Chapter Five - Physical Profile & Natural Resources

Introduction

Two of the community assets most often praised by the Bear Lake Community's citizens throughout the comprehensive planning process were the local natural resources and rural character. From picturesque Bear Lake to beautiful wide open spaces, the landscape of the community plays an important role in the quality of life of area residents. However, recent development in the rural areas of the community have raised the concerns of many residents about potential damage to groundwater and surface water and the need to protect the area's natural resources and rural character.

To get a more accurate picture of the current land uses and land use trends in the Bear Lake Community, LIAA staff members conducted a comprehensive land use/land cover update. LIAA compared 1978 land use maps created by the Michigan Resource Information System (MIRIS) with 2005 ortho-photographs provided by the USDA's Geospatial Data Gateway website, updating land use changes when necessary. Land use/land cover classifications were updated to the second tier category. More information on the land use/land cover update will be provided in chapter six of this plan.

To avoid duplicating research efforts on several items discussed in this section, portions of the 2002 Bear Lake Township and 1999 Pleasanton Township Land Use Plan were excerpted and incorporated into this chapter or are directly referenced. Where appropriate, these references have been updated to reflect 2007 statistics.

Climate

Climate data for the Bear Lake Community was considered from the Michigan State Climatologist's Office. However, due to the lack of specific climate data for the Bear Lake Community and a lack of current data from surrounding weather stations, the summary provided in this section was compiled from the 2002 Bear Lake Township Comprehensive Plan and 1999 Pleasanton Township Land Use Plan.

Prevailing westerly winds blowing across Lake Michigan assure that the area rarely experiences prolonged periods of hot, humid weather in the summer or extreme cold weather during the winter. In general, spring and summer temperatures range between 60 and 80 degrees while the fall and winter temperatures ranges between 0 and 30 degrees. Due to its proximity to Lake Michigan, the Bear Lake Community has a relatively long frost-free period, on average 153 days.

In general, the highest amounts of precipitation occur during September and October. On average, the total annual precipitation water equivalent (rain) is 30.1 inches a year. Due to the proximity of Lake Michigan, lake effect snow contributes to a higher annual snowfall for the Bear Lake Community. On average, the annual snowfall for Bear Lake Township is 66.4 inches, while Pleasanton Township to the north averages approximately 100 inches annually.

Geology

The 1982 Michigan Department Natural Resources (DNR) *Quarternary Geology Map* (Map 8) illustrates the surface geology of Manistee County and the Bear Lake Community. The map shows that the geological materials just beneath the soil are primarily composed of coarse-textures tills and outwash sand and gravel and postglacial alluvium left by glaciers. According to the 2002 Bear Lake Township Comprehensive Plan, *the network of hills in Bear Lake Township are marginal moraines. The hills are deposits created by water running off the edge of a stationary glacier. Bear Lake Township is also part of a glacial outwash plain. The outwash plain is where water moving away from the glacier deposits sands and silt creating flat areas.*

The DNR's 1987 *Michigan Bedrock Geology Map* (Map 8a) depicts the bedrock geology of the Bear Lake Community, which includes portions of the Antrim Group, Ellsworth and Antrim Shale.

Topography

The Bear Lake Community is dominated by a network of hills reaching heights of over above 900 feet above sea level in the north portion of the community (Pleasanton Township). Hills in the mid-section of the community (Bear Lake Township) have elevations of up to 900 feet above sea level. Areas around Bear Lake have some of the lowest elevations in the community ranging down to about 720 feet.

Soil Conditions

A firm understanding and knowledge of the soil types, soil suitability and soil permeability within the Bear Lake Community is useful when considering future land use development. For example, some soil types limit infiltration of fluids, presenting limitations to the use of on-site wastewater treatment systems (e.g. septic tanks and tile fields). These limitations can be very important to developers since the entire Bear Lake Community relies on on-site wastewater treatment systems.

