

## SECTION 2.0 | INTRODUCTION

The purpose of this study is to discuss the inventory of physical features in Washington Township that have the potential of influencing the location and character of development. Specific topics covered in this inventory include geology, topography, flood hazards, soils, water, woodlands and wetlands.

Existing physical features exert important influences in shaping the development of any specific area. They are nature's contribution to the Township's environment. Collectively, these features can determine the overall physical character of the community.

When integrated thoughtfully into development proposals, physical features serve to enhance the character and appearance of the constructed environment. Conversely, ignoring physical features, or misusing them, can have significant, long-term negative consequences. Some well-defined physical features serve as a barrier to development and may be difficult to overcome, except at considerable expense. It is usually better to design with nature than to attempt to substantially change an area's physical environment.

#### GEOLOGY

Michigan's physical setting, as we know it today, including the Great Lakes that surround the State, are the result of the interaction of glacial action on the bedrock formation that underlay the State. The bedrock formations of the State consist largely of sandstone, limestone and shale, which were particularly vulnerable to the weight and movement of the glaciers. The weight of the glaciers depressed the land mass surrounding Michigan, forming basins that would eventually become the Great Lakes.

Southeast Michigan's physical setting consists of three well-defined regions, two of which directly influence Washington Township. The first of these areas is known as the Erie-St. Clair plain. This area extends for a depth of approximately 25 miles along the shoreline of Lake Huron, Lake St. Clair and Lake Erie, from Michigan's thumb area on the north to Toledo on the south. It also extends east into Canada, encompassing the entire "panhandle" portion of Ontario. This area is a nearly level glacial plain that rises gradually to the west. It is crossed by numerous streams emptying out into the Great Lakes system.

The dividing line between the first area and the adjoining area, known as the Thumb Upland, crosses Washington Township on a diagonal line extending from the southwest to the northeast. This area consists of a hilly, uneven belt of interlobate moraine, pitted with lakes, muck areas, rounded gravelly hills, and relatively poor drainage conditions.

The last period of glaciers that covered Michigan was directly responsible for the Township's basic land forms. As these glaciers moved south, they accumulated large quantities of sil that were eventually deposited across southern Michigan and neighboring States. This fertile soil accounts for much of Michigan's productive agricultural land. The Township's most prominent physical feature is the Birmingham Moraine, a range of hills extending from Shelby Township on the south and running in a northeasterly direction through Lockwood Hills, Carriage Hills, Indian Hills Elementary School and Eastview Estates, eventually entering Bruce Township near Romeo High School. This moraine serves to define the edge of glacial movement in the Township. As temperatures warmed and melted the glacier at a rate equal to this forward movement, soil from the glaciers was deposited in a line parallel to the edge of the glacier, thereby producing this terminal moraine.

The Stony Creek Valley lies directly to the west of the Birmingham Moraine. Stony Creek Lake is the predominant physical feature of this area. This valley was once deeper and broader than it is today. Glacial ice and accumulated material restricted the flow of water through this valley. As a result, the valley was filled with fine-grained outwash. Today, Stony Creek occupies a meandering channel through this valley in the western portion of the Township.

Melting glaciers resulted in several lakes that flooded Macomb County at various times. These lakes form the Township's third major geologic feature, the Glacial Lake Bed, which covers the east side of the Township. The shoreline of one of these lakes follows the present-day Grand Trunk Railroad line as far north as 29 Mile Road. Powell Road, in the northeast corner of the Township, marks another portion of this Lake's shoreline. This ancient lake bed helps determine the general physical characteristics of the eastern half of the Township, which is essentially flat except for those drainage channels which cross the area.



ILLUSTRATION 4 GEOLOGY MAP

P L A N

#### TOPOGRAPHY

Topographic conditions can have a significant influence on land development patterns. Topography, for example, can impact the site location, orientation and design of buildings, roads and utilities. Where topography is extreme, slopes become an important consideration due to concerns relating to the ability of the land to bear the weight of buildings and the danger of erosion. Sometimes, topographic variations offer opportunities to appreciate the scenic environment. The absence of significant changes in topography can result in the need for man-made drainage improvements.

