

4.0 NATURAL FEATURES

Natural features, including soils, geology, topography, water features, and other natural resources, have a profound effect on a community's development. These physical features directly or indirectly constrain or encourage growth; for example, soil types and geology often affect the ability of a community to provide high quality water and wastewater services. The natural resources, such as timber or minerals, which occur in certain areas are often a primary factor in the establishment and growth (or decline) of communities. For instance, many areas in the Upper Peninsula were settled as a result of logging or mining operations in the late 1800s.

These natural features are often interrelated, and disturbance in one area can potentially affect other areas. From a planning standpoint, it is important to understand these interrelationships, and the role that natural features play in determining a community's future development.

4.1 Topography

The physical features of the landscape provide an area with its own unique character. Topography describes this character in terms of elevation above mean sea level. This defines the size and shape of watersheds as well as places to avoid with development because of grades in excess of recommended standards.

Steep topography or slopes of 10 percent (a rise in gradient of more than 10 feet in a horizontal distance of 100 feet) or greater can be aesthetically attractive for residential development as well as some commercial establishments. However, the steep grade increases the likelihood of soil movement or slides, and the weight of structures is an added force which encourages this movement. Beside such dangers, there is an added expense if development occurs on the sloping surface itself. Excavation of the hillside and/or building of retaining walls can greatly increase construction costs. There is also the problem of erosion as the water rushes down the steep grades. Natural water courses provide the pathway for such water and should be maintained in this capacity.

The City of Negaunee contains primarily rolling terrain, with some areas of steep slopes and very few level areas. The elevation in the City ranges from about 1,280 feet above mean sea level in the southeast corner of the City, where Partridge Creek leaves the City as it flows to Goose Lake, to 1,766 feet near the ski jump at the Superior Nordic Training and Recreation Complex (SUNTRAC), formerly known as Suicide Bowl. Steep slopes are located along the north shore of Teal Lake, in the area between U.S. 41/M-28 and CR 492, and in the southwest corner of the City near SUNTRAC. The SUNTRAC area offers a 300-foot change in elevation between the parking lot and the top of the ski jump.

4.2 Geology

Both bedrock and surface geology have an impact on community development. Bedrock geology consists of the solid rock formations found below the soil, which were formed during the early

periods of the earth's evolution. These formations have undergone extensive folding, uplifting, eroding, and weathering during the millions of years which have since passed, and are now overlain by surface geology and soil.

One of the primary factors which makes geology important to a community's development is its ability to supply groundwater. The quality and quantity of groundwater is influenced by the types of bedrock in which it is found, and the layers through which the water passes before it is extracted. Certain types of bedrock increase the potential for groundwater contamination, particularly when such bedrock is close to the surface. Surface runoff is filtered through the soil, sand, and gravel which overlay bedrock, and many contaminants are removed through this filtering process. When bedrock is close to the surface, there is less opportunity to filter out contaminants, and the polluted runoff can enter the groundwater table. If the bedrock is highly permeable, contaminants can quickly enter the same layers of groundwater used for domestic purposes.

The presence of commercially valuable minerals in bedrock is also a factor in land use and development of an area. In areas where minerals or ore are present, communities often exist which are dependent on mineral extraction at least to some extent. Such is the case in Negaunee, where the presence of iron ore was a major factor in the settlement and development of the area.

All of the bedrock underlying the City of Negaunee dates back to the Precambrian era, generally believed to be over 600 million years ago. The oldest formation is made up of volcanic and sedimentary rocks, including mafic-volcanic and intruded felsic rocks that have been metamorphosed into schist and gneiss. Volcanic and sedimentary rocks are found under a small portion of the northwestern corner of the City. Rock formations underlying the remainder of the City are somewhat younger, but still date to the Precambrian era. The majority of the City is underlain by the Negaunee Iron Formation (in the southwest portion of the City) and Siamo Slate and Abijik Quartzite in the southeast and central portion of the City. A small band of Chocoday Group is located in the northeastern corner of the City. These formations consist primarily of metasedimentary rocks like schists, quartzites, iron formations, and gneiss, and date back to the Middle Precambrian (Huronian) era.

All Precambrian rocks found in the Negaunee area exhibit similar water-bearing characteristics. Water in these rocks fills fractures, joints and weathered zones at shallow depths, and often fills abandoned mine shafts or pits. In general, these formations do not provide significant amounts of groundwater. Yields may be greater in areas covered by 20 feet or more of glacial deposits, and in valleys.

The surface geology of the City of Negaunee is primarily a result of glaciation which occurred 10,000-12,000 years ago. As the Wisconsin Continental Glacier moved over the area, existing landform features were obliterated under the weight of ice estimated to be about one mile thick. The surface character of the area has also been influenced by mining activities which have taken place since the area was settled.

Outwash, glacial till-bedrock and wetlands make up the surface geology of the City of Negaunee. Outwash consists of stratified sand and gravel, which was carried by glaciers and deposited as a result of meltwater flowing from glaciers. These deposits commonly are very permeable, and are a good source of ground water. Wells drilled into glacial outwash generally yield over 10 gallons per minute, providing water which is satisfactory for domestic use. Some areas of outwash contain groundwater with a high level of iron. Outwash is primarily located in the central portion of the City, with a small area of outwash along the northeastern boundary of the City.