Several maps were developed for the Bear Lake Community to indicate those areas subject to development and building constraints, based on soil information. While many of these constraints can be overcome, the engineering costs may be substantial. For example, soil characteristics of high slopes and poor drainage can limit or impede construction efforts. Map 9 illustrates the probable locations of hydric soils in the Bear Lake Community: areas with potentially high water tables and poorly drained soils. Map 10 illustrates areas where slopes may be greater than 12%, presenting construction concerns such as unstable soils and erosion. Map 11 illustrates areas with limitations for dwellings with basements. Map 11a illustrates areas with limitations for commercial buildings.

The Natural Resource Conservation Service (NRCS) has not yet published a *modern soil survey* for Manistee County. Therefore, the general soil characteristics discussed in this plan below were derived from the Major Land Resource Area (MLRA) descriptions published by the NRCS a number of years ago. According to the MLRA, the soils of the Bear Lake Community can be roughly lumped into either of two very general categories. Information about these general soil categories is presented below in general regional terms. Map 12 illustrates the soils of the Bear Lake Community.

94A - Northern Michigan and Wisconsin Sandy Drift

Land Use:

The forests are used mainly for lumbering and recreation. Forage and feed grains for dairy cattle and other livestock are the principal crops. In places fruits and vegetables are an important cash crop and other vegetables and fruit are also grown.

Soils:

Most of the soils are Orthods or Saprists. They have a frigid temperature regime, and the mineral soils have mixed mineralogy. Deep, coarse textured and moderately coarse textured Haplorthods (Kalaska, Vilas, Rubicon, Emmet and Montcalm series) formed in sandy or loamy glacial drift. The associated very poorly drained Borosaprists (Carbondale, Lupton, and Tawas series) formed in organic materials in depressions. Also important in the area are Udipsamments (Grayling and Omega series) on outwash plains, Psammaquents (Roscommon series) and Haplaquods (Au Gres and Kintoss series) in flat, wet areas and Eutroboralfs (Nester, Kawkawlin and Rudyard series) and Haplaquepts (Pickford and Sims series) on moraines, till plains, and lake plains.

Potential Natural Vegetation:

This area supports forest vegetation of broadleaf deciduous and needleleaf evergreen trees. Jack pine, red pine, and bigtooth aspen are the dominant tree species on the more sandy soils. Sugar maple, yellow birch, American beech, and hemlock are dominant on the moist sites. Tamarack, black spruce, and northern white-cedar are dominant on the wet soils.

MLRA 96 - Western Michigan and Northeastern Wisconsin Fruit Belt

Land Use:

Forage and feed grains for dairy cattle are the major crops, but fruits and specialty crops are also grown and are of great economic importance. This is one of the major areas of production of cherries in the United States. Recreation is an important land use, especially on sites bordering Lake Michigan and Green Bay. Controlling soil blowing and water erosion, conserving moisture, and improving drainage on wet soils are the principle concerns of management.

Soils:

Most of the soils are Orthods or Boralfs. They are moderately deep to deep and medium textured to coarse textured. These soils have a frigid temperature regime, an udic moisture regime and mixed mineralogy. Well drained Haplorthods (Montcalm, Kalkaska, Rubicon, Emmet, Onaway and Longrie series) in loamy or sandy textured glacial drift are dominant. Well drained Eutroboralfs (Kolberg series) in thin loamy glacial drift over lime rock are important in Wisconsin. In Michigan, well drained and moderately well drained Eutroboralfs (Nester series) and somewhat poorly drained Eutroboralfs (Kawkawlin series) formed in deep glacial drift. Udipsamments (Grayling series) formed in deep sands. Haplaquepts (Ensley and Ruse series), Haplaquods (Kinross and Au Gres series), and Psammaquents (Roscommon series) formed in sandy and loamy materials in low-lying areas. Borosaprists (Carbondale, Luton, Cathro and Seeleville series) formed from organic remains of plants in the deeper depressions.

Potential Natural Vegetation:

This area supports forest vegetation consisting of broadleaf deciduous and needleleaf evergreen trees. Sugar, maple, yellow birch and hemlock are the dominant tree species. Jack pine, red pine, and white pine are dominant on the more sandy soils. Lowland soils support mixed hardwood and conifer forests. Elm, soft maple, black ash, and white cedar are the major lowland species.

