



# Traverse City Environmental Stewardship Assessment 2012



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**Northwest Michigan  
Council of Governments**

Workforce • Business • Community

## Acknowledgements

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Michigan's Office of the Great Lakes leads policy development and implements programs to protect, restore and sustain our most precious natural resource. The office collaborates with partners to support sustainable use of these coastal resources, coordinate restoration of severely degraded areas, manage water quality and quantity, prevent aquatic invasive species and engage in emerging issues. We are committed to our Great Lakes mission to ensure a healthy environment, strong economy and high quality of life.

**2012**

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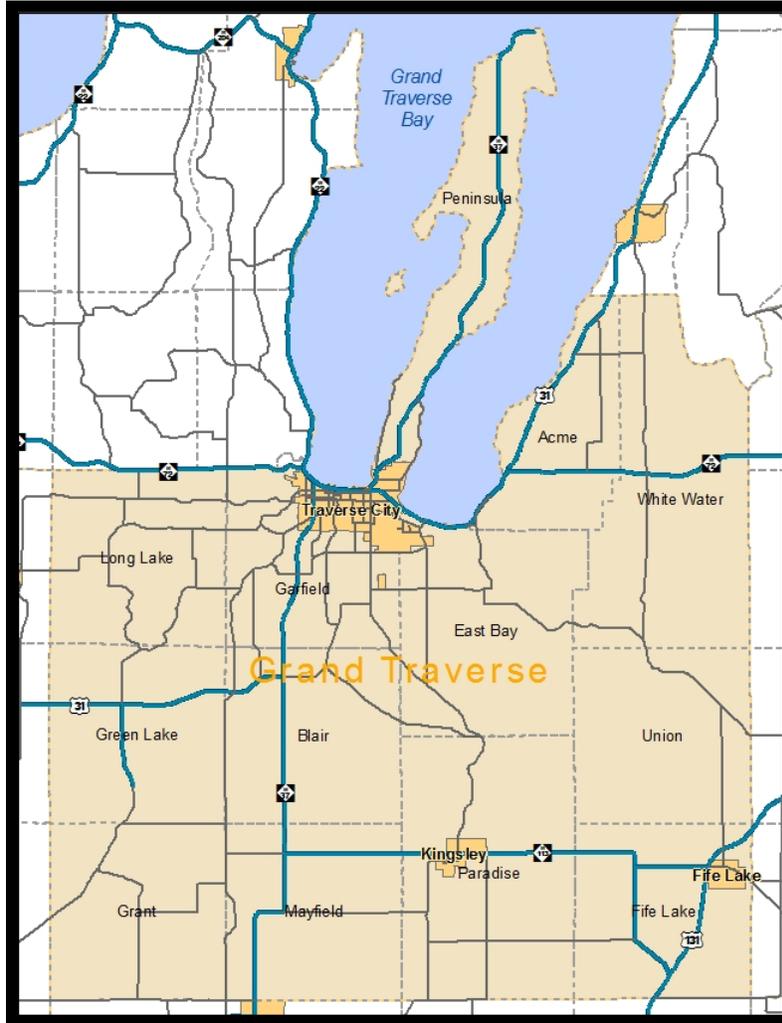
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# Grand Traverse County Map



# I. Introduction

## Environmental Stewardship and Economic Opportunity in Northwestern Lower Michigan's Coastal Cities and Villages

The Northwest Michigan Council of Governments received a grant from the Michigan Coastal Management Program to implement environmental stewardship and economic opportunity in the eleven coastal communities on Lake Michigan in the Northwest Michigan Council of Governments' region. The project work included assessing the current level of coastal environmental stewardship and then provided additional education for the communities on best management practices that would enhance and protect the natural resources. The communities will then learn how the health of the natural resources plays a key role in future economic development strategies in the region.

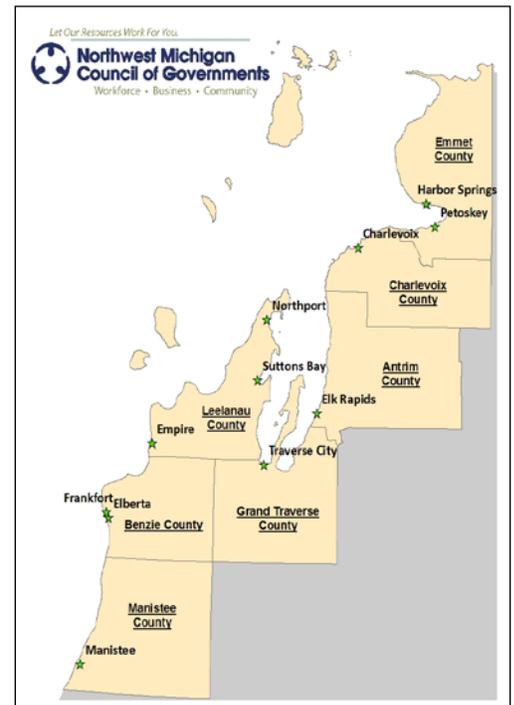
The eleven (11) coastal cities and villages included:

- City of Harbor Springs (Emmet County)
- City of Petoskey (Emmet County)
- City of Charlevoix (Charlevoix County)
- Village of Elk Rapids (Antrim County)
- City of Traverse City (Grand Traverse County)**
- Village of Suttons Bay (Leelanau County)
- Village of Northport (Leelanau County)
- Village of Empire (Leelanau County)
- City of Frankfort (Benzie County)
- Village of Elberta (Benzie County)
- City of Manistee (Manistee County)

The approach of community engagement and content of the training programs for this project fundamentally promoted principles of sustainable development.

### Essential Elements of the Project

- Perform stewardship assessments for each coastal city and village to benchmark the current level of environmental stewardship of the natural resources and the overall community health.
- Develop and provide educational programs for city and village officials and staff, citizens, agencies, economic development organizations, businesses and local organizations that focused on strategies and resources that optimize local environmental quality and on the value, benefits and strategies associated with leveraging an environmentally healthy coastal community to increase sustainable economic opportunities, create a sense of place, and attract and retain talent.
- Provide technical assistance to each community to help them adopt policies and implement actions to protect and enhance environmental quality and create and implement sustainable place-based economic development strategies.
- Create a regional report that provided the environmental quality benchmarks and stewardship status of each coastal community, accompanied by a one-stop-shop of coastal best practices and relevant sustainable economic development strategies that can be leveraged from a high quality coastal resource base. Also, create a general implementation strategy for the best management practices.



## II. Community Profile: Traverse City

### ◆ HISTORY

Ancient glaciers carved the long deep lakes and dramatic hills that give Traverse City and its surrounding communities their splendid natural setting. But this beautiful region is much more than the sum of its scenic and recreational qualities. It is a place rich with human history, where generations of Native Americans and missionaries, lumberjacks and fishermen, mariners and farmers all left their imprint on the landscape and helped create a colorful and vibrant culture that can still be experienced today.

Indian hunters and French traders were the first people to spend time here, and it was they who gave the region its name – La Grand Traverse, because of the “long crossing” they had to make by canoe across the mouth of the bay. But even the native Ottawa and Chippewa people didn’t settle here permanently until the early 18th century.