Washington Township's topographic features are a direct consequence of the glacial actions described earlier. The eastern half of the community is relatively flat. The western half is characterized by a series of rolling hills.

The lowest point in the Township, at 650 feet above sea level, is noted in the southeast corner of the Township, near the 26 Mile Road and Hayes Road intersection. Elevations between 900 and 950 feet are noted in the northwest corner of the Township. The most noticeable changes in topography are found along the Birmingham Moraine and within the Stony Creek Valley.

Proper site planning, good design and proper construction can make the Township's rolling topography an asset for future development. Careful attention should be paid to the development of these hillsides to avoid the problems frequently associated with building on slopes. Whenever developments seek to dramatically alter the natural topography or run against its grain, the likelihood of problems increases.

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#### SOILS

Soil characteristics have an important influence on the ability of land to support various types of land uses, including roads, buildings, utilities and agriculture. Four specific soil characteristics influence their ability to be used for various purposes. These include the following:

- 1. Bearing Capacity the ability to support the weight of roads, buildings or vehicles.
- 2. Erodibility/Stability the susceptibility of the soils erosion hazards and the ability to accept weight, without causing mass movements such as mud flows and slides.
- 3. Drainage the capacity of soils to transit and receive water. This characteristic is especially important for determining the ability of soils to accept on-site waste water treatment systems. Soil drainage characteristics are influenced by particle composition and water content.
- 4. Resource Value the economic worth of the soil for agricultural purposes, or as a fill or mined material.

Washington Township's soil characteristics were identified as part of the larger Macomb County Soil Survey conducted in 1967 by the United States Department of Agriculture Soil Conservation Service. Categories of soils with different characteristics and physical properties were identified as part of the survey. This process resulted in a patchwork or jigsaw-like pieces that fit together to portray a larger overall picture of existing soil characteristics. A large number of individual soil types are present in the Township. These individual categories are grouped into several generalized classifications of soils that share similar characteristics. A total of nine of these grouped categories are located in Macomb County. Three of these cover Washington Township. The characteristics of these categories are described as follows:

**Lapeer-Miami-Celina Association -** This category of soils occurs in the central portion of the Township and generally coincides with the location of the Birmingham Moraine described earlier. Soils in this association are well drained and moderately well drained, gently sloping to rolling soils that formed in glacial till consisting of sandy loam, loam and silt loam. These soils occur in the most hilly portions of the County.

This association is well suited to agricultural production, except for those sites where slopes are too extreme. Erosion control is the chief limitation of these soils for farming. Slopes are also a limitation for residential development which creates problems for the arrangement of street and utility line and the construction of home sites.

**Conover-Parkhill-Locke Association -** This association is comprised of soils with generally poor drainage characteristics occurring on nearly level to gently sloping soils formed in glacial till consisting of loam, silt loam and sandy loam. In Washington Township, these soils are confined to the eastern third of the Township lying east of the railroad tracks.

Soils in this association are among the best in the County for farming. They have medium to high fertility and respond readily to management improvements. Excessive wetness is the main limitation for agricultural purposes. Wetness and slow runoff are also limitations for residential development. Roads constructed on these soils tend to break up due to frost heaving and excessive wetness.

**Oakville-Boyer-Spinks Association -** This association is made up of welldrained, nearly level to hilly soils that formed in lakelaid sediments, other sediments, and glacial outwash. These soils occur in two locations in Washington Township: in the western one-third of the community, generally coinciding with the Stony Creek Valley; and extending diagonally as a narrow belt across the northeast corner of the Township. The general landscape that these soils are found in is one consisting of hilly areas, numerous narrow outwash plains, and small wet depressions.