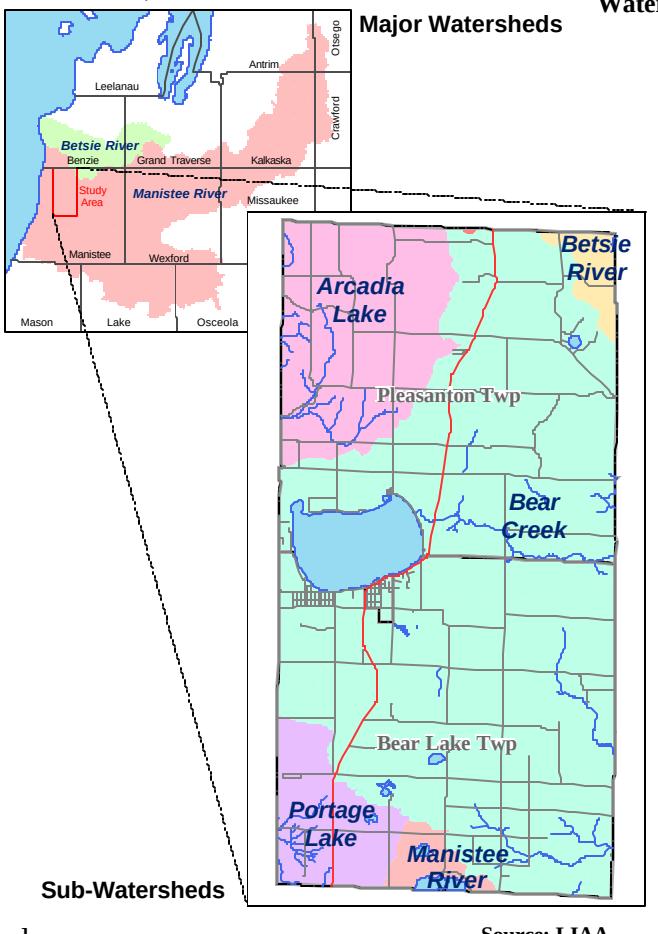
Woodlands and Wetlands

The Bear Lake Community includes a substantial amount of forested land and many wetlands - both wooded and emergent. These features represent important natural resources which can provide critical wildlife habitat, recreation areas, and harvestable timber, as well as providing valuable services such as filtration and stormwater detention (e.g., flood control).

Based on LIAA's 2005 land use/land cover analysis, forests of all types cover over 17,900 acres or about 40% of the Bear Lake Community's total land area. These wooded acres occur in most parts of the community. However, the largest concentration of contiguous woodlands (Approx. 2,083 acres) is found in the Pere Marquette State Forest, in the mid-eastern portions of Pleasanton Township (sections 13-14, 23-24, 25-26 and a portion of 36).

The 2005 land use/land cover analysis shows that wetlands account for over 3,800 acres or 8.4% of the Bear Lake Community's land area. The wetlands are predominantly located in large areas around Little Bear Creek and in the southwest portions of Bear Lake Township near Little Beaver Creek. Wetlands are unique ecosystems that filter out nutrients and sediments and help to maintain and enhance the clarity of lakes and streams. The protection and conservation of wetlands has been a very important issue in the Bear Lake Community. In fact, Pleasanton Township has adopted a *wetland overlay district* placing special regulations for onsite sewage disposal and zoning permits.

Figure 5.1
Watersheds



Source: LIAA

Surface Water

According to the Environmental Protection Agency (EPA) a watershed is the area of land where all the water that moves under and across the land surface drains to the same major water body. Most of the Bear Lake Community falls within the Bear Creek Watershed. The Bear Creek Watershed is part of the larger Manistee River Watershed - covering 1.4 million acres in northwest-lower Michigan, including parts of 11 counties.

