

CHAPTER III NATURAL FEATURES

Overview

Natural systems comprised of air, land and water sustain a living community of plants, animals and microorganisms that ultimately maintain a human life-sustaining balance on our planet. It is these natural systems that maintain the balance of atmospheric gases we breathe and that maintain a pure supply of underground water, for example. A community's natural features also form a visual backdrop against which all components of our built environment are placed. It is the aim of Ada Township in its growth and development policies to protect our natural features, both for the important natural functions they perform in maintaining conditions suitable for human life, and for their important contribution to the character and attractiveness of Ada Township as a place to live, work and recreate.

To ensure that valued natural features are not irretrievably lost or excessively diminished in their quality, it is important to 1) identify the important natural features in the Township, 2) ensure that natural features protection is taken into account in overall community planning and 3) incorporate natural features considerations into the development regulations of the Township.

Some of the specific benefits of protecting and conserving natural features include:

- Provision of water for municipal water systems.
- Groundwater recharge and purification, providing a supply of clean, potable water for homes not served by a municipal water system.
- Flood control and surface water quality protection.
- Provide habitat for unique plant and animal life.
- Recreation opportunities that include hunting, fishing, snowmobiling, skiing, skating, swimming, sledding, hiking, nature study, photography and related pursuits.
- Aesthetic values (views, serenity, rural nature, etc.) which contribute greatly to property values in the Township.
- Educational opportunities (natural history, biology, geology, ecology, etc.).
- Economic opportunities in farming, forestry and tourism.

Environmentally sensitive natural features can either enhance or restrict development potential of land, depending on the type and severity of the feature. For example, a wooded hillside may provide a view which is very appealing as a home site. There may, however, be additional costs, both financial and environmental, of development in such an environmentally sensitive location. Erosion control measures during and after construction can increase development costs. Potential public costs include disruption of an attractive horizon view by obtrusive development, or disruption of surface stream quality by erosion and sedimentation.

The following description of significant natural features in Ada Township establishes the character of the Township's natural environment and sets the basis for the analysis of suitable future land uses. This analysis will help evaluate the vacant land within the township, determine the potential constraints to development which the environment presents, and suggest ways in which these features can best be protected and integrated into future development decisions.

Topography

The Natural Features Map, contained in the Appendix, identifies areas within the Township having slopes greater than 15%. Much of the land in Ada Township, particularly in areas bordering the Grand River and its major tributaries, is rolling-to-steep terrain. These areas, formed as glacial moraines, are often covered in second growth oak forest or maple-beech forest. Nearly level

terrain is found in two major areas of the Township - in the valley of the Grand River along its entire length through the Township, and in the northeast part of the Township, in upland glacial till plains. Nearly level to gently rolling terrain is also found in the southwest part of the Township, where some areas north and south of Cascade Road are poorly-drained. Topographic variation within Ada Township ranges from 620 along the banks of the Grand River to 883 feet at the intersection of Giles Avenue and 4-Mile Road; a vertical change in elevation of 263 feet.

Steep slopes and rolling hillsides, unlike groundwater, are not a renewable resource, nor do they have clearly defined public benefits like wetlands or woodlands. Topography is a geological feature which exists in a balance with vegetation, precipitation and wind. The maintenance of this balance helps prevent non-point source pollution of water resources while preserving a distinctive and attractive feature of the local landscape. It is this distinctive visual character provided by topographic relief which is important to Ada Township's character.

Areas of steep topography, because of their susceptibility to erosion and the physical disruption and alteration which often accompanies their development, are an environmentally-sensitive resource. In addition, ridgelines in steep terrain areas are often visually prominent for long distances. The manner in which development occurs in these areas can significantly affect the visual character of the community.

Despite higher development costs, rugged terrain is much in demand as a setting for residential development. Ada Township's rolling woodlands have become prime locations for homeowner's seeking proximity to nature, and seclusion from the hectic surroundings of urban environments.

These factors can result in a clash of competing interests, between satisfying the demand for attractive home sites, and protecting a sensitive environmental feature which is one of the Township's defining characteristics.