These soils have severe limitations for farming. Many areas are too steep or sandy and are generally draughty in mid-summer. Where slopes are extreme, residential development and road construction are also difficult.

One of the more practical applications of this soil information is to determine the suitability of the land to support different types of activities and uses. Chief among these is the suitability for on-site sewage disposal systems. The capability of different soil classifications to support septic tanks is shown in Illustration 7. Soils with the most severe limitation for these systems are generally confined to the eastern portion of the Township. High water tables and poor drainage characteristics are responsible for creating these limitations. These characteristics will have the effect of limiting the density of development in the absence of public utilities.





## **Physical** Features

ILLUSTRATION 7 SOIL LIMITATIONS FOR SEPTIC TANKS

#### LIMITATION FOR SEPTIC TANK

Slight Moderate Severe Sand and gravel pits

#### WATER

Surface water exists in many forms, such as lakes, rivers, creeks and open storm drains. Several lakes and streams are located in Washington Township. For the most part, these features are located in the western portion of the Township. The largest of the Township's six lakes is Stony Creek Lake, located in the southwest corner of the community. Several smaller lakes are located to the north, along the Stony Creek Valley. Stony Creek also flows through this area, emptying into the lake of the same name south of 29 Mile Road. On the east half of the Township, the predominant water features are several smaller drains, including Healy Drain, Heide Drain, Yates Drain, Kim Drain and Price Brook.

No major flood zones have been identified in Washington Township. Some soil categories, however, exhibit seasonally high water tables and temporary ponding problems. Low areas in the Stony Creek Valley have similar characteristics. Potential hazards of this nature need to be evaluated as part of the site planning and subdivision process.

The Township's water features, especially those located along the Stony Creek Valley, make a significant contribution to the visual character of the Township. These lakes also provide attractive settings for residential development, in addition to their recreational value.

## SECTION 2.0 | WOODLANDS

At the time southeast Michigan was originally settled, the area was covered with dense hardwood forests. As the number of inhabitants increased, these forests were cleared for lumbering and farming purposes. Today, the quantity of land still occupied by mature vegetation has diminished. Where large contiguous woodlands remain, however, they provide benefits that need to be considered in the planning process.

Woodlands are frequently only considered valuable as a visual amenity enhancing the natural or constructed environment. Trees serve many other useful environmental purposes that should be recognized for planning purposes. These include the following:

- Slope stabilization and erosion control
- Conserving water quality
- Maintaining a micro-climate
- Filtering pollution from the atmosphere
- Decreasing noise
- Providing a habitat for wildlife

Recognizing these important physical properties and integrating woodlands into future development can improve the community's overall environmental quality and enhance the visual character of the constructed environment.



ILLUSTRATION 8 GENERALIZED WOODLANDS MAP

W A S H I N G T O N T O W N S H I P

Large wooded areas are distributed throughout Washington Township. Many of these woodlots are located in interior section acreage. These woodlands were measured in 1979. At that time, approximately 2,000 acres of land (eight percent of the total Township area) were covered by trees, excluding existing orchards and land within Stony Creek Park. Most of these wooded areas remain today and, as such, represent a valuable physical resource to be preserved and integrated into the development process.

#### WETLANDS

Wetlands are an important element of Michigan's landscape. Before experiencing settlement in the late 18th and early 19th centuries, Michigan was thought to contain over 11 million acres of wetlands. Like the extensive forests that once covered the State, the unique physical characteristics of many of these wetlands were permanently altered as a consequence of the settlement of the State. This change occurred as forests were logged and swamps drained for farming purposes. Between 25 and 50 percent of these original wetlands remain in Michigan today.