In 1839 the Rev. Peter Dougherty established the area’s first permanent settlement, an Indian mission at the tip of the Old Mission peninsula, and soon other settlers followed.

By 1847 a small sawmill operation had been established on the banks of the Boardman River, and soon it became the nucleus of a growing company town led by Chicago businessmen Perry Hannah and Tracy Lay. In 1852 the new settlement was christened Traverse City -- but until the first road through the forest was built in 1864 it remained a remote outpost, accessible only by water.

The development of manufacturing and agriculture – potatoes, apples, and eventually cherries – spurred the community to press for railroad service, which came to Traverse City in 1872. In 1885 Traverse City was designated as the site of the Northern Michigan Asylum, which became one of the city’s major employers and eventually housed a population several times larger than that of the town itself.

By the end of the 19th century, Traverse City was also attracting large numbers of summer visitors, who flocked by train and steamship to enjoy the region’s cool temperatures, clean air and water and scenic beauty. They are still coming today, and tourism has grown to become the area’s main economic mainstay.

But reminders of the past are everywhere, from lonely lighthouses and humble mission churches to grand homes whose owners made their fortunes shipping timber from the region’s vast forests.

(Source: Traverse City True North: Historical Sites, Copyright 2012, <http://www.traversecity.com/historical-sites-75/>)

### ◆ CLIMATE

Traverse City, located in north central Grand Traverse County of the Northwest Lower Climatic Division, is at the south end of the west arm of Grand Traverse Bay. The Old Mission Peninsula extends northward between the west arm and the east arm of Grand Traverse Bay about 15 miles, with the Bay itself opening into Lake Michigan about 30 miles north of Traverse City. The surrounding terrain is hilly and soils are predominantly sandy loam.

The lake effect on Traverse City's climate is quite strong during much of the year. The lake effect increases cloudiness and snowfall during the fall and winter and also modifies temperatures, keeping them cooler during the late spring and early summer, and warmer during the late fall and early winter. In the late winter as ice builds up on Grand Traverse Bay and Lake Michigan, Traverse City is subjected to temperature

variations which are more closely associated with interior locations. Cherry orchards are found on the Old Mission Peninsula and on many of the hillsides along the east shore of the east arm of Grand Traverse Bay where prevailing westerly winds and the cold lake water is most effective in modifying the climate. Diminished wind speeds or winds which do not traverse large unfrozen lakes often produce clearing skies and the colder temperatures expected at continental locations.

Because the day-to-day weather is controlled by the movement of pressure systems across the nation, this area seldom experiences prolonged periods of hot, humid weather in the summer or extreme cold during the winter. Long-term wind and humidity records are not available for this location, but these data should be similar to the following values which were observed at the National Weather Service Office in Houghton Lake. The prevailing wind is westerly, averaging 9 mph. The strongest one-minute wind speed, 40 mph, was recorded in June 1969 and January 1972. The average 1 P.M. relative humidity varies from 51% for May to 78% for December, and averages 63% annually.

Summers are dominated by moderately warm temperatures with a 1951-80 average of 9 days exceeding the 90 F mark. During the same period 5 days in 3 different years were 100 F or higher. The lake influence was reflected in the minimum temperatures; an average of 164 days was 32 F or lower, an average of 13 days was 0 F or lower, and no year stayed above 0 F. The highest average monthly maximum temperature of 87.3 F was recorded July 1955, and the lowest average monthly minimum temperature of -1.5 F was recorded February 1979. The following temperature extremes, based on the time period of this station's published record, are: maximum, 105 F, recorded July 7, 1936; minimum, -37 F, recorded February 17, 1979; warmest monthly mean, 75.3 F, recorded July 1955; and coldest monthly mean, 9.2 F, recorded February 1979.

Heating and cooling degree-day data are used as an index of the heating and cooling requirements for buildings which are proportional to the number of degree-days. Heating degree-days for a single day are obtained by subtracting the mean temperature from 65 F when the mean temperature is below 65 F. Cooling degree-days for a single day are obtained by subtracting 65 F from the mean temperature when the mean temperature is above 65 F. Each are then summed to yield monthly totals. The average heating degree-days for January was 1396 while October was 490. The average cooling degree-days for July was 157 while May was 20.

Based on the 1951-80 period, the average date of the last freezing temperature in the spring was May 24, while the average date of the first freezing temperature in the fall was October 3. The freeze-free period, or growing season, averaged 132 days annually.

Precipitation was well distributed throughout the year with the crop season, April-September, receiving an average of 17.55 inches or 59% of the average annual total for the 1951-80 period. During this same period the average wettest month was September with 3.60 inches, while the average driest month was February with 1.41 inches. The following precipitation extremes, based on the time period of this station's published record, are: greatest published 24-hour total, 4.30 inches, recorded August 22-23, 1898; greatest monthly total, 10.78 inches, recorded May 1942; and least monthly total, 0.00 inches, recorded March 1889.

Summer precipitation comes mainly in the form of afternoon showers and thundershowers. Annually, thunderstorms will occur on an average of 31 days. Michigan is located on the northeast fringe of the Midwest tornado belt. The lower frequency of tornadoes occurring in Michigan may be, in part, the result of the colder water of Lake Michigan during the spring and early summer months, a prime period of tornado activity. During 1950-87, Michigan has averaged 15 tornadoes each year. During this same period, 4 tornadoes occurred within the county.

The 1950-51 through 1979-80 average seasonal snowfall was 87.0 inches. During this period, 112 days per season averaged 1 inch or more of snow on the ground, but varied greatly from season to season. The following snowfall extremes, based on the time period of this station's published record, are: greatest observation-day total, 14.4 inches, recorded December 16, 1972; greatest monthly total, 57.9 inches, recorded January 1982; greatest seasonal total, 136.9 inches, recorded during 1984-85; least seasonal total, 30.8 inches, recorded during 1936-37; and greatest snow depth, 50 inches, recorded February 26, 1904.

Evaporation data from the Class "A" pan were not available for this station, but these data should be similar to those observed at Lake City. During 1960-80, the pan evaporation for May through October exceeded the average precipitation by 55%. Therefore, soil moisture replenishment during the fall and winter months plays an important role in the success of agriculture for this area. While drought occurs periodically, the Palmer Drought Index indicated drought conditions reached extreme severity only 2% of the time.

**Station History of Traverse City** - Observations began on November 20, 1872 and continued through January 1877. The station was re-established in January 1882. The earliest published records for this station are for January 1882. On June 1, 1896 the station was located at the GR & I Railroad Station. The exact locations of the above stations are unknown. On July 7, 1927 the station was moved to the Water Works Plant, 0.5 mi. NW of the post office (PO). On April 8, 1941 the station was moved to the Municipal Airport, 2.5 mi. SE of the PO. The station has been at this location to the present.

(Source: Michigan State Climatologist's Office)

## ◆ GEOLOGY

### **Overview of Michigan's Geology**

The geology of the State of Michigan is dominated by the Michigan Basin, which is an elliptical, intracratonic basin nestled against the southern margin of the Canadian Shield. The Basin occupies approximately 80,000 square miles, and the sedimentary rocks in the Basin, which are predominantly Paleozoic in age, reach a maximum thickness of 16,000 feet.