To protect this resource, overall planning for the Township should accomplish the following:

- limit land uses in steep terrain areas to those of low intensity, such as very low density residential development and recreational uses.
- encourage use of home site "clustering," (conservation design) techniques permitted under the Township's PUD zoning provisions, to set aside steep terrain areas as passive open space, and avoid placing home sites on prominent ridge lines.
- require responsible development of steeply-sloped areas by requiring the following as part of the development approval process:
 - accurate inventory mapping of existing topographic conditions.
 - site plan approaches which limit the extent of alteration of steep terrain.
 - site plan approaches which avoid placing building sites in locations which are visually prominent from long distances.
 - requiring that development plans identify suitable locations for main and reserve wastewater drain fields, without the need for extensive disruption of the terrain.

Surface Water

The Grand River is the most prominent surface water feature in Ada Township, running through the community from southeast to northwest. The Thornapple River passes through the Ada Village

area and joins the Grand River in the Township, downstream of the Ada dam, which creates an impoundment which extends into Cascade Township to the south.

With the exception of the Alticor facilities and low-lying portions of the Ada Village area, most of the land along either side of the Grand River in the Township is undeveloped, in either agricultural or other non-developed use. East of the Fulton St. bridge over the river, M-21 runs along the north side of the river, at the edges of the river floodplain on one side, and just below the steep hillsides which parallel the river valley. A broad swath of land adjacent to the Grand River is within the 100-year floodplain, a federally-defined area subject to periodic flooding, and also subject to floodplain development regulations. The floodplain is discussed more fully in a later section.

Several major creeks are tributary to the Grand River in the Township, the major named tributaries being Egypt Creek and Honey Creek north and east of the Grand River. Much of the land on either side of both of these creeks is rolling, wooded terrain. Upper reaches and branches of Egypt Creek extend through the Cannonsburg State Game Area, Egypt Valley Country Club and agricultural land in the northeastern part of the Township. Much of the land along Honey Creek is in very low density residential use.

Other minor tributary streams are found in the Township, such as Carl Creek in the southwest quadrant. It drains much of the industrial and residential land south of M-21, before crossing M-21 east of Alta Dale Ave. and leading to the Grand River north of Grand River Dr. Strawberry Creek is another small stream in the southwestern, more developed part of the Township, with a watershed that extends from the Forest Hills Central Middle and High School campus, through Adacraft Commons and Adatowne Subdivisions. The creek crosses M-21 near Grand River Dr. before entering the bottomlands of the Grand River. Significant development within the watersheds of Carl and Strawberry Creek have threatened the health of these streams, due to changes in the flow regime and due to sediment deposition in the stream beds. The Natural Features map identifies the major stream watersheds within the Township.

Many of these streams and their adjacent land, despite surrounding urbanization, still support a fishery resource and provide habitat for other wildlife. Much of the land in proximity to these streams has wetland characteristics. The streams and their adjacent wetlands serve valuable drainage, flood control and water purification functions, which can be disrupted if too overburdened by the increase in peak runoff rates and increased pollutant loads which often accompany urban development.

Ada Township has relatively few natural lakes, compared to other parts of Kent County. The largest lake in the Township is Chase Lake, east of Honey Creek Ave. at 3 Mile Rd. This 50 acre, eutrophic lake is nearly surrounded by a large wetland area. Two smaller lakes, including Down's Lake, are nearby.

Community land use planning must provide for the long-term protection of the valuable functions of the Township's stream corridors, by encouraging the maintenance of greenbelt corridors along major streams. Development regulations in the Township should ensure that land development activities provide protection of these resources, through the following means:

- ensuring that site development plans provide measures to limit peak runoff volumes after development to pre-development levels, through use of on-site storm water detention and retention facilities, as well as "low impact" development design measures that encourage natural infiltration of runoff into the ground.
- ensuring that site development plans provide for prompt revegetation of disturbed areas, and avoiding excessive slopes which will be prone to erosion.

- requiring appropriate setback of buildings from stream banks.
- encouraging provision of open space along stream corridors in new residential development.
- ensuring that site development plans provide measures to protect against spill and release of hazardous materials to the environment.
- prohibiting uses which may generate hazardous wastes in areas not served by public sewer.

