

III. Watershed Characteristics

A. Climate

Elkhart County experiences four well defined seasons. Air of both tropical and polar origin brings frequent changes in both temperature and humidity. The region experiences 36.7 inches of rainfall annually (period of record 1971-2000, Goshen, Indiana). Summer rainfall is normally experienced in afternoon thunderstorms. Although severe storms are rare, 26 tornadoes were reported in Elkhart County according to the National Climatic Data Center for the period of 1950 to 2002. Snowfall has occurred as early as October and as late as May. Typically, the largest amount of snowfall is in February. The normal maximum monthly temperature ranges from 31.5° F in January to 84.5°F in July. The normal minimum monthly temperature ranges from 17°F in January to 62.8°F in July. The maximum temperature recorded at Goshen, Indiana was 102°F on June 25th 1998. The minimum temperature recorded was -24°C on January 21, 1984. The maximum precipitation was 5.84" on July 8, 1951. The maximum calendar day snowfall was 14.0" on January 26th 1978.

B. Geology

The consolidated rocks underlying the watershed are of Ordovician age. These rocks consist of dolomite, dolomitic limestone and shale and are overlain by dolomitic limestone, shale and dolomite of Silurian age.¹

The bedrock is overlain by thick, unconsolidated glacial deposits. These deposits are the results of several glacial periods, but predominantly the Wisconsin Glaciation and the subsequent recessions of the Saginaw Lobe. The thickness of the deposits ranges from 150 to 250 feet within the Puterbaugh Creek – Heaton Lake Watershed in Indiana.¹

There is a surficial aquifer in the Indiana portion of the watershed.¹ In much of the watershed, the groundwater is within a few feet of the surface, especially during the wet season. With a high groundwater table, the creeks and ditches are typically fed by the groundwater in addition to surface runoff.⁴

C. Soils

The primary soil types within the Puterbaugh Creek – Heaton Lake Watershed consist of the Coloma-Spinks-Oshtemo and Riddles-Hillsdale-Gilford soils associations. The Coloma-Spinks-Oshtemo soils association generally consists of somewhat excessively drained to well drained soils and they have moderately rapid to rapid permeability rates. The available water capacity in the Coloma and Spinks soils is low and is moderate in the Oshtemo soil. The Coloma soils are poorly suited to cropland; but, crops such as corn, small grain and soybeans can be grown. The Riddles-Hillsdale-Gilford soils associations consists of well drained soils (Riddles) to very poorly drained soils (Gilford) and they have moderate to moderately rapid permeability rates. The Gilford soils can be considered prime farmland when they are drained due to the potential for water ponding.

The soil types for the watershed are illustrated in Figure 3. Table 1 presents the soil types within the watershed and their suitability for various uses.

**Table 1
Watershed Soil Types**

<i>Soils Association</i>	<i>Acreage</i>	<i>% of Watershed</i>	<i>Farming</i>	<i>Sanitary</i>
Coloma-Spinks-Oshtemo	5,411	49.6%	Not Prime Farmland (Coloma, Spinks) Prime Farmland (Oshtemo)	Limited Filtering Capacity
Houghton-Adrian-Carlisle	676	6.2%	Not Prime Farmland	Limited Filtering Capacity, Flow Percolation Rates, Ponding
Riddles-Hillsdale-Gilford	3,774	34.6%	Not Prime Farmland (Riddles, Hillsdale) Prime Farmland (Gilford – if drained)	Limited Filtering Capacity, Ponding (Gilford); Moderate Filtering Capacity, Slow Percolation Rates (Riddles)
Oshtemo-Kalamazoo-Houghton	1,048	9.6%	Not Prime Farmland (Houghton) Prime Farmland (Oshtemo, Kalamazoo)	Limited Filtering Capacity, Slow Percolation Rates

Reference: Soil Survey of Elkhart County, Indiana, USDA and NRCS, 2002.
Soil Survey of Cass County, Michigan, USDA and NRCS, 1991.

Table 1 indicates that all soils within the watershed are designated as being limited for on-site waste disposal systems. They are designated as being limited due to filtering capacity or due to restrictive permeability because of a high water table that contributes to ponding. When constructing on-site disposal systems in these conditions, specialized on-site systems are required, including mound systems or pressure dosed systems. These systems can be quite costly compared to the conventional on-site systems.