Glacial till-bedrock includes areas where the movement of the glaciers scoured all or most of the surface material away, leaving bedrock exposed. In some cases a thin layer of till may remain. Availability of groundwater depends on the type of bedrock but is usually poor. Glacial till-bedrock occupies most of the northern half and the southeastern and southwestern corners of the City.

Wetlands are areas of poor drainage and high water tables where an accumulation of muck and peat overlay a glacial lake plain. A small area of wetlands is located in the east central portion of the City.

4.3 Mineral Resources

The City of Negaunee owes its existence to the extensive deposits of iron ore found beneath the area, and many abandoned mines are located in the City. The two remaining active mines in Marquette County are located to the south and southwest, close to the City. Mines which formerly operated within the City included the Mather B Mine, Tracy Mine, Negaunee Mine, South Jackson Pit, Athens Mine, Maas Mine and Cambria-Jackson Mine. Several areas in the undeveloped portions of the City are characterized by caving and unstable ground as a result of past mining activities. Mining and processing methods have changed over the years in order to make it economically feasible to mine relatively low-grade ore. There are many mineral deposits remaining in areas of the Upper Peninsula and elsewhere which contain ores with such low concentrations of iron that mining is currently infeasible. Depending on future technology, demand, and prices, it may become feasible in the future to mine these low-grade ores.

4.4 Soils

Soil occurs at the earth's surface, and generally has a finer texture than the bedrock or surface geology described in the previous section. Most soils in the U.P. have been formed as a result of glacial action, followed by accumulation of organic matter in some areas.

An updated and detailed soil survey has just been completed for Marquette County by the U.S. Department of Agriculture Natural Resource Conservation Service (formerly the Soils Conservation Service). Soils throughout the County have been mapped based on aerial photo interpretation and extensive field work over the past several years. An interim report was issued in December 1997, with the final report expected in 1999. Digital soil maps were released in June 1999.

Over 300 soil mapping units have been identified in Marquette County. These mapping units consist of a single soil type, or a complex containing more than one soil type which responds to development or use in similar ways. Some mapping units will also contain dissimilar soils, such as mapping units which contain areas of rock outcrop too small to be mapped separately. The documentation for the soil survey provides information on the suitability of each of these mapping units for various uses, such as woodland, agriculture, building site development, etc. Various properties of the soil, such as texture, depth to bedrock, permeability, stoniness, droughtiness, etc. influence a soil's ability to support various uses. This information is important to developers, foresters, planners, realtors, farmers, and anyone else concerned with the utilization and development of the land.

From a planning standpoint, some of the most important features of soils have to do with the ability to support residential, commercial or industrial development. In areas not served by municipal water or sewer systems, suitability for septic tank drainfields is a major consideration. Limitations on local roads and streets, and limitations on building construction are also important. It should be noted, however, that although the soils survey is relatively detailed, site inspections should still be used to determine the suitability of a particular site for development. Within any particular mapping unit, areas will exist where limitations are more or less important as a result of terrain or other features too small to be included in this county-wide survey. The areas mapped as "variable" on the maps accompanying this plan are soil mapping units which contain complexes of different types of soils, or areas where the original soils have been significantly impacted by human use, through filling, compaction, leveling, or other means. The limitations on uses within these types will vary too greatly to allow them to be mapped as having slight, moderate or severe limitations. The large areas which are not rated generally include caving grounds and abandoned mines.

Engineering and construction techniques can be used to overcome soil limitations, often at considerable cost. However, the long-term implications of such techniques should be carefully considered, since development in areas of marginal suitability may increase costs to local governments, and thence to taxpayers, in order to provide services to these areas.

Limitations for Septic Tank Drainfields: Soil limitations affect the ability of septic tank drainfields to properly remove contaminants from effluent. Examples of such limitations include soils which are impermeable, and thus do not allow effluent to be filtered through the underlying soil; soils which are highly permeable, and allow effluent to pass through rapidly without proper filtering; areas of shallow bedrock, where there is insufficient soil to support a drainfield; and so on. Site-specific characteristics may mean that a particular site may be suitable for development, however. For example, very sandy soils are generally considered to have severe limitations due to the very rapid permeability of these soils. However, if the sand is very deep, adequate filtering will occur before the effluent reaches the groundwater, and septic systems will operate normally for many years.

The majority of the developed areas of the City of Negaunee are rated as variable, as is typical of urban areas. Fill, paving and excavation have altered the original soils types in these areas to the

point where conditions may vary widely from one site to the next. Since the developed portion of the City is served with municipal water and sewer, however, this is not significant from a planning standpoint. Of more importance is the nature of the soils in the more remote areas of the City, where scattered homes are served by on-site systems. Many of these areas contain severe limitations on septic tank drainfields. The primary limitations are poor filtration, slow percolation, wetness and slope. Although the soil survey would seem to indicate that there are few, if any sites suitable for development in these areas, the actual situation is that many suitable sites exist even in areas with generally severe limitations. Local health departments rely on site-specific testing in determining whether to issue a permit for a septic system. The soils survey information represents a general guideline as to the extent of potential limitations, and should not preclude individual sites from consideration for development.