In addition, the Grand River corridor through the Township has the potential to be part of a County-wide linear greenway, as encouraged in the Township Parks, Recreation and Open Space Plan.

Soils

In Kent County three major physiographic regions are recognized. The first region consists of outwash plains and lake plains in nearly level valleys with rather definite boundaries. These occur primarily in the lower portion of the county in the Wyoming and Grandville areas. The second physiographic region, which encompasses much of Ada Township, occurs as hilly morainic belts rising from the nearly level valleys and bordering the county's rivers and their tributaries. These belts are characterized by ridges with smooth or rounded slopes, and sharp steep knobs. Along major rivers, such as the Grand, these morainic belts can be 2 to 4 miles wide and along smaller streams are generally less than a mile wide. The third region consists of gently sloping to rolling till plains that are generally higher than the hilly morainic belts and outwash valley plains. Land in the northeast part of the Township, where much of the Township's farmland is located, is of this physiography.

A variety of soils occurs within these three major physiographic regions in the Township. Like topography, soil characteristics have a significant influence on the suitability of land for different types of uses. In particular, they influence the feasibility of development relying on on-site wastewater disposal systems. Soil properties also affect development costs, due to the varying capability of soils to support loads, and the need to appropriately design foundation structures and pavement sub-base.

Knowledge of soils associations is useful in identifying the general suitability of soils for different types of land use. Since much of the Township is outside of the water and sanitary sewer service area, soils have a significant impact on development patterns.

The Generalized Soils map identifies the 8 major soils associations found in Ada Township. The following descriptions give an overview of each association and its suitability for various types of uses. These interpretations are general in nature and should not be used as a substitute for on-site sampling and analysis of soil properties.

Plainfield-Oshtemo-Spinks association: Nearly level to gently rolling, excessively drained and well drained, sandy and loamy soils formed in sandy and loamy materials. This association has a slope of 0 to 12 percent and is used mainly as pasture or woodland or is idle land. A few areas are used for cultivated crops. If cultivated crops are grown, soil blowing, water erosion, and droughtiness are the major management concerns. The major soils are well suited to most kinds of building site development, but are only fairly well suited to septic tank absorption fields because of a poor filtering capacity which may result in ground water pollution.

In Ada Township, this association is found east of the Grand River, in the area along Pettis Ave., extending nearly to the north Township line. This area has witnessed significant mining of useful sand and gravel deposits in the last 50 years; much of the area that has been mined has reached or is nearing depletion of the useful mineral deposits, and is likely to be considered for redevelopment in the future.

Ithaca-Rimer-Perrinton association: Nearly level to gently rolling, well drained to somewhat poorly drained, loamy and sandy soils formed in loamy, sandy, silty, and clayey deposits. Slope ranges from 0 to 12 percent. Because of the wetness and the shrink-swell potential, the major soils are poorly suited to building site development. They are generally unsuited to septic tank absorption fields, mainly because of the wetness and slow permeability.

This association is found only in the far southwest corner of the Township, in an area known for its poor drainage.

Marlette-Capac-Metamora association: Nearly level to gently rolling, well drained to somewhat poorly drained, loamy soils formed in loamy deposits. Slope ranges from 0 to 12 percent. This association is used mainly for cultivated crops or orchards. If the soils are cultivated, controlling soil blowing and water erosion, removing excess water, and maintaining good soil tilth are the main management concerns. The major soils are poorly suited for building site development and are poorly suited or unsuited for septic tank absorption fields because of wetness and slow permeability.

This soil association occurs in the northeast part of the Township, where much of the Township's farmland is located. It extends westward across Honey Creek Ave. into the eastern end of the Egypt Valley Country Club. It nearly surrounds Chase Lake and its surrounding wetland areas.