The Michigan Basin covers all of Michigan's Lower Peninsula and the eastern half of the Upper Peninsula. Strata from Middle Cambrian through Upper Pennsylvanian Periods are well represented throughout the subsurface as seen in the many oil and gas wells drilled throughout the Basin. There are also limited outcrops throughout the Basin, especially at the margins near the Great Lakes. Most of the rocks of the Michigan Basin are buried beneath thick deposits of Pleistocene glacial drift that are the only Cenozoic deposits known from the Basin. These sands, gravels, and clays are stacked in complex facies relationships and control the patterns of topography seen in much of the Basin. Beneath this veneer of glacial sediments is the eroded bedrock.

Natural resources abound in the Michigan Basin. Oil and natural gas have been produced from subsurface formations in the Basin in Michigan, Ohio, Indiana, and southwest Ontario. Almost 2 billion barrels of oil and 10 trillion cubic feet of natural gas have been produced since the late 1800s. Underground mines near Detroit have produced large quantities of rock salt from Silurian-age evaporite deposits. Solution mining of these salts has occurred nearer the Basin center. Large amounts of potash, bromine, sodium, and chloride have been solution mined from these layers. Limestone, dolomite, and gypsum have been extensively mined from surface quarries in the outcrop areas. Sand and gravel for construction and clay for ceramics and bricks are mined statewide from surficial glacial deposits.

The Great Lakes of Michigan, Huron, and Erie represent the greatest fresh water resources in the region. Along with Lakes Superior and Ontario (which are not geologically part of the Michigan Basin), these five

Great Lakes comprise the largest accumulation of fresh water on the earth's surface. There are also vast volumes of fresh water in the glacial drift and shallow bedrock throughout the Basin. The Great Lakes owe their origin to the erosional processes of lobes from the Laurentide ice sheet. The moving ice scoured the areas of softer bedrock, commonly composed of shales.

### **Quaternary Geology**

**Formation of the Great Lakes Basins** - Episodic glaciation was the major process responsible for creating the Great Lakes basins; however, bedrock (type and distribution), regional structure and paleo-drainage patterns have all influenced the present-day configuration.

The watershed can be divided into two regions. The northern upland region (the Canadian Shield) is underlain by Precambrian granites, gneisses, and metavolcanic and metasedimentary rocks. The southern lowland region (the Michigan Basin) is underlain by relatively soft, Paleozoic sedimentary rocks. These rocks all dip toward the center of the state of Michigan into the structural basin. These rock layers appear as a series of stacked bowls with their truncated edges forming a circular pattern encompassing and forming the state of Michigan (much like a bull's-eye). This region includes the Lake Erie, the Lake Michigan, the western portion of the Lake Huron, and a portion of the Lake Ontario basins. Glacial erosion has scoured out these lake basins following the circular, structural pattern where the Paleozoic rocks crop out at the surface around the Michigan Basin. Here, the pattern is much more controlled and better developed than that formed by glacial erosion on the Canadian Shield granite, gneisses, and metasedimentary rocks. This difference is particularly apparent when observing the semi-circular shape of the western portion of Lake Huron carved out of the Paleozoic rocks, in comparison to the more random shape of the eastern portion (Georgian Bay) glacially scoured from the Precambrian Shield. This semicircular pattern is reflected in the curvilinear shape of Lake Michigan to the west and Straits of Mackinac to the north. The Great Lakes basins simply conform to the outcrop pattern of the soft limestones and shales of Upper Silurian, Ordovician, and Devonian age.

The Great Lakes watershed was subjected to long-term subaerial erosion prior to Quaternary glacial events. Glacial ice was then channeled through the region by this pre-existing drainage system. Relatively weak bedrock, already exploited by valleys of the paleo-drainage system, was increasingly scoured and eroded, thereby exerting one more control upon the formation of the present-day landscape. Glacial scouring varies considerably from lake to lake. The floor of the northern portion of Lake Michigan tends to be somewhat irregular.

Glacial sediments, often greater than 165 feet (50 meters) thick, and in places over 1,150 feet (350 meters) thick, blanket the region. Broad, low, glacial moraines and a few Paleozoic bedrock escarpments provide moderate relief. Quaternary glacial sediments also occur in the basins, often exceeding 330 feet (100 meters) in thickness. These glacial sediments indicate that the present-day Great Lakes Basins are the product of both glacial erosion and post-glacial deposition.

**Glacial Events** - The glacial history of the Michigan Basin is very complex. Six major ice sheets advanced across the Michigan region probably beginning as early as 2.4 million years ago. The last two advances are the Illinoian and Wisconsinan events. Illinoian events are inferred from deposits found primarily in Illinois. Warm conditions much like today, in a period 125–179 thousand years ago known as the Sangamon interglaciation, existed between the Illinoian and Wisconsinan glacial events. The last glacial episode, the Wisconsinan advance of the Laurentide Ice Sheet, is well documented throughout the Michigan Basin. Three separate sublobes of this last glacial ice sheet advanced and retreated across the Basin (the Michigan, Saginaw, and Erie Lobes).

Wisconsinan glaciation began sometime between 65 and 79 thousand years ago. Glacial ice first invaded

the eastern section of the Great Lakes watershed where the ice margin oscillated until approximately 25 thousand years ago. During this time, a boreal forest-tundra environment covered most of the western portion of the watershed (the Michigan Basin). After 25 thousand years ago, the ice sheet advanced from both the north and the east, overriding the western forest-tundra landscape, and covered the entire watershed. Ice eventually reached the Ohio River to the south and northern Wisconsin and east central Minnesota to the west. The ice front fluctuated there for nearly 4,000 years. After 18 thousand years ago, the ice margin began to retreat, but experienced a series of re-advances. Ice finally continued its retreat about 10 thousand years ago, and the watershed was completely ice-free by 9 thousand years ago.

**Glacial Lakes** - Large, glacial, ice-margin lakes (proglacial lakes) were developed during each retreat of the ice sheet. These lakes filled the newly scoured Great Lakes basins. The northern margin of each lake was established by the southern edge of the glacial ice sheet. The extent and elevation of these lakes varied as outlets were blocked by ice or uplifted by isostatic rebound. New outlets formed as rising lake levels found new low spots through ridgelines. Channels were eroded and downcut or melting ice re-opened old channels. Occasionally, catastrophic influx of water from neighboring glacial lakes left a legacy of lake sediments, abandoned spillways and channels, wave-cut cliffs, beach ridges, deltas, and abandoned shorelines. Some of those old shorelines can still be traced from one lake basin to another.

Fed by glacial meltwater during ice retreats, these lakes expanded, often to the point where they merged with one another. Conversely, the lakes contracted as water levels fell due to the opening of new drainage channels, or as glacial ice once again advanced through the various basins of the watershed.