Limitations for Building Site Development: Soil limitations for building site development include the presence of shallow bedrock which can make construction of basements difficult; wetness, which can result in wet basements or unstable support for foundations; or steep slopes, which increase the potential for structures to slide. Outside the developed areas of the City, the majority of the soils have severe limitations on building site development; however, there are some areas with only moderate limitations along existing roads and streets, such as Buffalo Road, Miller Road, and Rolling Mill Road. Some areas have differing limitations depending on whether or not basements are used; for example, a soil type characterized by shallow bedrock may be suitable for construction of a building without a basement, but the costs of constructing a basement may be prohibitive. As noted above, specific sites, even within areas mapped as having severe limitations, may be suitable for development.

Limitations for Local Roads and Streets: Local roads and streets are those with an all-weather surface, designed to carry automobile and light truck traffic all year. Construction and maintenance of roads and streets is affected by a soil's shrink-swell potential, frost action potential, depth to bedrock or water table, and slope. The majority of the City contains soil types with severe limitations; however, significant areas with only moderate limitations exist. The largest areas with moderate limitations are in the southeast portion of the City, along Rolling Mill Road, Miller Road, Makinen's Road and Buffalo Road. Moderate limitations also exist along U.S. 41/M-28 southwest of Teal Lake, along Maas Street and Old Cemetery Road, and near BR M-28. As with other soil constraints, construction techniques are available to overcome many of the limitations of the underlying soils. However, such techniques are often costly, and roads which are built over unsuitable soils generally require more frequent maintenance.

4.5 Water Features

The most significant water feature in the City of Negaunee is Teal Lake. Formerly used as the City's municipal water source, Teal Lake has remained largely undeveloped in order to protect water quality. A Teal Lake Park Master Plan has been completed, and the overall intent is to provide recreational opportunities and the opportunity for some development, while still protecting the unique visual character of the lake. The cities of Ishpeming and Negaunee have received grant funds from the Michigan Department of Natural Resources to acquire a large

parcel of land encompassing the lake's north shore, and the City of Negaunee is planning to implement a 100-foot setback requirement around the lake to protect the character of the shoreline.

Other water features in the City include Lake Miller, Gunpowder Lake, Rolling Mill Pond and some ponds that have formed in caved-in mining areas. The Carp River flows through the northeast corner of the City, and Partridge Creek flows through the southeast corner of the City on its way to Goose Lake.

4.6 Wildlife

The area surrounding the City of Negaunee, as well as the undeveloped portion of the City, contains a large variety of wildlife species. Mammals found in northern Marquette County include whitetail deer, moose, black bear, fox, coyotes, wolves, and a variety of small game. Birds include game birds such as ruffed grouse and woodcock, waterfowl, raptors and songbirds. Within the developed portions of the City, small mammals and songbirds are the most frequently encountered species. Teal Lake supports populations of walleye, perch, bass and panfish, and many species of waterfowl and other birds stop at Teal Lake during seasonal migrations.

4.7 Climate

The climate in and around the City of Negaunee is heavily influenced by Lake Superior, with long, cold winters and relatively cool summers. The lake helps keep temperatures cool in summer and is responsible for significant amounts of "lake effect" snow in winter. This "lake effect" snow results from cool air masses traveling over the relatively warm waters of Lake Superior. When these air masses reach the cooler land areas, the moisture picked up from Lake Superior is deposited in the form of snow. The average annual snowfall at the Marquette County Airport is 172.2 inches, although the last two winters have produced record snowfalls of 251 inches in 1995-96 and 272 inches in 1996-97. The mean monthly temperature ranges from 14 degrees Fahrenheit in January to 66 degrees Fahrenheit in July, with a mean annual temperature of about 41 degrees Fahrenheit. Total precipitation averages approximately 32 inches per year, with the wettest month in June and the driest month in February.

The growing season averages about 109 days. The last frost in the spring usually occurs about May 31, and the first frost in fall usually occurs about September 17. Incidence of thunderstorms is around 26 days per year. Michigan is located on the northeast fringe of the Midwest tornado belt. Between 1950 and 1987, only four tornadoes occurred in Marquette County.

4.8 Issues and Opportunities

Areas of steep slopes within the City may limit certain types of development, but may also provide the opportunity for scenic views and recreational facilities.

Many areas within the City are unsuitable for development due to caving which has occurred as a result of past mining activities. Although these areas are largely undeveloped and remain in mining company ownership, they pose a potential safety hazard, and limit the amount of land available for future development.

The unique beauty and undeveloped nature of Teal Lake offer the opportunity to provide recreational opportunities for local residents and tourists, while enhancing the appearance of the area. Protection of the undeveloped character of the north shore of the lake is critical.

Negaunee's long, cold winters and relatively cool climate can make travel difficult at times, and limit the suitability of the area for various agricultural crops, home gardens, etc. The long winters and heavy snow provide excellent winter recreation opportunities, however, including skiing, snowmobiling, ice fishing, etc.