Marlette-Perrinton-Metea association: Gently rolling to very steep, well drained, loamy and sandy soils formed in loamy, silty, and sandy deposits. Slopes range from 6 to 45 percent with the steeper areas generally along major drainage ways and streams. The major soils are well suited or fairly well suited to cultivated crops in areas where the slope is less than 12 percent. The steeper soils are poorly suited or unsuited for cultivated crops. The less sloping areas are fairly well suited for building site development, but the steeper soils are poorly suited. All of the major soils are generally unsuited to septic tank absorption field because of moderately slow permeability or slope.

The area between Hall St. and Ada Dr., on either side of Fox Hollow Ave. falls in this soil association.

Marlette-Chelsea-Boyer association: Similar to the above; gently rolling to very steep, somewhat excessively drained and well drained, loamy and sandy soils formed in loamy and sandy deposits. Slopes range from 6 to 45 percent with less sloping areas occurring in drainage ways and along the tops of ridges. Steeper areas are generally along the major drainage ways and streams. The major soils are poorly suited or unsuited for cultivated crops because of droughtiness, soil blowing, water erosion, and slope. The less sloping major soils are generally well suited to building site development and fairly well suited to septic tank absorption fields. The more sloping soils are less well suited to building site development and generally unsuited to septic tank absorption fields.

Site specific soil conditions in this association vary greatly, due to the varying topographic and hydrologic conditions it encompasses. This soil association is found in a large area of the central portion of the Township, coinciding with the area in which much of the Township's rolling terrain is found.

Chelsea-Plainfield-Boyer association: Similar to the Marlette-Chelsea-Boyer association; gently rolling to very steep, excessively drained to well drained, sandy soils formed in sandy and loamy materials. Slope ranges from 6 to 45%, depending on location in relation to ridge tops and drainage ways. Characteristics of this association are very similar to the previously-described one, with suitability for development and on-site disposal systems very dependent upon slope and extent of excessive permeability.

This association is found in the southeast quadrant of the Township, in areas adjacent to Bailey Dr. and Vergennes Rd., extending north into the area between Conservation and 2 Mile Rd., east of Honey Creek Ave.

Kibbie-Dixboro-Thetford association: Nearly level and undulating, somewhat poorly drained, loamy and sandy soils formed in loamy, silty, and sandy materials. This association is on broad plains, in swales and on low ridges and knolls. Slopes range from 0 to 6 percent. The major soils are well suited to cultivated crops and pasture. The major soils are poorly suited to building site development and unsuitable for on-site waste disposal because of wetness and moderately slow permeability.

This soil association is found in a small pocket in the far northeast corner of the Township, in an area of agricultural land use.

Houghton-Cohoctah-Ceresco association: Nearly level, somewhat poorly drained to very poorly drained, mucky and loamy soils formed in herbaceous organic material or loamy alluvial deposits. Soils in this association are referred to as "muck" soils. This association is on flood plains along the major streams and rivers and in basin like areas. Slope are less than 2 percent. Land in this soil association is usually undeveloped open land, although some areas are drained and used for specialty crops such as lettuce, carrots, onions, and sod. When adequately drained, the major soils are well suited to cultivated crops and pasture. As expected, the major soils are unsuited to building site development and on-site waste disposal because of wetness, flooding, and the instability of the organic soils.

This association occurs along much of the west bank of the Grand River in the Township, east of Grand River Dr. The area occupied by Alticor's manufacturing facilities falls in this soil association.

Again, it should be emphasized that a variety of specific soil types and conditions are found within each of these broad associations. For example, small pockets of wetland and muck soils can be found within any of these associations. Nevertheless, these soil associations coincide with areas of recognizably distinct character and development adaptability in the Township.

Wetlands

The term "wetland" includes marshes, swamps, bogs, and similar areas that are often found between open water and upland land. Many, but not all of these areas are subject to State regulation under the Goemaere-Anderson Wetland Protection Act of 1979.

Wetland inventory mapping contained in the Appendix was prepared by the Michigan Department of Environmental Quality. Areas mapped as potential wetland are an overlay of the following sources of information:

1. The National Wetland Inventory (NWI), conducted by the U.S. Fish and Wildlife Service through interpretation of topographic data and aerial photographs.
2. Land Cover, as mapped by the Michigan Department of Natural Resources' Michigan Resource Inventory System (MIRIS), through interpretation of aerial photographs.