Soil erodibility has a direct effect on water quality. Erodible soils can be transported through wind and water erosion to surface waters. Nutrients and other pollutants are transported with the soils. Erodibility of the soils can be estimated using the factor Kw and Kf in the Universal Soil Loss Equation. K factors range from 0.02 being least susceptible to sheet and rill erosion by water to 0.69 being most susceptible to sheet and rill erosion by water. The K factors vary with depth. The Kw and Kf factors range from 0.05 (Coloma) to 0.17 (Spinks, Oshtemo) for the Coloma-Spinks-Oshtemo soils association (approximately 50% of the watershed)^{4,5}. The Kw and Kf factors range from 0.15 to 0.24 for the Riddles-Hillsdale-Gilford soils association (approximately 35% of the watershed)^{4,5}. Based on these values, the soils are slightly susceptible to sheet and rill erosion by water.

The majority of the soils in the watershed show a low susceptibility to wind erosion. Wind erodibility values range from 1 (most susceptible) to 8 (least susceptible). The Coloma-Spinks-Oshtemo soils association is in wind erodibility group 1 and 2 and the Riddles-Hillsdale-Gilford soils association is in wind erodibility group 3^{4,5}.

D. Hydrology

The primary stream within the watershed is Puterbaugh Creek, which flows from just south of County Road 6 and discharges to the south into the St. Joseph River. A number of tributaries feed Puterbaugh Creek from the upper portion of the watershed. The Rhineheart Lateral, which flows under Stateline Road, and the Kindig/Kellog ditch, which flows under County Road 15, receive the majority of the flow from the Michigan portion of the watershed along with some flow from Indiana. These two laterals combine to flow into Bishop Ditch which then flows directly into Heaton Lake. There is only one outlet from Heaton Lake which when combined with the flow from Mather Ditch to the west of Heaton Lake flow into the Jacob Myers Ditch. The Jacob Myers Ditch then flows from just north of the East – West Indiana Toll Road to the headwaters of Puterbaugh Creek at County Road 6.

There are small wetlands areas within the watershed, as identified in the National Wetlands Inventory. These are shown in Figure 4. The National Wetlands Inventory abbreviation, description, and acreage of each type of wetland within the watershed are shown in Table 2.

Table 2
Wetlands within Puterbaugh Creek – Heaton Lake Watershed

<i>Wetlands System and Classification ⁽¹⁾</i>	<i>Acres, within Puterbaugh Creek – Heaton Lake Watershed</i>
Lacustrine Limnetic	99.5
Lacustrine Littoral	32.4
Palustrine Aquatic Bed	3.8
Palustrine Emergent/Scrub-Shrub	57.4
Palustrine Emergent	652.2
Palustrine Forested/Scrub-Shrub	63.2
Palustrine Forested	53.9
Palustrine Scrub-Shrub/Forested	7.8
Palustrine Scrub-Shrub/Emergent	88.9
Palustrine Scrub-Shrub	71.7
Palustrine Unconsolidated Bottom/Aquatic Bed	0.5
Palustrine Unconsolidated Bottom/Emergent	7.3
Palustrine Unconsolidated Bottom	19.5
Riverine Lower Perennial	3.2
Total	1,157 Acres

(1) Wetlands Definitions⁶

System:

Lacustrine – Includes wetlands and deepwater habitats with the following characteristics: (1) situated in a topographic depression or dammed river channel; (2) lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30% area coverage; and (3) total area exceeds 20 acres.

Palustrine – All non-tidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where ocean derived salinity is less than 0.5%.

Riverine – All wetlands and deepwater habitats contained within a channel with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and (2) habitats with water containing ocean derived salts in excess of 0.5%.

Subsystem:

Limnetic – Deepwater habitats within Lacustrine System

Littoral - Wetlands habitats within Lacustrine System

Lower Perennial – Riverine wetlands where gradient is low and water velocities are slow. There is no tidal influence and some water flows throughout the year.

Classes and Subclasses:

Aquatic Bed – Wetland and deepwater habitats dominated by plants that grow principally on or below the surface of the water for most of the growing season in most years.

Emergent – Characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. Vegetation is present for most of the growing season in most years. Usually dominated by perennial plants.

Forested – Characterized by woody vegetation that is 20 feet tall or taller.

Scrub-Shrub – Characterized by areas dominated by woody vegetation less than 20 feet tall. Species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions.

Unconsolidated Bottom – Wetland and deepwater habitats with at least 25% cover of particles smaller than stones, and a vegetative cover less than 30%.

Wetlands are important features in the watershed, as they provide beneficial functions, including water quality improvement, floodwater storage, fish and wildlife habitat and biological productivity.

Wetlands make up approximately 10% - 11% of the total watershed.

According to the FEMA Flood Insurance Rates Maps, Puterbaugh Creek and adjacent areas are within the 100-year flood elevation. The 100-year flood elevation ranges in width from about 37 feet at the Sellers Court crossing to approximately 350 feet immediately downstream of Heaton Lake. A detailed study of Puterbaugh Creek was conducted in the Flood Mapping, from its discharge point at the St. Joseph River to County Road 4 (just upstream of Heaton Lake). The 100-year flood elevation of Puterbaugh Creek downstream of County Road 6 is 761.4 feet NGVD 29 and the 100-year flood elevation at the point of discharge into the St. Joseph River is 742.5 feet NGVD 29.

