of the natural environment function, change and interact as part of an ecosystem. An ecosystem is a biological energy system made up of food chains along which energy is passed from one group of organisms to another. It is important to understand the interaction between these components and that alteration to one element will inevitably affect all others.

Alteration to the fragile natural features needs to be carefully considered to minimize impact and insure mitigation where necessary to maintain the natural balance. Not doing so will alter the system and possibly result in such things as increased erosion and sedimentation, decreased ground water recharge and increased surface runoff to the Township's various lakes and streams. To ensure that community development is compatible with the natural features of the Township, all new developments need to make every effort to maintain the natural functions of the environment.

In Genoa Township, limitations on the type and extent of future development occur in areas that are unsuitable for septic systems, unstable for building foundations, poorly drained and not well suited for road construction. While these factors place restrictions on development, other natural resource factors present opportunities for development. The scenic and recreational attractiveness of the lakes, hills and woodlands offer a unique residential setting. It is helpful to examine these natural resource factors in detail to determine both the opportunities and constraints. Examination involves an inventory of resource factors and a determination of the capability of the natural resource base to support future development.

Environmental Conditions:

- *Geology*
- *Topography*
- *Soils*
- *Drainage*
- *Groundwater*
- *Surface Water*
- *Wetlands*
- *Floodplains*
- *Woodlands*
- *Fish & Wildlife*
- *Farmland*
- *Scenic Features*
- *Contamination Sites*

The following is an overview of some of the major natural features that are prevalent throughout the Township. As development occurs, the following features should be considered in addition to other site specific conditions that may be pertinent to each individual location.

GEOLOGY

The soils and geology in the township are characteristic of glacially formed landscapes consisting mainly of moraines (hills of glacially deposited sands and gravel) and till plains (mixed soil materials deposited by glacier advance and retreats). The underlying bedrock is a grey shale known as the Coldwater Formation. The surface geology of the Township was formed 10,000 to 12,000 years ago when glacial activity deposited rock, soil and large blocks of ice. The glacial drift is a very thick layer of soil material that has been deposited by the advance and retreat of the Wisconsin glacier during the last ice age. The ice blocks embedded within the soil eventually melted and left depressions, which today are lakes.

Since the last ice age the soils in Genoa Township have formed as a result of a number of soil forming factors. These include water drainage, wind, slopes, climate, biological activity and human activity.

TOPOGRAPHY

Slope is an important development consideration associated with topographic features. There are areas of significant topography in the southern and eastern portions of the Township.

Excessive slope presents constraints to development. Areas with slopes greater than 12% have been mapped to identify constraints to development (Map 1). There are three general problems with steep slopes:

- Mechanical cut and fill and placement of structures on slopes result in a significant change in the natural functions of the hillside. Drainage flow can be altered, diverted and possibly increased. This can alter the function of the hillside and increase erosion and sedimentation.
- The root system of trees and vegetation helps to stabilize the soils on the hillside. Removal of natural vegetation by agricultural operations and development causes a weakening of the slope, increased surface runoff rates and eventually erosion.

Steep slopes require sensitive site planning prior to development and during construction. Care should be taken to insure that grading is minimized and vegetation, and top soil are protected.

Along the edges of many stream courses and wetlands there are steep banks or bluffs which separate field, the lowland and the upland. These will generally have steep slopes and be heavily vegetated. Disruption of the vegetative cover on these bluff areas may cause significant erosion problems and affect stream ecology.

SOILS

Construction costs and risks to the environment can be minimized by developing areas with suitable soils. Poor soils present problems such as poor foundation stability and septic limitations. The three major soil characteristics considered in the analysis of soil conditions are drainage, foundation stability and septic suitability. Each of these factors have been inventoried and mapped by the Livingston County Soil Survey, prepared by the Soil Conservation Service. (See Map 2.)

Drainage: Development on poorly drained soils increases development costs, maintenance costs, and will lead to sanitary problems. Development costs are increased due to additional foundation, road and septic preparation. Maintenance costs and problems will be associated with septic field failures, flooded basements and impact to roads from frost action.