3. Hyric soils, as mapped by the U.S. Department of Agriculture, Natural Resource Conservation Service. These are soils that are saturated with water, flooded or ponded long enough during the growing season to develop anaerobic conditions in the upper part of the soil profile.

The inventories represent existing information that suggests the probability that a wetland may or may not exist in a given area. Areas shown as wetlands, wetland soils, or open water on the map are potential wetlands, and deserve further site investigation to verify if wetlands are actually present. The map may not identify all potential wetlands in the Township. It may show wetlands that are not actually present and it may not show wetlands which are actually present.

An extensive area of wetlands is found in a very large area surrounding Chase Lake, near 3 Mile Rd. and Honey Creek Ave. Other extensive wetland areas are found along the major and minor streams in the Township. Examples include land along Carl Creek, the Strawberry Creek corridor north of St. Roberts Church and east of Adacraft Commons, and the extensive wetlands found along Honey Creek and its tributaries in Seidman Park.

In the past, wetlands were often regarded as wastelands--sources of mosquitoes, flies, and unpleasant odors. Most people felt that they were places to be avoided, or better yet, eliminated. This negative view, combined with the demand for more developable land, has resulted in the destruction of some of the township's poorly drained lands. These areas have been drained and converted to farmland, industrial use, or filled for housing development. Of the estimated 11 million acres of wetlands that stood in Michigan 150 years ago, 3 million acres remain. Since there is little historical data on wetland identification, it is not possible to estimate the total loss of wetlands within Ada Township.

Because they occur where the dry land meets the water, wetlands play a critical role in the management of the township's water-based resources. Acre for acre, wetlands produce more wildlife and plants than any other Michigan habitat type. Michigan boasts about 2,300 native plant species; 50 percent of these are wetland species and over 25 percent of the wetland species are threatened or endangered.

Other benefits of wetlands include the following:

- They help reduce the extent of flooding by absorbing runoff from rain and melting snow and slowly releasing excess water into rivers and lakes. (A one-acre swamp, when flooded to a depth of one foot, contains 325,851 gallons of water.)
- They filter pollutants from surface runoff, trapping fertilizers, pesticides, sediment and other potential contaminants, and help to break them down into less harmful substances.
- They contribute to recharge of groundwater supplies when connected to underground aquifers.
- They form part of the natural nutrient and water cycles, and produce vital atmospheric gases, including oxygen.
- They provide commercial and recreational value to the economy, by producing plants, game birds and fur-bearing mammals. Survival of many varieties of fish are directly connected to wetlands, as they require shallow water areas for breeding, feeding and escape from predators.
- Wetlands also contribute to the open, natural character of Ada Township, by providing natural areas of open space interspersed with developed land. Wetland areas can provide

a valuable site design element in residential development, providing separation between neighboring properties and attractive natural areas which serve as a property value-enhancing amenity.

In Michigan, the Goemaere-Anderson Wetland Protection Act (Act 203 of the Public Acts of 1979) provides for the statewide preservation, management, protection, and use of wetland areas. Wetlands having an area of at least five acres in size, or those that are contiguous with a lake or stream are subject to State regulation. The Act requires a permit from the Department of Natural Resources (DNR) for activities such as filling, dredging, and draining.

Floodplains

Floodplains are relatively flat stream valley floors which are periodically overrun by the stream at high water after heavy rainfall or rapid snowmelt within the stream's watershed area. The 100-year floodplain within Ada Township has been determined by the Federal Emergency Management Agency (FEMA). These areas, subject to a 1 in 100 or greater chance of flooding in any year, are located along the Grand River and are identified on the Natural Features map.

Land within the 100-year floodplain is subject to restrictions on development under provisions of the Township Floodplain Development Ordinance, as well as Michigan Department of Environmental Quality regulations. Administration and enforcement of floodplain development regulations by the Township is required in order for property within the Township to be eligible for participation in the Federal Flood Insurance program. These regulations are intended to ensure that construction within floodplains is protected against flood damage, and will not impede flow of flood waters and cause more severe upstream flooding. Habitable structures must have the lowest floor level, including basement, located above the 100-year flood plain elevation. In addition, both the Township and State floodplain development regulations require that a permittee create compensating storage volume within the floodplain to offset the loss of flood water storage volume caused by placement of fill in the floodplain.