The Bear Creek Watershed encompasses 118, 000 acres in both Manistee and Benzie Counties. The Bear Creek Watershed is drained by Bear Lake, which drains into Little Bear Creek. Little Bear Creek drains into Big Bear Creek (Brown Township), then into the Manistee River and on to Manistee Lake. Along the way, Little Bear Creek is fed by Greens Creek, Horseshoe Creek and Little Beaver Creek. At the southern edge of the community, Chief Lake drains into Chief Creek, which drains into the Manistee River.

The northwest portion of Pleasanton Township lies within the Betsie-Platte Watershed. The Betsie-Platte Watershed is drained by Bowens Creek and Lumley Creek which drains into Arcadia Lake and Lake Michigan.

Picture 5.1
Bear Lake

Source: LIAA

The Bear Lake Community also has a number of small ponds and lakes. Bear Lake is the largest lake at approximately 1,800 acres. Other lakes include Chief Lake, Emma Lake, James Lake, Watson Lake, Adamson Lake, Cooper Lake, Glovers Lake and Mud Lake. According to the 2002 Bear Lake Township Comprehensive Plan, Watson Lake and Cooper Lake are thought to be kettle lakes - *Generally, a kettle lake doesn't seem to be connected to a surface water drainage basin and is not connected to any of the Township or County's rivers.* After reviewing several community-wide maps, Grovers Lake and Mud Lake also appear to be kettle lakes.

Groundwater

Groundwater is the exclusive source of drinking water for the Bear Lake Community. Therefore, the Bear Lake Community's groundwater quality is very important to the overall health of the community, future development options and to the quality of the area's water features. According to the 2002 *Wellhead Protection Delineation Report* for the Village of Bear Lake, *the Village's supply wells are completed in an unconfined sandy aquifer. Groundwater in the subject aquifer recharges south of Bear Lake (surface water body) and then flows to Bear Lake.*

Due to the nature of the unconfined aquifer and the relative high ground water elevation, a wellhead protection area (*Bear Lake Wellhead Protection Delineation Report*) has been delineated. This area represents a 10-year *groundwater capture zone* for the supply wells of the Village. In theory, a drop of groundwater (and any contaminants in it) at the far edge of the capture zone would take 10 years to reach the public water supply well. Therefore, contaminants released into the groundwater within the capture zone could threaten the public water supply within 10 years. Map 12a illustrates the soil permeability of the Bear Lake Community. Map 6 illustrates the wellhead protection area for the Bear Lake Community. Methods for controlling the release of contaminants within the *groundwater capture zone*, along with an analysis of the soil permeability of the community were considered and discussed in the development of the goals and objectives of this plan.

Farmland

One of the Bear Lake Community's most valued resources is farmland. In 2005, just over 8,300 acres of the land or about 18% of the community was in agricultural use. According to the USDA soil survey, only a few small areas of the community are considered prime farmland. Map 9a illustrates the Prime Farmland within the Bear Lake Community.

Picture 5.2
Bear Lake Community Farm

Source: LIAA

According to the *2002 Bear Lake Comprehensive Plan*, there are numerous sites ideal for growing cherries, peaches and apples due to their close proximity to Lake Michigan. In addition, there are a number of families involved in cow-calf operations. Farmers in cow-calf operations are growing their own cattle feed including: hay, corn, oats and rye for cover crop. In more recent years, a number of organic farming operations have begun in the Bear Lake Community.

Picture 5.3
Ware Organic Farm

Source: LIAA

The historical significance of farming in the Bear Lake Community is emphasized by the number of Centennial Farms still in operation. According to the Michigan Department of Agriculture Centennial Farm Program, a centennial farm is a working farm of 10 or more acres that has been continuously owned by the same family for at least 100 years. According to the 2002 Bear Lake Township Comprehensive and information received from the Michigan State Historic Preservation Office, there are 13 centennial farms (listed below) in the Bear Lake Community.