Foundation Stability: Soil areas that do not provide stable foundations may experience shifting building foundations, cracked walls and cracked pavement and roadways. These problems often result in increased development and maintenance costs or, in extreme cases, structural failure.

Septic Suitability: Because there are many areas of Genoa Township that rely on individual septic systems, the location of septic systems on proper soils is extremely important. Inspection and approval for use of a septic system is under Livingston County's jurisdiction and ultimately their responsibility to maintain high standards of review to prevent system complications or failures. Septic field failures are often the result of poor soil permeability, high water table or excessive slope. Soils such as compacted clays and silts will not allow wastewater to percolate, a high water table prohibits adequate filtering and excessive slope does not provide adequate percolation.

The suitability of soil for various types of development is influenced by factors such as:

- *Drainage*
- *Foundation Stability*
- *Septic Suitability*

Soils Poorly Suitable for Development:

- Areas with little topographic relief, which does not allow proper drainage.
- Areas with excessive slopes which are susceptible to erosion.
- Mucks or soils with high organic materials.
- Silts and clays.
- Areas with high water tables.
- Generally along lakes, creeks and wetlands.

Soils Well Suited for Development:

- Topographic relief that provides for drainage but not excessively steep.
- Loamy and sandy soils.
- Areas sufficiently above groundwater table.

FARMLAND

Genoa Township was historically a resort and farming community. Over the years, much of the farmland has been converted to residential, commercial and industrial uses. There is still active farmland in the northeast corner of the Township and in the western portion of the Township. The prime farmland is in the northern portion of the Township. By 1998, only one farm was still registered under the State of Michigan P.A. 116 Farmland Protection Program in the northeast corner of the Township.



KEY VISTAS

The lakes, topography, vegetation and cultural resources are components in the overall scenic attractiveness of the Township. Scenic vistas are places which afford expansive views of Township visual resources. These are located on top of hills and high elevations or along roadways. Roadways are important visual corridors because they unfold a rapid sequence of vistas. Lakes, fields, homes, buildings and signs are common sites which are presented to the roadside viewer. The combination of curves in the roadway and sections of densely vegetated areas along the roadway provide departures and entrances to a sequence of changing view sheds along the road.

There are a number of areas of the Township, particularly in the west along Chilson Road, which have views characteristic of a rural/open space community. These are topographically high or open agricultural areas. These areas provide a wide panoramic view of the surrounding hills and are characteristic of an open, rural agricultural area.

Other areas of the Township have characteristic views due to topography and natural features. Many of the roadways in the Township pass through rolling topography and are lined by dense woodlands. Woodlands along roadways contribute to a natural/rural atmosphere in a number of ways. The impact of vegetation on the person within the public right-of-way will be greater because of the close proximity. A greater mass of vegetation will be within the forward view of the person within the public right-of-way. Other features outside of the public right-of-way, such as buildings, will have a less dominant impact on the streetscape because they fall behind the vegetative foreground. Taller trees provide a sense of enclosure, providing a well defined public space bounded by vegetation.

Landmarks are important visual resources. There are a number of historic farm homes which lend an important character and identity to the Township. The cultural or man built landmarks should be preserved and managed in a sensitive manner. New development should compliment unique landmarks and should not detract from the scenic vistas of Genoa Township's lakes, hills and open areas.

WOODLANDS

While the Township has been experiencing rapid development, there are still significant areas of natural woodlands. The most significant woodland areas are found in the southwestern corner of the Township. This area is the most isolated portion of the Township. The rolling topography and large forested wetlands limit development in this area and contribute to the natural character. (See Map 3)

The Township currently protects woodlands through provisions in the Zoning Ordinance that restrict clearing of woodlands on a site prior to site plan approval. During site plan review, woodlands are required to be inventoried and the design is required to demonstrate preservation of natural features. As a condition of site plan approval, trees are required to be protected during construction with root-zone fencing. The Township also has landscaping regulations that require the planting of greenbelts and street trees for any new development. Landscape materials used should be native to Michigan and a variety of species should be used for street trees to minimize the impact of disease.