Woodlands

While regulatory programs apply to certain critical environmental areas, such as floodplains and wetlands, this is not the case with woodlands, even though they also provide important environmental benefits. They are buffers and moderators of flooding, climate, erosion, noise and air pollution. Significant woodland areas within the Township are shown on the Forested Lands map in the Appendix.

Ada Township's wooded areas give the community a rural charm many residents and visitors find particularly attractive. Woodlands also have other values which cannot be measured in board feet, such as providing wildlife habitat and recreational opportunities, moderating climate, enhancing air quality and filtering and buffering noise. Woodlands are important protective features for watersheds and soils. Forest vegetation moderates the effects of winds and storms, stabilizes and enriches the soil, and slows runoff from precipitation, thereby allowing it to be filtered by the forest floor before percolating into groundwater reserves. By decreasing runoff velocity and increasing groundwater infiltration, woodlands also help to regulate flooding.

Groundwater

Almost one-half of the State's population, and much of Ada Township's population, relies upon groundwater as the source of drinking water. Despite this dependence, there is little public understanding of the nature and importance of groundwater. One widely held misconception is that groundwater flows in huge underground lakes and rivers. Another is that groundwater travels very rapidly or that it's direction follows the earth's contours. Of all of the common

misconceptions, perhaps the most dangerous ones are that groundwater is adequately protected by the earth's surface and that activities on the land surface have little impact on this resource. In reality, groundwater quality can be easily affected by human activities on the surface.

Like most other natural resources, groundwater is more vulnerable in some areas than others. This vulnerability is determined by three main factors: soil type, depth to the 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.

In Ada Township, the depth to groundwater and extent of protection of groundwater supplies by impermeable geologic strata varies considerably throughout the Township. In most areas, groundwater relied upon for water supplies are sufficiently deep that they are well protected by impermeable layers from surface contamination. In some areas, however, shallow groundwater is overlain by highly-permeable sandy soils - a situation which creates groundwater contamination risk by above-ground activities. Fortunately, there have been no reported widespread problems of well water contamination by elevated nitrate levels in Ada Township, according to the Kent County Department of Environmental Health. Nitrate contamination is the most commonly-encountered pollutant of vulnerable aquifers, resulting from septic system drain field leachate, agricultural and residential fertilizers and farm animal waste.

In areas that offer little natural protection, or where the protection level is unknown, special consideration should be given to the types and densities of land uses which are permitted. Businesses such as vehicle repair and service facilities, dry cleaners, photographers' darkrooms and hair salons are examples of land uses that should be located only in areas served by public sewer, due to the types of chemicals which are routinely used. If these businesses rely on on-site waste water disposal drain fields, the chance of groundwater contamination, through an accidental spill or improper disposal, is especially high.

Even land use activities generally thought to be environmentally sound, such as golf courses and manicured residential lawns, can be potential groundwater hazards if the use of lawn chemicals is not properly managed. In addition to carefully considering the types of land uses which are to be allowed, the following list offers other local protection measures:

- Require as part of site plan applications information about hazardous substances to be used, stored or generated by the proposed land use activity. Relevant information should include presence and ultimate outlets of floor drains, content and storage of chemical containers, and disposal procedures for any chemicals used.
- Regulations requiring spill prevention and secondary containment of hazardous substances should be required at new business sites which may be of such a size that exempts them from State regulation.
- New businesses should be required to obtain a Pollution Incident Prevention Plan (PIPP) from the Michigan Department of Natural Resources. PIPP Plan submittal should be a precondition for site plan approval.

Groundwater protection is a true example of "an ounce of prevention being worth a pound of cure." Low-cost contamination prevention measures can help protect against a spill or leak which could ultimately require costly remediation by a property owner or community.