Location	First Owner	Date of Purchase
John & Lillian Porter 7332 Chippewa Highway Kaleva, MI 49645	John Baptiste Porter (PaQuin)	7/1/1863
Mabel Schimke Route 1 Bear Lake, MI 49614	Gotleib Schimke	10/18/1866
Hazel Briske Route 1 Bear Lake, MI 49614	James Griswold	11/23/1868
Winston S. Churchill 11058 11-Mile Road Bear Lake, MI 49614	Andres Arner	6/5/1869

Location	First Owner	Date of Purchase
Donovan and Bernice Anderson Route #2 Bear Lake, MI 49614	David Anderson	5/11/1872
Harold and Joyce Johnson 7174 Thorpe Road Bear Lake, MI 49614	Andrew Johnson	7/1/1880
Earl F. and Dorothy Osborn Route #1 Bear Lake, MI 49614	Andrew & Calhevine Arner	4/27/1867
Joel D. and Carol Meister 7901 Anderson Road Kaleva, MI 49645	Daniel and Tillie Meister	4/6/1895
Felix S. and Catherine Gauthier 7616 Adamson Lake Road Kaleva, MI 49645	Frank L. Gauthier Sr.	4/21/1898
Douglas E. and Linda Alkire 8390 11-Mile Road Bear Lake, MI 49614	Micheal Fauble	7/7/1899
	Ludwig Worch	
	Renaldo Norconk	
	Renaldo/Sarah McKinstry Norconk	

Currently, there are no acres of farmland operating under the Farmland and Open Space Preservation Program (PA 116). The Farmland and Open Space Preservation Program allows land owners to enter into an agreement with the state promising to keep the land in agricultural use for a minimum of ten years. In return, the land owners are entitled to certain income tax credits and limits on special assessments.

Other Public Lands

The Grand Traverse Regional Land Conservancy owns and manages several large parcels within northern Pleasanton Township. According to the Conservancy, several parcels will be sold to willing farmers with conservation easements that may allow for agricultural buildings. Additionally, some of the parcels will be preserved to establish a grassland preserve and some parcels will be incorporated into lands already designated in the Arcadia Dunes Preserve. Map 13 illustrates the public lands in the Bear Lake Community

Large Lots

In considering the preservation of natural resources and farmland, it can be helpful to discuss the preservation of large tracts of land (40 or more acres). There are a number of tracts within the Bear lake Community that are 40 or more acres. Map 13a illustrates large lots within the Bear Lake Community. This map was examined and discussed in the development of the goals and objectives of this plan.

Environmental Contamination Sites

The Michigan Natural Resources and Environmental Protection Act (NREPA) 451 of 1994, as amended, provides for the identification, evaluation and risk assessment of sites of environmental contamination in the state. The Remediation and Redevelopment Division (RRD) of the Michigan Department of the Environmental Quality (MDEQ) is charged with administering programs that facilitate the cleanup and redevelopment of contaminated sites. A site of environmental contamination is defined by Public Act 451, as "the release of a hazardous substance, or the potential release of a discarded hazardous substance, in a quantity which is or may become injurious to the environment or to the public health, safety, or welfare."

The agency publishes an annual list of environmental contamination sites under Part 201 by county, showing the sites by name, address, city, source, pollutant(s) and site assessment score. *A Part 201 listed site is a location that has been evaluated and scored by the MDEQ using the Part 201 scoring model. The location is or includes a facility as defined by Part 201, where there has been a release of hazardous substance(s) in excess of Part 201 residential criteria, and or where corrective actions have not been completed under part 201 to meet the applicable cleanup criteria for unrestricted residential use.* This list is available from the MDEQ website and is regularly updated with new information regarding site reclassifications, site additions and site deletions. Table 5.1 provides the 2007 site identification number, site name, location, source, type of pollutant, and SAM Score. Site severity is partially determined by the site assessment model (SAM) score. The score is based upon a 48-point scale with a 48 rating indicating the most hazardous conditions. It should be noted that not every site of contamination that is subject to regulation under Part 201 is listed because owners are not required to inform the MDEQ about sites and can pursue cleanup independently.