Woodlands provide the following community benefits, which serves as a basis for these regulations:

- **Quality of life:** The woodlands of Genoa Township contribute to the quality of life for Township residents. The abundant woodlands and trees help create the peaceful, rural atmosphere. Trees provide a visual barrier between individual properties and neighboring properties, an essential factor for preserving the rural atmosphere and property values.
- **Influence on micro-climate:** Woodlands play an important role in moderating ground-level temperatures. Tree canopies buffer the ground surface from the sun's heat and wind. Temperature extremes during winter months can also be moderated with the help of trees.
- **Reduction in air pollution:** Woodlands absorb carbon dioxide and return oxygen to the air. Tree leaves filter pollutants from the air, removing ozone, chlorine, hydrogen fluoride, sulfur dioxide and other pollutants. Large and dense stands of trees serve as a noise buffer as well.
- **Reduction in soil erosion:** Woodlands and other vegetation stabilize soils and help prevent soil erosion. The vegetation absorbs the energy of falling rain and the web of roots of all types help hold soil particles in place. Tree leaves reduce the impact of raindrops on the soil surface and give soil a chance to absorb water. Fallen leaves minimize the loss of soil moisture, help prevent erosion and enrich the soil to support later plant growth. Wooded wetlands provide the additional benefit of trapping and holding storm water runoff. Dense vegetation can help slow flood surges and flows.
- **Wildlife habitat:** Woodlands provide essential shelter and food for deer, raccoon, rabbits, pheasants and other birds and animals. The opportunity to observe wildlife in a natural setting has educational benefits for Township residents.
- **Township's natural character:** There is a significant amount of mature vegetation along many of the road corridors that pass through the Township. Woodlands located near the roadway contribute to a natural/rural atmosphere in a number of ways. The impact of vegetation on the motorist will be greater because of the close proximity to the roadway. A greater mass of vegetation will be within the forward view of the motorist. Other features such as buildings will have a less dominant impact on the streetscape because they fall behind the vegetative foreground. Taller trees will provide a sense of enclosure, providing a defined space bounded by vegetation. There is also a significant amount of vegetation along most lakes and streams throughout the area.



WETLANDS

Wetlands are transitional areas between the aquatic ecosystems and the surrounding upland areas. They are low areas which are intermittently covered with shallow water and underlined by saturated soils. Vegetation which is adapted to wet soil conditions, fluctuation in water levels and periodic flooding can be found in wetlands. Wetlands are linked with the hydrologic system, and as a result, these wetland systems are vital to the environmental quality of Genoa Township.

Wetlands serve a variety of important functions which not only benefit the natural environment but also the community. Some of the primary values which wetlands contribute are as follows:

- Mitigate flooding by detaining surface runoff.
- Control soil erosion and sedimentation loading in rivers and lakes.
- Provide links with groundwater.
- Improve water quality which is degraded by such things as:
 - nutrients and chemicals from fertilizers and pesticides used in agriculture and landscaping/lawn care;
 - polluted urban run off from roads, parking lots, industrial and other commercial activities;
 - treated effluent from waste water treatment facilities;
 - erosion and sedimentation resulting from agricultural and construction activities.
- Function as highly productive ecosystems in terms of wildlife habitat and vegetation.
- Serve a variety of aesthetic and recreational functions.

Wetlands play a very important part in the hydrological and ecological systems. In addition to providing fish and wildlife habitat, wetlands maintain and stabilize groundwater supplies, reduce the dangers of flooding and improve water quality.

The largest interconnected series of wetlands are located along the Chilson Creek corridor in the western portion of the Township. There are also numerous kettle depressions scattered throughout the Township. (See Map 4)

There are four types of wetlands predominate within the boundaries of Genoa Township: (1) emergent wetlands with rooted cattails, bulrushes and sedge grasses; (2) Scrub/shrub wetlands, (3) bogs; and (4) forested wetlands with an over-story of trees and an under-story of shrubs. As water levels rise and fall from year to year, some

ecological succession may be occurring as the wetlands shift from emergent marsh to forested wetlands.