High Quality Natural Communities

Two sources of inventory information, one at a statewide level, and one specific to Ada Township,

contain information regarding sites within the Township which have high quality natural plant communities.

Michigan Natural Features Inventory:

In 1992, the Michigan Natural Features Inventory program of the Michigan DNR Wildlife Division conducted an inventory of natural areas in Kent County. This inventory identified a total of 25 high quality natural area sites in the County. Three of the 25 sites are located in Ada Township. They include natural prairie fen and inundated shrub swamp adjacent to Chase Lake, a small (3-acre) hillside prairie on a steep hillside west of Grand River Dr., and a southern mesic forest containing red, white and black oak, as well as sugar maple and American beech located between Pettis Ave. and the Grand River, north of Knapp St. There are several other areas of mature forest with high species diversity in the Township, that were not included as part of this inventory.

Natural Areas Inventory Conducted by Calvin College, 2006:

As part of the Township's preparation of the initial Open Space Protection Plan in 1999-2000, a broad-brush inventory of high quality natural areas was conducted by two biologists and a team of undergraduate research assistants. In 2006, this work was supplemented by a more complete inventory using a more thorough screening protocol, with the same project leadership from Calvin College. The purpose of the survey was to identify high quality natural areas according to criteria that are focused on plant community composition and integrity. A combination of published data sources and field surveys were used to identify sites of high plant diversity representative of both historic and contemporary Michigan plant communities. Sites of potentially high botanical diversity were surveyed in 30 sections of the Township (plus one site in the additional southeast section). From this review a total of 17 sites, which included land that is located in 20 sections, were visited for an in-depth inventory. This inventory yielded the following summary results:

- From all the surveyed parcels 15 different plant communities recognized by the Michigan Natural Features Inventory were identified. 60% (9/15) of the community types encountered were wetland communities. 43% of the actual community type occurrences found (45/105) were upland communities (prairie and forest).
- A total of 771 plant species were identified from the 17 highest quality sites. Eighty two percent of those species are Michigan natives; the remainder are species introduced to the area since European settlement.
- Of the total species count, 168 (22%) were found at only one site in the Township, indicating that a significant portion of the plant biodiversity in the Township is quite limited in distribution and of tenuous status.
- Among the species identified, ten are listed by the State of Michigan as special concern, threatened or endangered because of their state-wide rarity and limited distribution. These species were identified on 9 different properties.
- Among the species identified, 25 of the native Michigan plants were new records for Kent County.
- A somewhat alarmingly high 23 non-native species were also recorded as new species for Kent County, suggesting a relatively recent origin.
- The measure used to assess the ecological integrity of sites in this survey, the floristic quality index (FQI), ranged from 47.8 to 75.9. According to the Michigan Department of Natural Resources, values above 35 indicate communities with biodiversity of statewide significance and

are considered to be unmitigable. Values above 50 indicate sites that are very rare and contain a significant component of Michigan's natural biological diversity. Of the highest quality sites in Ada Township, 15 of 17 (88%%) were higher than 50. Preservation of the biodiversity of these sites should be made a high priority.

Because many of the sites studied in the 2006 survey lie in close proximity to each other or connect to natural and man made corridors (such as railroad lines, power line right-of-ways, etc.), these sites have the potential of contributing to a network of high quality natural areas in the Township. The contemporary term for such a network is 'green infrastructure', calling attention to the fact that a livable, functioning natural environment depends not only on planned development of the built environment but also the planned conservation and restoration of a system of natural areas as well.

Ada Township still holds the opportunity to protect large areas with mostly natural cover to serve as hubs in a green infrastructure. Such hubs should be built around high quality core areas such as those detailed in the Calvin study. To draw conserved and protected areas into an overall infrastructure, corridors should be created and protected to link those hubs. As planning proceeds in Ada Township, attention to the protection of existing natural areas and the creation of effective landscape corridors between natural areas should be a major consideration in all future planning decisions.

Figure 3 identifies the elements of a green infrastructure network that were identified by the Calvin College team.

In addition, the Inventory of Existing Open Space map contained in the Appendix identifies lands that have a high degree of commitment to open space use, either by virtue of public ownership, status as common open space in a development, or permanent restriction on development in a recorded conservation easement.