Table 5.1 Part 201 Site List

Site ID Number	Site Name	Location	Source	Type of Pollutant	SAM Score
51000002	Chief Road GW Contam	9909 Chief Rd.	Agricultural Production-Crops	1,2 DCP	17 out of 48
51000061	Res. Well 8 Mile Road	8758 8 Mile Rd.	Unknown	1,2 DCP	20 out of 48
51000062	Res. Well Co Rd. Bear Lake Twp.	10395 Linderman Road	Refuse Systems	Benzene; Zn	21 out of 48
51000069	Res. Well Pleasanton Hwy.	13479 Pleasanton Hwy.	Unknown	1,2 DCP; Cl: EDB	21 out of 48
51000086	Res. Well Maidens Road	9237/9276 Maidens Rd.	Unknown	1,2 DCA; 1,2 DCP; EDB	22 out of 48
51000125	Vorbau Estate	13489 Lakeside Avenue	Private Households	Benzene; Ethylbenzene; Toluene; Xylenes; PNAs	15 out of 48
Source: Remediation and Redevelopment Division (RRD) of the Michigan Department of Environmental Quality (DEQ) 2007					

Another category of Michigan Sites of Environmental Contamination includes leaking underground storage tank or LUST sites. According to the MDEQ, open LUST sites are locations where a release has occurred from an underground storage tank system and where corrective actions have not been completed to meet the appropriate land use criteria. According to Michigan State University's Institute for Water Research, "a leakage of two drops per second can result in the loss of up to 500 gallons of fuel per year and can contaminate up to 500 million gallons of water to the level where odor and taste make it unacceptable for drinking." Table 5.2 provides the open LUST sites for the Bear Lake Community. Closed LUST sites and Active & Closed UST facilities are not noted in this plan.

This list is updated regularly and can be downloaded from the MDEQ website: http://www.deq.state.mi.us/sid-web/

Table 5.2 Open Leaking Underground Storage Tanks (LUST) sites

Facility ID	Site Name	Site Address
00011182	Blarney Castle #2	123-48 U.S. 31
00011170	Cooks 66 Service	U.S. 31
Source: Remediation and Redevelopment Division (RRD) of the Michigan Department of Environmental Quality (MDEQ) 2007		

Wildlife

The Bear Lake Community is home to a wide range of fauna, birds, fish and mammals, typical of Northern Michigan. Some of the unusual mammal species seen in the Bear Lake Community are Black Bear, Bobcat, Coyote, and Northern Flying Squirrel. In addition, the Bear Lake Community and Manistee County are home to numerous plants, birds, fish and mammals that are classified under federal and state status. The Nature Conservancy and the Michigan Department of Natural Resources jointly produce and maintain a Michigan Natural Features Inventory (MNFI). The MNFI's mission is to *actively contribute to decisions that impact the conservation of biological and ecological diversity by collecting, analyzing, and communicating information about rare and declining plants and animals, and the array of natural communities and ecosystems native to Michigan.*

As part of this mission, the MNFI publishes an *elements list* for Manistee County that *should be used as a reference of which natural features currently or historically were recorded in the county and should be considered when developing land use plans. Included in the list is scientific name, common name, element type, federal status, and state status for each element.* The following species are just a few of the threatened, endangered or special concern plants and animal species found in Manistee County. A full list can be found in Appendix H.

Common Name

- Cooper's Hawk, *Special Concern*
- Grasshopper Sparrow, *Threatened*
- Migrant Loggerhead Shrike, *Endangered*
- Common Loon, *Threatened*

Picture 5.4
Cooper's Hawk

Source: Patrick Williams
Utah Wings Website

Picture 5.5
Grasshopper Sparrow

Source: Gerhard Williams
Smithsonian, National Zoological Park
Website

Common Plant Name

- Hill's Thistle, *Special Concern*
- Pitchers Thistle, *Threatened*
- Wild-rice, *Threatened*

Picture 5.6
Pitchers Thistle

Source: U.S. Fish & Wildlife Service
Website

Picture 5.7
Hill's Thistle

Source: A.B. Sheldon
Chicago Wilderness Magazine
Website