The Lake Michigan Basin became ice free early in its history. Ice retreated from the southern portion of the basin about 16 thousand years ago, and the first of a series of proglacial lakes formed. This early lake, termed Lake Chicago, expanded and contracted in conjunction with a series of glacial retreats and re-advances. Glacial Lake Algonquin formed approximately 12 thousand years ago as ice retreated, the Straits of Mackinac opened, and Lake Chicago (Kirkfield Stage) expanded and merged with waters occupying the Huron Basin. Eventually, with continued ice retreat, waters in the Lake Michigan Basin joined those of Superior and Huron to form glacial Lakes Nipissing and Algoma.

High rates of bluff erosion, development of strong cliffs, and formation of very large sand dunes occurred in association with the Lake Nipissing Great Lakes stage. Mt. McSuba, just east of Charlevoix, is an example of these large Lake Nipissing dune fields. Sleeping Bear Dune, north of Frankfort, Michigan, is partially glacial moraine and outwash deposits covered by windblown sand dunes formed during this same time.

**Glacial Landscapes** - Glacial landscapes in Michigan result from two opposing processes: deposition and erosion. Thick deposits of glacial debris capped by associated depositional landforms blanket the entire Lower Peninsula of Michigan and the eastern portion of the Upper Peninsula.

**Erosional Glacial Landforms** - Glacial erratics (of Precambrian age), carried by the glacial ice southward into Michigan from the Canadian Shield, are found in glacial deposits throughout the state. Boulders of Banded Iron Formation (BIF) and pieces of native copper from the Upper Peninsula are occasionally found in Lower Michigan. Although fairly rare, they are easily spotted because they are so distinctive and tend to stand out from the drab sands and gravels. More commonly, rounded pebbles of gray and pink granite, derived from the Canadian Shield, are found in the gravels deposited throughout the Michigan Basin.

Most of the Michigan Basin is blanketed by glacial deposition in the form of diamictons (formerly termed "glacial tills") and glacial outwash. Landforms, such as drumlins and moraine systems, are composed of diamictons deposited directly from the glacial ice. Diamictons are unsorted and unstratified deposits composed of a heterogeneous mixture of materials in all shapes and sizes.

Outwash, on the other hand, is a very general term applied to sorted and stratified deposits laid down by glacial meltwaters. Depositional glacial landforms such as kames, kame terraces, eskers, and ice-channel fillings are indicative of ice-contact and outwash deposition. Landforms such as outwash plains and valley trains, pitted outwash plains, kettles, and kettle lakes usually indicate deposition near the ice but farther removed from the immediate ice front.

**Diamicton and Drumlins** - Numerous, well developed drumlins can be observed along both sides of Grand Traverse Bay. Drumlins in Charlevoix and Antrim Counties, just north of Torch Lake, trend south-southwest, indicating the direction of the ice movement. U.S. Route 31 follows the length of two drumlins between Torch Lake and Charlevoix. The exposed interior of these drumlins is composed of unsorted, unstratified clay and boulder diamicton (till).

**Moraines** - Moraine systems are the most prominent landscape features across Lower Michigan. Three major ice lobes advanced across Michigan during the Wisconsin glacialiation. These advancing ice masses took on lobate forms, fanning outward in radial patterns along their fronts as glacial ice was channeled through the pre-existing Great Lakes Basins. The Michigan Lobe advanced southward through the Lake Michigan Basin. The Saginaw Lobe advanced southwestward as it was channeled through the Saginaw Bay area. The Erie Lobe advanced westward as it was funneled through the Lake Erie Basin. These three lobes advanced into northern Illinois, Indiana, and Ohio, developing a pronounced terminal moraine (the Cary Border) approximately 16 thousand years ago. The state of Michigan was covered by thousands of feet of ice during this time. Retreat from this position lasted until about 13.5–13.2 thousand years ago, depositing a series of recessional moraines of “Cary” age. The prominent Valparaiso Moraine and Lake Border Moraine that parallel the Lake Michigan coastline through western Michigan, Indiana, Illinois, and Wisconsin formed during this time.

These moraines took on the form of rolling ridges of diamicton and poorly sorted sediments laid down as ice contact deposits, grading into sloping wedges of outwash deposits farther away from the ice front. Minor re-advances interrupted the retreat, often smearing out and re-working the just-deposited recessional moraine system as the advancing ice moved over it.

The last major advance of Wisconsin glacial ice occurred 11,800 thousand years ago (termed the Valdres stadial). Ice, advancing from the north through the Lake Michigan Basin, picked up large quantities of red silt and clay from the Lake Superior Basin (evidence that the Lake Superior Basin must have been a proglacial lake prior to this event) and from the Precambrian iron formations of the Upper Peninsula. The resulting Valdres-aged moraines and diamicton deposits, all of which lay north of the older Port Huron Border, are a distinctive red color as a result. This Valdres ice advance is also responsible for the formation of the drumlins located in Leelanau and Charlevoix counties.

**Proglacial Outwash and Valley Trains** - Proglacial outwash is deposited as a sloping, apron-like fan of meltwater laid sediments out in front of an ice-contact recessional moraine being deposited along the ice lobe. Most recessional moraines throughout Michigan occur in association with proglacial outwash aprons that were initially deposited away from the glacial margin. The term “valley train” is applied to these sloping proglacial aprons when they are confined within valley walls. Good examples of valley trains can be observed in the valley extending from Mancelona to Kalkaska, Michigan.

**Pitted Outwash, Kettles, and Kettle Lakes** - Outwash sediments are frequently laid down around separate blocks of stagnant ice left in front of the retreating ice sheet. Large depressions in the outwash plain result when these ice blocks finally melt. These depressions are termed kettle holes, and the resulting outwash fan, pock-marked by a number of kettle holes, is termed a pitted outwash plain. Kettle holes become kettle lakes when they fill with water. Most of the numerous, small, inland lakes throughout Michigan are ket-

tle lakes, and are associated with pitted outwash plains.

**Modern-Day Geologic Processes** - The geologic history of the Michigan Basin does not end with the retreat of the most recent glaciers. Rather, landscape development is an evolutionary, ongoing process. For example, several distinct types of shorelines exist along the Great Lakes.

High dolomite cliffs are common along the Lake Huron and Lake Michigan shorelines wherever they intersect the Niagaran Series of rocks. The eastern margin of the Door Peninsula, the Garden, Bruce, and Presque Isle Peninsulas, and the western margin of Manitoulin Island are examples of such areas. Rocky headlands and small pocket beaches composed of rounded limestone gravel and sand are found along these shores. Bluffs cut into glacial sediments are especially prominent along the southeastern shore of Lake Huron, the central section of Lake Michigan, and the shores of Lake Erie.

**Erosional Shorelines** - Coastal bluffs, composed of glacial sediments, are subject to erosion. Low lake levels, as experienced during recent years, have greatly reduced the rate of slope failures along the Michigan coastline. Also, water content of bluff materials is a major controlling factor. Bluff stability is greater, displaying little to no slope movement, during dry periods when water tables are low.

### **Depositional Shorelines**

**Sand Dunes** - Beaches along the shores of the state of Michigan are some of the best-developed, quartz-rich, sand beaches in the world. Numerous areas of irregular sand accumulations and dune fields occur well inland from current lake shorelines. These areas originated in conjunction with earlier proglacial lakes standing at much higher elevations, and are generally the oldest dunes in the state of Michigan.