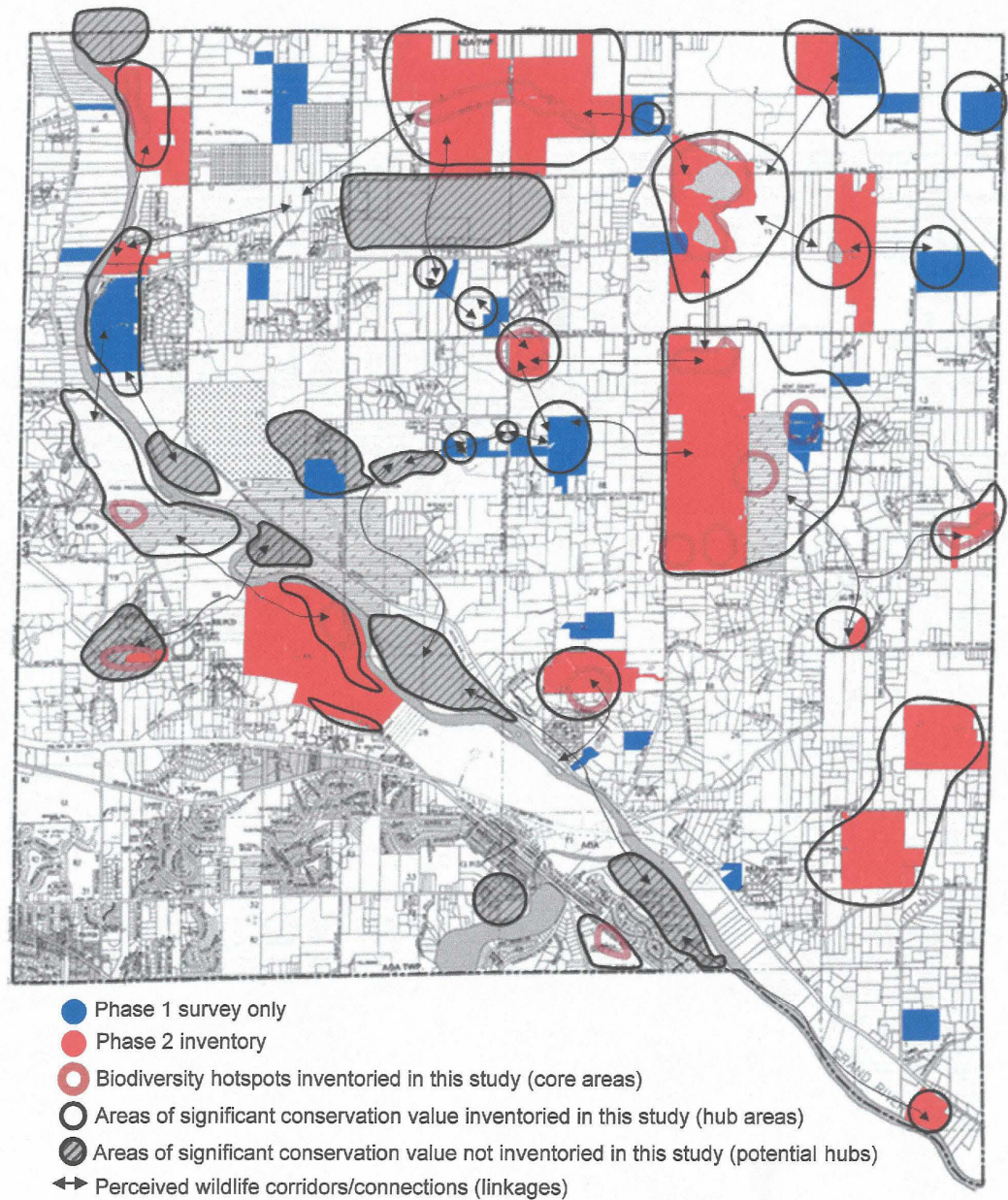


Figure 3 – Potential Green Infrastructure Network in Ada Township

Figure 1