Wetlands are areas characterized by the presence of water that either saturate the soil or cover the land most or all of the year. Because of this characteristic, wetlands have the ability to support unique varieties of plants and animals. Not all wetlands are similar, however. Several categories of wetlands are found in Michigan. These varieties are the result of differences in climate, bedrock geology, soil characteristics and landforms that are unique to different portions of Michigan. The characteristics of wetland vegetation provide the basis for making a distinction between different types of wetlands. The two basic types of wetlands are forested and unforested. The largest share of remaining State wetlands are of the former variety. Many of these forested wetlands have soils that are seasonally saturated with water during seasonal periods. These wetlands are commonly referred to as swamps. Swamps differ from unforested wetlands more commonly known as marshes, wet prairies, wet meadows, fens and bogs.

Marshes are those areas that normally occur along the edges of lakes and streams. These areas are flooded for much of the year with average depths of under five feet. Commonly occurring vegetation in marshes include emergent plants such as bulrushes, cattails, sedges, grasses and floating or underwater plants.

Wet prairies consist of land located between marshes and abutting farm land. Their existence is a result of fluctuating water levels and Indian fires, which prevented the establishment of more permanent vegetation, including trees and shrubs. Few of these unique wetlands exist today. Many of these areas have been absorbed into the adjoining agricultural acreage. Wet prairies are recognizable by the striking vegetation that inhabit these areas, such as asters, goldenrods, mints, rare milkweed, Indian plantain and assorted prairie grasses.

Fens are a common herbaceous wetland located in areas characterized by saturated, lime rich soils. Fens are commonly found at the bottom of ridges where poor drainage conditions exist resulting in mulch soils. Like wet prairies, farming has absorbed many of these wetlands.

The remaining category of non-forested wetlands are known as bogs. The most striking feature of a bog is the thick acidic peat mats that cover these areas. These are formed as a result of the decomposition of sphagnum mosses and sedges. Many bogs have been permanently changed as a consequence of peat mining activities, especially those located in the more populated portions of southeast Michigan.

In spite of these differing characteristics, wetlands share some common physical properties that have important consequences for planning purposes. Wetlands serve a number of necessary environmental functions. These include the following:

- Protecting downstream water supplies by providing clean ground water as a result of the nutrient retention and sediment removal. Wetland vegetation traps these sediments and pollutants, thereby preventing them from being deposited in surface water bodies.
- Functioning as effective natural storage basins for flood water. Wetlands
  may be considered sponges that absorb large quantities of seasonal
  precipitation, gradually releasing it when the receiving channels are
  able to accept it.
- Protecting the shoreline from erosion caused by wind and wave action and effectively serving as environmental shock absorbers.



Source U.S. Department of the Interior and Macomb County

#### ILLUSTRATION 9 GENERALIZED WETLANDS MAP NATIONAL WETLAND INVENTORY

 Providing a habitat for many types of plants and animals that thrive in the type of physical environment created by wetlands. These plants and animals provide an economic and recreational benefit as a result of hunting, fishing and other leisure activities.

# Development in or around wetlands are regulated by several State statutes, the most prominent of which is Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended. This Act regulates the development of wetlands if they meet one or more of the following criteria:

- Are contiguous to the Great Lakes or Lake St. Clair, an inland lake, pond, river or stream.
- Are not contiguous to one of the water features noted above, but are greater than five acres in area and are located in counties with populations exceeding 100,000 persons.
- Are less than five acres, not contiguous to any water feature, and are considered necessary to the preservation of the natural resources of the State from pollution, impairment or destruction.

Permits are required by this legislation for the following activities: 1) depositing or placing fill material in a wetland; 2) dredging or removing soil from a wetland; 3) constructing, operating or maintaining any use or development in a wetland; and 4) draining surface water from a wetland. Specific categories of activities are exempt from the requirements of the Wetland Protection Act.

Other State statutes that have the effect of regulating wetland development include the Inland Lakes and Streams Act, the Floodplains Regulatory Act, the Great Lakes Submerged Lands Act, and the Shoreline Protection and Management Act.