Inland, high dunes are common along all the shorelines that ring the state of Michigan. Many of these high dunes are related to high-water levels of Early Glacial Lake Nipissing (9 -2.2 thousand years ago). Along the western side of the state, many of the inland, high dunes are related to the high stages of Glacial Lake Chicago that occupied the Lake Michigan Basin. Generally, these inland dunes are no older than about 13,000 years. They were stabilized by vegetation long ago and are no longer sites of extensive dune growth.

Coastal dunes are younger than inland dunes, having formed along the modern Great Lakes shoreline. They are generally less than 4,500 years old, and are mainly related to Late Glacial Lake Nipissing water levels. Coastal dunes can be divided into two categories. Foredune ridges are low dunes (30–50 feet) that are found close to the water's edge. High dunes (greater than 100 feet) are generally found slightly farther inland behind the foredunes. High dunes may also be found at the water's edge in a few instances. Some of the older high dunes may have been deposited on the tops of glacial moraines and outwash deposits during periods of higher lake levels. These are termed perched dunes. Sleeping Bear Dune is just such a complex, standing 450 feet above the current Lake Michigan water level. Perched dunes tend to be less thick than other foredune types.

Foredunes are the youngest and most active dunes along the Michigan coast. Blowouts occur where dunes lack the stabilizing effects of vegetation. Sand is blown from the windward side of the dune, up and over the crest, to be deposited on the dune's lee side. The dune is observed to "march inland" as this process continues. However, the coastal dunes eventually stabilize as (1) they move away from the beach; (2) the source of sand supply diminishes; (3) they become more protected from the shore winds; (4) they encounter the fronts of the inland high dunes; and (5) vegetation takes hold and provides stabilization.

**Beach Ridges** - Many beaches along Michigan's shores are marked by a series of recessional beach ridges. These ridges, composed of gravel and coarse sands, were formed along the shorelines by progressively dropping glacial lake water levels. Sets of beach ridges can be observed along the Lake Michigan shoreline

in the Sleeping Bear National Lakeshore. Examples can be found between Platte Lakes and the Lake Michigan shoreline evidenced by the closely spaced lines of trees parallel the present-day shoreline. These tree lines reflect former beach ridges, where sediments that favor tree growth have accumulated.

**Hooked Spits** - Sands necessary for the growth of spits and mid-bay and bay-mouth bars are supplied as beach drift. This beach drift develops as longshore currents erode sands from the beaches they are moving along.

Sand bars and spits grow as beach drift, moving along a shoreline, is deposited into an open embayment as it attempts to extend the beach. Waves, coming into the embayment from offshore, redistribute sediments near the end of the spit, carrying those materials farther into the as the end of the spit “bends” around toward the inner shore of the embayment.

**Mid-Bay and Bay Mouth Bars** - Waves, longshore currents, and wind action constantly re-shape the shorelines of Michigan. The Upper and Lower Herring Lakes, located in Benzie County about 6 miles south of Frankfort, are good examples of such evolving shorelines. The two lakes lie within a U-shaped depression. This depression is enclosed on the north, east, and south by the Manistee Moraine, but was originally open toward the west as an embayment to Lake Michigan. During late Lake Algonquin time, mid-bay bars developed within the embayment. These bars isolated Upper Herring Lake in the mid-eastern portion of the embayment and another small basin in the very eastern section. This eastern basin was a short-lived lake and is now filled with sediment and vegetation.

The remaining western portion of the embayment drained during the early stages of Glacial Lake Nipissing, but during late Nipissing time, the embayment was once again flooded. During post-Nipissing times, the current bay-mouth bar formed, isolating Lower Herring Lake in the western portion of the embayment. Eventually, during recent times, low foredunes developed on top of this bar and adjacent shorelines. Presently, the two Herring Lakes are isolated from Lake Michigan, being drained only by narrow Herring Creek that cuts across the mid-bay and bay-mouth bar systems.

Crystal Lake, located immediately north of Frankfort, formed in a similar manner. The area originally occupied a topographic low, situated between two east-west trending glacial moraines, and opened to Lake Michigan to the west. Development of a bay-mouth bar isolated the embayment, and complete closure was assured as dunes related to Glacial Lake Nipissing covered the bar.

### **Geology of Water Resources**

**Groundwater** - Michigan is very fortunate, mostly due to its glacial heritage, that high quality water resources abound throughout the state. The majority of Michigan’s water wells tend to be shallow, and can easily be pumped from surficial sands and gravels deposited by glaciers. Much of the groundwater in the Lower Peninsula comes from these glacial deposits, and is “hard” due to the lime (CaCO<sub>3</sub>) held in solution. Gravels buried beneath impermeable glacial drift in Michigan are responsible for numerous artesian water systems.

**Karst Topography** Although Michigan is not normally thought of as a region of caves and karst topography, there are limited areas within the state where these conditions do exist. Paleozoic carbonates, now near the surface and only buried by a thin veneer of glacial debris, are readily susceptible to dissolution and karst development.

### **Surface Water**

**Rivers** - The surface topography of Michigan is primarily the result of glacial events, the last of which ended only 13 to 9 thousand years ago. Therefore, rivers and streams have played a somewhat limited role in

the development of Michigan's landscape.

**Deltas** - Delta growth, where rivers enter standing bodies of water, is an important means of delivering sediments into these glacial lakes.

Many of the delta systems built into earlier glacial lakes have been rejuvenated as water levels dropped and/or as isostatic rebound raised the delta complexes in relationship to the water surface. Distributaries incised the delta floodplains attempting to maintain grade. This has resulted in newly incised river valleys cutting through older, broad, now terraced, deltaic, floodplain deposits.

**Inland Lakes** - The natural beauty of Michigan is in large part due to the hundreds of inland lakes found throughout the state. Kettle lakes abound and are the most common type of all Michigan's inland lakes.

Other lakes, primarily found in the northern portion of the Lower Peninsula, formed in basins scoured out by the glaciers. Glacial lake levels eventually dropped, causing the shallower portions of these basins to become dry land. Only the deeper portions of the basins remained submerged as inland lakes, now isolated by the shallower dry areas.

Coastal lakes, as already discussed, are the result of embayments being cut off from the surrounding Great Lakes by mid-bay and bay-mouth bars, and later being modified by the development of sand dune systems. Upper and Lower Herring, Hamlin, and Crystal Lakes are typical examples of these lakes.

(Source: Geology of Michigan and the Great Lakes, Robb Gillespie, William B. Harrison III, and G. Michael Grammer, Michigan Geological Repository for Research and Education – Western Michigan University)

## ◆ MINERAL RESOURCES

**Nonfuel Minerals** - In 2008, Michigan's nonfuel raw mineral production was valued at \$1.99 billion, based upon annual U.S. Geological Survey (USGS) data. This was a \$19.7 million, or 1%, increase from the State's total nonfuel mineral production value for 2007, which had increased by \$23.8 million, or 1.2%, from 2006 to 2007. With 2.8% of the U.S. total, the State remained ranked 12th in 2008 (11th in 2006) among the 50 States in total nonfuel mineral production value.

Sand and Gravel are the Traverse City area's main nonfuel raw mineral resources.