Future development in areas surrounding these wetlands could significantly impact wetland resources. Therefore, developers and Township officials should evaluate alternative designs to minimize any potential for impact. This is best done by initially considering wetland resources as constraints to development. The relative weight of these constraints must also account for other environmental and socio-economic constraints. Minimization of impacts to these resources should take into account the cost of avoidance and the property rights of the individual. If impact is unavoidable, then mitigation should include an analysis of retaining or enhancing the wetland values to be lost.

Wetland areas are valuable as natural buffers between residential and commercial land uses. They contribute significantly to the aesthetic character of the community. By incorporating wetlands as part of the future development, they will continue to maintain open and green space as well as contribute to retaining the rural setting.

Any wetlands greater than five acres in size or contiguous with a waterway are regulated by the Michigan Department of Environmental Quality (MDEQ) through the Goemaere-Anderson Wetland Protection Act, Public Act 203, as amended. Any activity which requires these regulated wetlands be filled or drained requires a permit from the MDEQ. Permits will generally not be granted unless the issuance is in the public interest and necessary to realize the benefits derived from the activity. If a wetland fill permit is granted, mitigation should be required such as creating new wetlands within the same drainage way or enhancement of existing wetlands. In addition to this, Genoa Township Zoning Ordinance contains wetland standards that provide local reinforcement of State regulated wetlands.



LAKES

Lakes are among the Township's most valuable natural resources of the community. The largest and most significant lakes in the Township are Lake Chemung, East Crooked Lake and West Crooked Lake. The numerous lakes provide recreational opportunities such as boating, fishing and swimming. The quality of these water features enhances the value of adjacent property for residential opportunities. Areas surrounding many of the larger lakes in the Township have been developed for smaller lot resort and residential uses. These areas were initially developed with resort cottages on small lots with individual septic drain fields. Over time these areas have been converted to year-round homes. Areas

surrounding the lakes have soil conditions that are not well suited for drain fields due to poor soil texture and a high water table. The combination of the natural soil characteristics and increased residential use of the lake areas led to significant problems with septic tank systems. The septic tank leakage began affecting the quality of wells and the lakes. In response to these problems, Genoa Township has provided sanitary sewer to serve the most intensely developed areas around Lake Chemung and the Tri-Lakes.

DRAINAGE

Upland areas drain to the low lying wetlands, lakes and streams that pass through the Township. Soil permeability of most upland areas is moderate to moderately rapid. As these areas become developed, the amount of water infiltrating the surface will decrease and the surface runoff will increase. This will be caused by clearing of natural vegetation, addition of impervious material to the land (buildings and pavement) and installation of storm drains. These will have the cumulative effect of increasing the peak discharge to the area's drains, streams and lakes while reducing the amount of water infiltrating to ground water. Minimization of these impacts may involve protecting native vegetation, on-site storm water retention and clustered development.

While many of the lakes and wetlands within the Township are located within isolated potholes, there are some significant creeks, drains and streams that interconnect some of the wetlands and lakes. Chilson Creek is the major stream in the Township that flows from the north down to the Huron River in Hamburg Township in the south. Ore Creek in the southeastern corner of the Township, near the city of Brighton also drains to the Huron River in the south. Associated with the creeks are corridors of adjacent wetlands. The creeks and wetlands are important for surface drainage, groundwater recharge and wildlife habitat. Alteration of the creeks and wetlands can contribute to flooding, poor water quality, insufficient water supply and loss of valuable wildlife habitat.

GROUNDWATER

Important factors in the evaluation of groundwater are the quantity and quality of the water. Quantity or yield standards for a typical residential or commercial use range from 7 gallons per minute to 20 gallons per minute. Water is generally available in sufficient quantity and will not likely be a factor in limiting growth.