E. Topography

The topography of the area in the northern portion of the watershed (north of U.S. 12 in Michigan) is typically characterized by gently rolling hills. South of U.S. 12 and into Indiana, the topography of the area is relatively flat. The elevation of the watershed ranges from elevation 750 NGVD 1929 near the discharge point at the St. Joseph River to 880 NGVD 1929 in the upper reaches of the watershed.

F. Land Use

The existing land use varies within the watershed. The lower reaches of the watershed are primarily residential with some industrial development. The upper portions of the watershed are primarily agricultural or undeveloped. Figure 5 shows the land use within the watershed. Land use was determined utilizing aerial photographs and field verification. Table 3 summarizes the land use by type. This land use information was developed using USGS Quadrangle maps and 2003 aerial photography and field verified as part of the 205(j) Grant Project.

**Table 3
Land Use**

<i>Land Use</i>	<i>Acreage</i>	<i>Percent</i>
Undeveloped (Indiana)	1,757	16.1%
Undeveloped (Michigan)	492	4.5%
Agricultural (Indiana)	2,488	23%
Agricultural (Michigan)	2,359	21.6%
Residential (Indiana)	2,045	18.7%
Residential (Michigan)	826	7.6%
Commercial (Indiana)	82	0.7%
Manufacturing (Indiana)	727	6.6%
Institutional – School (Indiana)	16	0.1%
Institutional – Church (Indiana)	2	0.0%
Ideal Beach (Indiana)	27	0.3%
Heaton Lake	88	0.8%
Total	10,909	100%

The developed portions of the watershed are divided by land use (residential, commercial, manufacturing and institutional).

A septic permit database that includes all of the septic permit applications filed with the Elkhart County Health Department from 1990 to 2004 has been received. The data from the septic permits will be incorporated into a database and geocoded for their placement on the Figures. See Figure 5 for the location of the septic permits that were issued from 1990 to 2004. A similar septic database for Cass County, Michigan was not available.

Elkhart County zoning is shown in Figure 6. Zoning within Elkhart County is regulated through the County Zoning Ordinance. Zoning is used to guide the types of land use and development that can occur in specific geographic areas. Zoning allows development to occur in targeted areas, limits development in other areas, and provides protection for land conservation areas. With a zoning ordinance in place, development is targeted where public facilities and services are nearby and/or could be provided at a reasonable cost and a specific time frame. Zoning classifications can be utilized in water quality management strategies, by focusing best management practices, by land use, and protecting critical resource areas. The acreage of each zone classification is shown below in Table 4. In comparing the actual land use with the zoning classifications, it can be seen that there is more land that is developed than is zoned for development (commercial, manufacturing or residential).

Table 4
Watershed Zoning Areas

<i>Zone</i>	<i>Acreage</i>	<i>Percent</i>
Agricultural	5,243	48.1%
Commercial	6	0.1%
Manufacturing	669	6.1%
PUD	651	6%
Single Family	2,860	26.2%
Two-Family	398	3.6%
Multi Family	42	0.4%
Water	90	0.8%
Elkhart Corporate Limits	950	8.7%

G. History

Prior to the exploration and settlement by the Europeans, the Miami Indians resided in what is now Elkhart County. The area was explored by France's Sieur de La Salle in about 1680. The area was later settled by French settlers. The French were displaced by English settlers following the French and Indian War (1754-1763). After the American Revolutionary War, what is now Elkhart County was conquered for the United States as part of the Indiana Territory.² Elkhart County was established by the Indiana Legislature in 1830, with the County seat being Dunlap (located immediately south of the Puterbaugh Creek – Heaton Lake Watershed).

The watershed is located within Osolo and Washington Civil Townships. The watershed area historically has been primarily agricultural with the main crops being corn and soybeans.

H. Endangered Species

The Indiana Department of Natural Resources provides information on endangered, rare or threatened species, high quality natural areas and natural areas in Indiana in its Natural Heritage Center Database. The Indiana Natural Heritage Data Center database is designed to provide information about Indiana's diversity of natural ecosystems, species, landscape features, and outdoor amenities, and to assure adequate methods for evaluating this information and setting sound land protection priorities. The inventory is a continuous process, becoming an increasingly valuable tool for decision makers and scientists as it progresses. Because the IDNR relies on observations from individuals, it does not document every occurrence of a particular species or habitat. Conversely, a listing of a species does not guarantee that the particular species is present.

The results of the database search for the Puterbaugh Creek – Heaton Lake watershed are attached in Appendix B.