From 2007 to 2008, the most substantial decreases in nonfuel raw mineral production took place in portland cement, crushed stone, and construction sand and gravel and was owed to the slowdown in U.S. construction in 2007 and 2008. The value of Portland cement fell by \$35 million, or 7%; crushed stone was down \$28.7 million, or 22%, with a 21% decrease in quantity produced; construction sand and gravel value fell by \$22.4 million while the quantity produced fell by 22%. Smaller, yet significant, decreases also took place in masonry cement, potash, and industrial sand and gravel.

**Oil and Gas** - The majority of the oil and gas exploration in the Grand Traverse region has been in the Silurian-Niagaran pinnacle reefs and the Antrim Shale. The Antrim Shale is located in the upper portion of the lower peninsula of Michigan within the Michigan Basin. This Late Devonian-age shale is bounded by shale (Bedford Shale) above and by limestone (Squaw Bay Limestone) below and occurs at depths of 600 ft to 2,200 ft.

Aside from the Barnett, the Antrim Shale has been one of the most actively developed shale gas plays with its major expansion taking place in the late 1980. The Antrim Shale encompasses an area of approximately 12,000 square miles and is characterized by distinct differences from other gas shales: shallow depth, small

stratigraphic thickness with average net pay of 70 ft to 120 ft, and greater volumes of produced water in the range of 5 to 500 bbls/day/well. The gas content of the Antrim Shale ranges between 40 scf/ton and 100 scf/ton.. Well spacing ranges from 40 acres to 160 acres per well.

According to the 2004 USGS's Assessment of Undiscovered Oil and Gas Resources of the U.S. Portion of the Michigan Basin, The Devonian Antrim Shale has the greatest potential for undiscovered gas, having an estimated mean of 7 trillion cubic feet of undiscovered, technically recoverable gas. The Silurian Niagara Reef also has significant potential for undiscovered, technically recoverable gas.

Recently interest in the Utica Collingwood Shale, resulting from a 2010 demonstration well located in Missaukee County, could signal future development of this oil and gas resource. This resource composed of the overlapping Utica and Collingwood Shales is located 10,000 to 12,000 feet below the surface with current activity focused east of Traverse City in neighboring counties.

## ◆ TOPOGRAPHY

The City's northern boundary is Lake Michigan's Grand Traverse Bay, a large bay divided by the Old Mission Peninsula. The southern tip of West Grand Traverse Bay is fully within the City of Traverse City. The western portion of the southern tip of East Grand Traverse Bay is also in the City limits. Situated in the Boardman River Valley, the City is surrounded by forested hills, cherry and apple orchards, vineyards, and numerous inland lakes. The Boardman River passes through the City of Traverse City including Boardman Lake. The Boardman Lake level is enhanced approximately nine feet by the Union Street Dam right in the center of the City.

## ◆ WATER RESOURCES

Glacial deposits are the sole source of ground-water supplies in Grand Traverse County. These deposits range in thickness from 100 to 900 feet and consist of till, outwash, and materials of lacustrine and eolian origin. In some areas, the deposits fill buried valleys that are 500 feet deep. Sedimentary rocks of Paleozoic age, which underlie the glacial deposits, are mostly shale and are not used for water supply.

Of the glacial deposits, outwash and lacustrine sand are the most productive aquifers. Most domestic wells obtain water from sand and gravel at depths ranging from 50 to 150 feet and yield at least 20 gallons per minute. Irrigation, municipal, and industrial wells capable of yielding 250 gallons per minute or more are generally greater than 150 feet deep. At places in the county where morainal deposits contain large amounts of interbedded silt and clay, wells are generally deeper and yields are much lower.

Areal variations in the chemical and physical characteristics of ground and surface water are related to land use and chemical inputs to the hydrologic system. Information on fertilizer application, septic-tank discharges, animal wastes, and precipitation indicate that 40 percent of nitrogen input is from precipitation, 6 percent from septic tanks, 14 percent from animal wastes, and 40 percent from fertilizers.

Streams and lakes generally have a calcium bicarbonate-type water. The dissolved-solids concentration of streams ranged from 116 to 380 milligrams per liter, and that of lakes, from 47 to 170 milligrams per liter. Water of streams is hard to very hard; water of lakes ranges from soft to hard. The maximum total nitrogen concentration found in streams was 4.4 milligrams per liter. Water of lakes have low nitrogen concentrations; the median nitrate concentration is less than 0.01 milligrams per liter. Pesticides (Parathion and Simazine) were detected in low concentrations at six stream sites; 2,4-D was detected in low concentrations in water of two lakes. Relationships between land use and the yield of dissolved and suspended substances could not be established for most stream basins.

Calcium and bicarbonate are the principal dissolved substances in ground water. Dissolved-solids concentrations ranged from 70 to 700 milligrams per liter; the countywide mean concentration is 230 milligrams per liter. The mean nitrate concentration is 1.3 milligrams per liter; about 1.6 percent of the county's ground water has nitrate concentrations that exceed the U.S. Environmental Protection Agency's maximum drinking water level of 10 milligrams per liter. An effect of fertilizer applications on ground-water quality is evident in some parts of the county.

(Source: Hydrology And Land Use In Grand Traverse County, Michigan, U.S. Geological Survey, Water-Resources Investigations Report 90-4122, 1990)

The Grand Traverse Bay Watershed containing the Boardman River, Old Mission Peninsula, and Mitchell Creek subwatersheds covers the entire Traverse City geographical area. 220 billion gallons of water enter the Grand Traverse Bay each year from the watershed (Source: Grand Traverse Bay Watershed Facts, The Watershed Center Grand Traverse Bay)

## ◆ SOILS

Soils are of the mixture of sands, gravel, silts and clays that are found in lateral moraines in northwestern Michigan. There are also muck deposits in the wetland areas. The predominant soil types are sandy loams. Loam is an agricultural term that refers to a mixture of sand, silt and clay.

## ◆ VEGETATION AND WILDLIFE

Residents of the Grand Traverse region go to great lengths to care for our natural world. In recent years, area land managers have grown increasingly concerned about how invasive species are impacting the region, and so they have joined together in forming the Northwest Michigan Invasive Species Network (ISN).

Coordinated by the Grand Traverse Conservation District with funding through the Great Lakes Restoration Initiative, ISN partners in Antrim, Benzie, Charlevoix, Grand Traverse, and Leelanau counties work to survey and manage invasive species in regional natural areas, as well as to educate the public about our shared natural resources.

## ◆ ENERGY

Owned by the citizens of Traverse City with oversight by the TCL&P Advisory Board, Traverse City Light & Power (TCL&P) owns, operates and maintains its own electrical distribution utility system for much of the City. TCL&P's roots trace back to 1912 with the purchase of Queen City Light & Power, the Keystone Dam and the property around Brown Bridge Dam. By 1922 the Boardman River Electric Light Company and the just-completed Brown Bridge Dam supplied all of fast-growing Traverse City's power. In 1928, the first steam turbine was added to the Traverse City Waterworks building, which became the site of our coal-fired Bayside Power Plant.