Water quality is a more important factor than water availability. Water hardness, iron content, salinity and septic field contamination are hazards encountered in Genoa Township. Potential sources of

groundwater contamination can result from all of the various land uses within Genoa Township. The level of threat of groundwater contamination will vary based on 1) the susceptibility of groundwater to contamination due to geologic features, 2) contamination loading rates based upon land use and hazardous materials management and 3) the amount and type of hazardous materials utilized within the Township.

Major sources of groundwater contamination are as follows:

- Buried wastes in landfills discharge liquids referred to as leachate which can enter groundwater.
- Agricultural fertilizers and pesticides often infiltrate the soil surface and enter groundwater.
- Urban storm water run-off from buildings, streets and parking lots contains contaminants that infiltrate the soil and enter waterways.
- Septic drainfields release sewage effluent into the soil through seepage beds.
- Spills and leakage of hazardous materials such as underground storage tanks and spills of hazardous materials will infiltrate the soil surface and enter groundwater if not properly contained.

Sources of groundwater contamination:

- ***Landfills***
- ***Agricultural fertilizers and pesticides***
- ***Urban storm water runoff***
- ***Septic drainfields***
- ***Spill of hazardous materials***
- ***Leaking underground storage tanks***

State and county requirements will need to be adhered to for any facility within the Township that involves the use, storage or disposal of hazardous materials. Facilities for storing hazardous materials should have secondary containment and a pollution incident prevention plan.

POTENTIAL ENVIRONMENTALLY IMPACTED SITES

According to Livingston County Health Department records, there are a few contaminated sites within the Township which pose environmental problems. Michigan Public Act 307 provides for identification, risk assessment, evaluation and cleanup of sites of environmental contamination in the State. Sites are identified through information from concerned citizens, environmental groups, industry, local health departments, MDEQ staff and others. From this process a priority list was and will continually be, updated. This list is used in part to develop funding recommendations to undertake response activities utilizing state funds when the parties responsible for the contamination are unwilling or unable.

Six Act 307 Sites have been identified in Genoa Township. These are located in industrial and commercial areas, with the majority in the northwest corner of the Township near the city of Howell. These locations are planned to remain in industrial, commercial or public land uses.

There are two closed landfills within the Township. The old Howell landfill is located on Lucy Road, adjacent to the city of Howell. This closed landfill is now a park. The second closed landfill is located on the south side of Brighton Road, east of Chilson Road.

NATURAL RESOURCE MANAGEMENT STRATEGIES

This Plan consistently emphasizes the importance of the natural resource base. The correlation of land use density in the Future Land Use Plan to natural resource capability described in this chapter will help promote preservation of natural amenities.

The Master Plan must address both the quality and the quantity of land use within the Township. Protection of Township resources requires the adoption of policies directed toward the specific resource problem including drainage, and groundwater quality, natural topography and vegetation. Resource protection regulations can be incorporated in subdivision, zoning and other special purpose regulations. High-quality natural areas have been mapped by the Livingston County Planning Department and are shown on Map 5.

Lower Density Zoning Districts: The interrelation of the environmental component of the Master Plan with the land use component is most visible with the establishment of land use categories. Within areas identified as having significant and fragile natural resources, lower impact/density development is recommended. This is based upon the natural capability analysis.

Certain portions of the Township are characterized by significant natural features such as extreme topography, large wetland complexes and extensive wildlife habitat. These, in combination with other factors such as existing land use patterns and transportation areas with critical natural features, are identified in the future land use map for Country Estate and Rural Residential Districts.

Natural Feature Setback Standards: The Township has enacted general zoning standards for setbacks from wetlands, lakes and ponds that apply to all zoning districts. There is a strong basis for this type of requirement. Development surrounding water features, particularly wetlands, affects the function of the water feature. Development immediately adjacent to a water feature may have the

Natural features to be preserved:

Wetlands:

- ***Regulated Wetlands***
- ***Non-regulated Wetlands***
- ***Wetland Buffers***
- ***Restoration of Wetlands***

Slopes Greater than 12%

Bluffs/Setbacks along Waterways

Soils That Are Not Well Suited for Development

Woodlands:

- ***Along Public Thoroughfares***
- ***Along Greenways***
- ***High Quality Woodlands***
- ***Individual Mature Trees***

Fish & Wildlife Habitat

Scenic Views and Open Space Along Roads

Connections to Adjacent Open Space

effect of increasing the disturbance to this natural ecosystem and reducing the water feature's ability to perform its natural function.