Extensive wetland areas are located in Washington Township. These generalized wetland areas are identified on National Wetland Inventory maps prepared by the U.S. Department of the Interior. High altitude aerial photographs were used to identify wetland areas based on vegetation, visible hydrology and geography. On-site field investigations are needed to determine more conclusively the actual characteristics and extent of each identified wetland. Most of the existing wetlands in Washington Township are confined to the western portion of the Township within the Stony Creek Valley west of Mound Road. Stony Creek and numerous small lakes are located within this area, which explains the presence of these wetlands. The wetlands located in the eastern half of the Township generally coincide with the location of large wooded areas.

The preservation of the Township's natural wetlands is a legitimate concern of local planning. This may be accomplished through cooperation with the DNR regulations that prevent development of these poorly drained geological areas.

## SECTION 2.0 | AGRICULTURE

Historically, agriculture has played an important role in the development of Washington Township. The Township's numerous orchards have, in fact, made a significant contribution to the Township's identity. This importance is further reflected in the amount of land that has been devoted to agricultural production in Washington Township.

At the turn-of-the-century, approximately 85 percent of the Township's total land area was being used for farming purposes. By 1940, between 45 and 65 percent of the total Township area was used for agriculture. When the Master Plan was prepared in 1979, this proportion had declined to 25 percent. According to 1990 property assessment records, approximately 6,500 acres of land were being farmed. The amount of land dedicated to farming continues to decline as development pressure hastens the disappearance of agricultural land. In 2000, approximately 4,000 acres of farmland currently exist in the Township.

Most of the existing agricultural land is located east of Mound Road. The suitability of this land for agricultural purposes is directly related to soil characteristics. The soils in the eastern half of the Township are generally well-suited to support farming. The Important Farmlands Map prepared by the U.S. Department of Agriculture Soil Conservation Service identified prime farmland based on soil capabilities. Much of the Township lying east of Mound Road is capable of supporting productive agriculture. See Illustrations 10 and 11.





Farmland is often viewed as an inexhaustible resource, when in fact it is a finite one. Once an acre of land is converted to a non-farm use, its potential for converting back to farmland is severely diminished. The quantity of farmland in the country is being eroded by competition for other land uses. Other acreage is often idled prematurely because of unrealistic expectations for future development. The Michigan Farmland (14.7% of all farmland in Michigan) were lost between the years 1982 and 2002.

Major demographic shifts occurring in this County explain this steady loss of farmland. The most significant aspect of this change was the movement of the population from central cities to suburban areas. Evidence of this trend is found in the population, housing unit and employment increases which have occurred in rural areas in recent years.

As a result of these trends, farming within Macomb County in the past three decades has been typified by a decreasing number of farms. Generally, over the past few years, the farmer has increasingly rented more land for production and has hired specialized teams to fertilize or cultivate specific crops. Farm equipment has become such a major capital expenditure that the only way it can provide an economic return is to keep it in service each day as long as possible.



## Physical Features



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The corridor of development extending north, proximate to M-53, suggests that the Township's remaining agricultural land will face even greater pressures in the future. Factors threatening continued use of remaining farmland include land speculation and scattered housing development, increased land values, taxation, and a poor return on investment.

As part of the Master Plan for Washington Township, and in other policy and implementation processes, the Township should consider the adoption of ordinances that allow farmers the opportunity to remain economically productive. Standards permitting alternative forms of agricultural business will allow the farmer to generate supplemental income and ensures that agricultural land owners have the option to maintain their land as such during the lifetime of this Plan.

#### CONCLUSION

As this chapter points out, the physical features of the community are nature's contribution to the Township's environment. For a variety of reasons, different communities have different endowments. Physical features appear to either enhance or limit development. Until recent times, development limitations were considered an adverse circumstance and engineered solutions were often employed to overcome natural limitations. Experience has proven that cooperation with nature, using imagination and creativity, is preferable to removing and/or paving over natural features. Because the Township is only partially developed, it should carefully examine each opportunity to maximize its design in a manner that enhances the community's livability. Planning can best assist in accomplishing this by encouraging designs that respect and work with nature.