In 1996, TCL&P became the first Michigan municipal electric utility to install a utility scale wind turbine. At the time of construction, it was the largest operating wind turbine in the country. In 2005, the Bayside Power Plant, which had been relegated to peak power support, was removed. Also in 2005, it was determined that, because of current and anticipated Federal Energy Regulatory Commission (FERC) requirements, it was no longer feasible to generate electricity at three hydroelectric dams operated by TCL&P. In the fall of 2006, the license to generate electricity at the Boardman, Sabin and Brown Bridge dams was surrendered to FERC.

In 2009, TCL&P signed a contract to purchase all generation output from five 2-megawatt wind turbines lo-

cated southeast of Cadillac. In the fall of 2010, when all five turbines were running, TCL&P had the highest percentage of wind generation to total generation of any utility in Michigan.

The 2011 “City of Traverse City Climate Action Plan” has the goal the transitioning Traverse City’s government operations toward energy independence through the establishment of clear goals and objectives. The plan promotes environmental stewardship and economic sustainability through resource conservation, responsible consumption, and energy efficiency efforts. The plan provides both specific strategies for reducing energy usage and meeting climate goals as well as a step-by-step planning guide.

## ◆ **ECONOMIC ACTIVITY**

In 2011 Traverse City’s top 10 economic sectors for total annual wages were:

1. Health Care and Social Assistance
2. Local Government
3. Manufacturing
4. Retail Trade
5. Finance and Insurance
6. Construction
7. Professional and Technical Services
8. Accommodation and Food Services
9. Administrative and Waste Services
10. Wholesale Trade

Downtown Traverse City offers retailers a very strong retail destination, a variety of space size and price, the region's best tourist traffic, and a central location in Michigan's fastest growing retail market.

## ◆ **AIR QUALITY**

As of date of this report, the Michigan Department of Environmental Quality does not maintain any air quality monitoring sites in Traverse City. The nearest MASN Monitoring Sites are located in East Jordan, Frankfort, and Houghton Lake.

# III. Results of the Environmental Stewardship Assessment

## ❖ Environmental Stewardship Dashboard

<b>Water Systems</b>	▼	Wellhead Protection/Source Water Protection	
	▲	Water Metering	
<b>Wastewater Treatment</b>	▲	Sufficient Capacity	
	▲	Extends to Surrounding Community	
	▲	Non-Combined Stormwater System	
	▲	Technology	
<b>Solid Waste</b>	▲	Reduction Programs	
	▲	Recycling	
	▲	Reuse	
	▲	Purchase Recycled Content	
<b>Energy Management</b>	▲	EnergyStar Portfolio Manager	
	▲	Energy Conservation	TC Climate Action Plan
	▲	Efficiency Updates	
	▲	Renewable Use	
<b>Stormwater Management</b>	▲	Municipal Low Impact Development	
	▲	Stormwater Management Plan	
	▬	Incentives/Requirements for Private Develop LID Use	Considering Stormwater Utility
<b>Transportation Policy</b>	▲	Complete Streets Policy	
	▲	Street Cleaning	
	▲	Non-Motorized Priority	
	▲	Public Transportation	BATA Loop & Link
<b>Environmental Data</b>	▼	DMR Pollutant Releases	
	▼	TRI Releases	
	▼	MAERS	
	908	WDS Sites	
	47	NPDES Permits	
<b>Planning</b>	▲	Smart Growth	
	▲	Open Space Preservation	
	▲	Transportation Options	
	▲	Walkable Higher Density Housing	
	▲	Placemaking	
<b>Recreation</b>	▲	Environmental Management of Recreational Resources	
	▼	Certified Clean Marina	
<b>Watershed Protection</b>	▲	Watershed Protection Plan	
	▬	Areas of Concern	
<b>Economic Development</b>	▲	Economic Development Strategy	
	▲	Economic Sustainability Policy	
	▲	New Economy	

## ❖ Community Water System

Traverse City's Water Treatment Plant draws water from East Bay, provides direct filtration treatment and chlorination then pumps water to the City's distribution system via high service pumps. The 20 Million Gallons per Day (20 MGD) capacity provides water to the residents and businesses of Traverse City and portions of Garfield, Elmwood and Peninsula Townships. Daily demand runs from under 3 MGD in the winter to about 14 MGD during prolonged summer dry spells.

Studies in the early 1960's resulted in a recommendation that the municipal water source be relocated and that a water filtration plant be constructed for the distribution of municipal water. By 1966 a new Water Treatment Plant was built and began supplying a much higher-quality water to city residents. The new filtration plant consisted of a 36 inch intake line and two rapid sand filters giving the plant a total capacity of 5 million gallons per day (MGD). In 1972 a clarifier and a third filter were added to increase the capacity to 12 MGD. The plant was automated in 1988 by the addition of a PLC computer and a telephone dialing system. The latest expansion (1992-93) included two flocculation basins, two additional filters, and two new pumps. To improve the reliability of the Water Plant, standby power generation was also added. This increased plant capacity to 20 MGD. In 1995 the disinfection system was converted from gaseous chlorine to sodium hypochlorite (bleach) for safety reasons. Zebra mussel control was also installed at that time. In 2000 SCADA (Supervisory Control And Data Acquisition) was first installed to meet EPA LT1 regulations. In 2006 the Wayne Hill Booster Station was completely reconstructed to better serve pressure districts on the west side of Traverse City. In 2007 a regional water study was conducted by Black & Veatch, in association with Wilcox & Associates, to project future short-term and long-term water demand for the City and surrounding townships. The study also presented recommendations for facility upgrades to meet future demand.

### **A. Source**

The source of Traverse City's water is the East Arm of Grand Traverse Bay of Lake Michigan. The intake is a steel and wood crib about 15 feet in diameter and in about forty (40) feet of water offshore. Raw water is pumped from a station onshore to the filtration plant, located about 400 yards west.

### **B. Capacity**

20 million gallons per day (MGD)

### **C. Number of Customers**

6,755

### **D. Length of Distribution System**

119 miles

### **E. Wellhead Protection Plan/Source Water Protection Plan**

No: A source water assessment for the Traverse City water supply was completed by MDEQ in 2002, and identified the vulnerability of the City's source as being of moderately high susceptibility, but notes that the treatment plant and intake have a historic record of maintaining safety of the water supply. The assessment recommends the implementation of a source water protection program to assure the continued safety of the water supply.

## ❖ Community Water System Continued

### F. Laboratory

The City's water testing laboratory is certified by the State of Michigan to test for Total and Fecal Coliform Bacteria, chlorine (disinfectant), pH, hardness, alkalinity, chlorides, turbidity and fluoride. The State Drinking Water Laboratory tests the City's water for other possible contaminants as required by the EPA.

## ❖ Wastewater Treatment

Traverse City contracts with CH2M-HILL for the operation and maintenance of the Regional Wastewater Treatment Plant. The partnership between Traverse City and CH2M HILL began in 1990.

During the CH2M-HILL's involvement, the scope of work for the wastewater treatment plant has expanded to include a revised industrial pretreatment program. CH2M HILL also has worked on two upgrades for the plant, which originally dates back to 1932, doubling its biochemical oxygen demand treatment capability.