For example, wetlands are dependent on an interaction between the wetland and the surrounding upland. In terms of hydrology, water enters a wetland from the surrounding upland area in a number of ways- overland flow, through the upper layers of the soil and through groundwater. The upland soil and vegetation surrounding the wetland affect the amount, the means and the rate at which water enters the wetland following a storm or snow melt. Development of the surrounding upland will alter the relative balance between the overland (surface) flow and infiltration, resulting in a greater peak discharge to the wetland. In other instances, physical improvements such as structures, roads and storm sewer systems can intercept surface flow to the wetlands. These alterations to hydrology can result in much greater fluctuations in water levels between wet and dry seasons. The undisturbed soil between the site improvements and the wetlands acts as a buffer to try to maintain the natural upland/wetland interaction that existed prior to development.

In addition to the hydrologic function, waterways are natural open space corridors which serve as wildlife habitat. Animals move through suburban areas along remaining undeveloped natural corridors, such as the numerous drainage ways that cross the Township. Development immediately adjacent to these natural features has a detrimental impact on wildlife habitat by moving structures and disturbance further into natural corridors and increasing constriction of development on these habitats. Protection of areas that line natural features is important to wildlife because this is the interface between the aquatic and terrestrial (upland) ecosystems system. This interface is important to animals such as land mammals that need water or birds which perch on trees to hunt for fish.

Streambank & Slope Protection: Steep slopes require sensitive site planning prior to development. Above many drainage ways of the Township there are steep banks or bluffs separating the lowlands and the uplands. These generally have steep slopes and are heavily vegetated. Disruption of the vegetative cover on these bluff areas may cause significant erosion problems and adversely affect stream ecology. Care should be taken to insure extensive grading is minimized and natural features such as vegetation and top soil are protected. This applies not only to bluffs that line waterways, but also other areas of the Township where there is significant topography.

There are a number of means for the Township to protect steeply sloped areas:

- Maintain setback requirements for all waterways. The current requirement could be revised to be variable based on the extent of the slope.
- Use flexibility offered by the Planned Unit Development regulations to cluster the development away from steep slopes. The Planned Unit Development regulations could be amended to require areas with steep slopes be preserved as natural open space.
- Adopt slope-related regulations where the density of development would be reduced on sites that contain steep slopes. Lots that are located in areas with severe topography would have to be larger. While this may add complexity to conventional development, it may also serve as an incentive for clustered development under the Planned Unit Development regulations.

Storm water Management: Increase in development activity will place additional burden on existing natural drainage systems unless preventive measures are adopted. The overtaking of drainage systems could lead to localized flooding, environmental damage and costly storm drainage improvements to be borne by taxpayers.

By prompting preservation of natural drainage ways and providing storm water retention basins, the impact of development on drainage systems can be minimized. The Township should take a comprehensive approach to storm water management by encouraging the preservation of existing natural features that perform storm water management functions, minimization of impervious surface, direction of storm water discharge to open grassed areas and careful design of erosion control mechanisms. Wet ponds and storm water marsh systems should be required for detention in new developments. Storm water basins, wet ponds and storm water marsh systems need to be landscaped. Plantings should be adapted to hydric conditions and installed to create a system that emulates the functions of natural wetlands and drainage ways both in terms of hydrology and natural habitat.

Septic Disposal: Ground water and surface water contamination from septic drain fields is a serious concern in the Township. This issue was particularly a concern in areas surrounding the lakes that developed prior to current zoning and health regulations. Many of these neighborhoods developed as cottage communities at higher densities than currently allowed and within areas where the soils are

not suitable for septic disposal. The continued growth of the community and the conversion of many of these cottages into year-round homes lead to contamination problems. In response, the Township has established public sanitary sewer districts to serve these areas, which has been effective in improving water quality in the Tri-Lakes and Lake Chemung. Through working with the Livingston County Health Department, the Township can continue to manage the problem of ground water and surface water contamination from septic drain fields.

- Continue providing public sanitary sewer to higher density areas, including high density areas around the lakes that are currently within the utility districts.
- Restrict the density of future development in areas where the threat to ground water and surface water contamination is highest. This would include areas along waterways and areas with poor soil suitability for septic drain fields.

Restoration of Wetlands: Prior to current wetland regulations, many wetlands within the Township have been filled, drained and/or otherwise altered. Wetlands along the various lakes have been filled for the purpose of development. In other areas, drains and agricultural tiles may have been installed to drain surface water from wetlands so the land could be farmed.

The location of these altered wetlands can be identified. Although the hydrology of the site has been altered, the native soils will still exhibit coloration and textures associated with hydric conditions. Also, the Michigan Department of Natural Resources has mapped pre-settlement land cover (vegetation) based on historic survey records. Maps are available for Genoa Township that show the historic natural land cover.

Where development of agricultural lands is proposed, these wetlands can be restored as part of the drainage and open space design of the development. Hydrologic restoration may involve the removal of fill material and/or closing (or slowing) man-made drainage ways. Restoration may also involve covering the soil surface with peat and re-establishing hydrophytes (wetland vegetation). Within Planned Unit Developments where there are damaged or filled wetlands, a condition of approval may be the restoration of the natural system.

Lake Access & Use Regulations: Increased population in Genoa Township and lake front development have continued to place pressures on the many lakes of the Township for recreational use. The Township has regulations that govern the creation of "keyhole" development. A keyhole, also referred to as a common use access

site, is a waterfront lot that is used to provide lake access for non-riparians (non lake front lot owners). There are many existing subdivisions that contain these keyhole lots and predate the ordinance. These keyholes are generally waterfront parks owned in common by all lot owners within the subdivision.

When used for access and dockage for numerous boats, these can increase the density of boat usage on the lakes and contribute to the following problems, particularly from power boats:

- Shore erosion.
- Damage to lake bottom and stirring-up sediment.
- Oil and gas spillage.
- Noise.
- Conflicts and safety problems between users (power boats, sail boats, personal water crafts, canoes and swimmers).

As the Township continues to grow, problems associated with lake overcrowding could worsen. It is important to point out that keyholes are only one part of the problem. Impacts to the safety and quality of the Township's waterways is impacted by recreational use by riparian and waterfront lot owners, as well as through public access sites. While the current keyhole ordinance can help manage the problem, the Township should consider a more comprehensive approach to managing lake usage. Any policy needs to balance the rights of riparian owners with the right of the general public to have access to public navigable waters, and with the need to protect the quality of the state's natural resources.

The Township may adopt a lake access ordinance that restricts the number of boats that can access each lake based on water frontage. This ordinance would apply both to keyhole access and lake front lot owners. Under this ordinance, each lake front lot (keyhole or private) would be allowed one power boat plus one additional boat for each specified amount of shore length. The specified amount of shore length would need to be established for each lake based on the carrying capacity of the lakes determined by the following:

- Lake characteristics including lake size, shoreline perimeter, amount of shallow vs. deep lake area, water quality, bank and soil characteristics and turnover rate.



- Land use characteristics including the number of platted lots along waterfront, ownership patterns, zoning minimum lot sizes/widths and common use/keyhole/public access sites.
- An inventory of the number of power boats stored on the lake, the number of boats gaining access through common use/keyhole/public access sites and the total number of boats using the lake on peak days.

Preservation of Natural Topography and Vegetation: Due to the scarcity of large tracts with woods or rolling topography, those that still exist are highly valuable. The land use densities proposed by the Land Use Plan will promote the preservation of existing vegetation and topography. Specific standards can be applied to subdivision plat regulations and site plan review to require preservation of tree cover, the provision of landscaping and buffer strips and the minimization of site grading. The Planned Unit Development regulations should continue to be utilized to encourage preservation of open space, vegetative cover and natural topography.