The first upgrade, completed in 1999 for \$1.5 million, improved the plant's biological nutrient removal capability to meet new regulations related to nitrification. The second, a design-build project valued at \$31 million and completed in 2004, installed the newest and largest membrane bioreactor in North America at the time. The Traverse City plant can handle a peak flow of 17-million-gallon-per day, making it capable of processing the largest instantaneous flow with membrane bioreactor technology in the world. The project also added a new digester, and sludge dewatering and storage facilities. CH2M HILL has also made adjustments in the plant operations to reduce energy and chemical consumption.

### A. Type

Activated Sludge/Membrane Bioreactor

### B. Size

8.5 million gallons per day (MGD), Adequate.  
Running at 50% to 60% capacity

### C. Service Area

Traverse City and parts of Elmwood, Garfield, Peninsula, Blair, East Bay and Acme Townships totaling approximately 30 square miles of sewered area.

### D. Length of Distribution System

69 miles of pipe in Traverse City, length was not available for surrounding Townships.

## ❖ Solid Waste

Traverse City utilizes a single hauler for all residential waste services in the City in response to complaints received from residents about redundant garbage trucks on the streets and alleys and the additional degradation on the City's infrastructure. The City has authorized a five year contract starting April 1, 2011, with American Waste.

### A. Source Reduction

Yes

### B. Recycling

Yes. Most buildings with American Waste screening for recyclables

## ❖ Solid Waste Continued

### C. Reuse

Yes. The City sells unwanted equipment, sells scrap metal, and offers a spring cleanup

### D. Buy Recycled

Yes, the City purchases recycled paper and trash bags with recycled content.

## ❖ Energy Management

The City owns, operates and maintains its own electrical distribution utility system.

### A. Consumption/one year

N/A

### B. Utilities and Sources

Traverse City Light & Power (TCL&P), owned by the citizens of Traverse City, and Cherry Land Electric Cooperative provide electric service with DTE Energy providing natural gas service.

The TCL&P owned Bayside Coal Fired Power Plant was removed in 2005. In the fall of 2006, the license to generate electricity at the Boardman, Sabin and Brown Bridge dams was surrendered to FERC by TCL&P. The Brown Bridge dam was removed in 2012. Traverse City Light & Power provides a variety of energy saving programs through the TC Light & Power Energy Smart Program®.

### C. Energy Star® Portfolio Manager

Yes

### D. Energy Conservation

The 2011 “City of Traverse City Climate Action Plan” has the goal the transitioning Traverse City’s government operations toward energy independence through the establishment of clear goals and objectives. The plan promotes environmental stewardship and economic sustainability through resource conservation, responsible consumption, and energy efficiency efforts. The plan provides both specific strategies for reducing energy usage and meeting climate goals as well as a step-by-step planning guide. It establishes a prioritization of projects and a sustaining source of financing through the use of an Energy Savings Account. The plan’s initial focus is on energy efficiency projects that provide the strongest economic return. The long term focus is a transition to economic and environmental resilience through incremental steps.

The Climate Action Plan begins with an analysis of operational assets and liabilities and progress is gauged against benchmarks of performance. In 2008 the City completed a baseline inventory of energy use and greenhouse gas emissions generated by City government operations. As part of this action plan operational costs, energy use, and emissions were again inventoried for the year 2009. This interim inventory indicated that, as in 2005, the Wastewater Facilities sector of operations represents the largest portion of City government emissions and that the primary energy source contributing to these emissions is electricity. The 2009 annual emissions inventoried were 10,692 metric tons of CO<sub>2</sub>e, 14% below the 2005 baseline. This reduction was achieved in part through LED traffic signal retrofits, turning off unnecessary lighting at the marina, recycling waste generated during the Spring Clean-up, and lighting retrofits in buildings, with the primary reduction due to process optimization and biogas utilization at the City’s regional wastewater treatment plant.

## ❖ Energy Management Continued

### E. Energy Efficiency

The City improved efficiency by installing lighting upgrades, additional insulation, programmable thermostats, replaced old boilers and heaters, and added infrared heaters. TC Saves is a program for residents of Traverse City that offers low-cost, expert, energy assessments of homes, grants for initial energy efficiency improvements, and low-interest loans for additional efficiency improvements. TC Saves was provided funding from the Better Buildings for Michigan program.

### F. Renewable Energy

The City incorporated a Renewable Energy chapter into their zoning ordinance for wind and solar energy systems.

TCL&P has wind generation in its energy portfolio. TCL&P became the first Michigan municipal electric utility to install a utility scale wind turbine in 1996. In 2009, TCL&P signed a contract to purchase all generation output from five 2-megawatt wind turbines located southeast of Cadillac. In the fall of 2010, when all five turbines were running, TCL&P had the highest percentage of wind generation to total generation of any utility in Michigan.

TCL&P, in partnership with Cherryland Electric Cooperative (Cherryland), established the Solar Up North (SUN) Alliance program. The SUN Alliance provides an opportunity for residential and business customers of both utilities the ability to invest in solar energy through participation in a community solar project.

The SUN Alliance is a community-based initiative where customers of both utilities are invited to invest in a solar generation project. Those who invest in the project will receive a monthly bill credit equal to their share of the project's overall energy production, without the risk and maintenance cost involved in owning their own solar array.

### G. Education

N/A

## ❖ Other Stewardship Activities/Policies

### A. Environmentally Friendly Activities

- Extensive Parks and Natural Areas
- Tree City USA
- Biking and Hiking Trails including sections of the Traverse Area Recreation and Transportation Trails system (TART)
- Invasive Species Removal Efforts
- Water Quality Testing
- Storm Water Retention and Improvements
- Worked with other Groups on Bay Day, Beach and River Cleanups

### B. Environmentally Friendly Operations Policies

- Member ICLEI
- Michigan Green Communities

## ❖ Stormwater

Traverse City's Stormwater Public Utility Plan Element of its Master Plan calls for the protection of Traverse City's natural resources, the Bay Front, the Boardman River, Boardman Lake, the wetlands, the parklands, rolling hills, and view sheds, are vital to our health, safety, welfare, economy and quality of life as a community. In addition, The City's economic development, growth, and type of development will depend in great measure on the ability to contain and treat storm water in the area. The general goals and objectives of the Stormwater Plan Element are:

1. Water quality is of more importance than the quantity of water being treated.
2. Coordinate with the Natural Resources Plan Element.
3. Manage stormwater to reduce deleterious impact on the bay and other bodies of water.
4. Conform to Best Management Practices for removal of sediment and other contaminants from stormwater released into natural water courses.
5. Strive to contain/retain water on site both to reduce loads on stormwater infrastructure and to allow sediments to settle out before the water is released.
6. Monitor the stormwater and sanitary sewer systems for illicit connections and maintain their separation.
7. Identify a dedicated and sustainable funding mechanism for the operation and maintenance and capital improvement of the stormwater system.
8. Require that a Stormwater runoff ordinance be maintained.
9. Encourage use of the City's tree canopy and street sweeping efforts where practicable to assist in natural cleaning of stormwater.
10. Campus Plans shall include a plan for stormwater management and provide for the continued repair and maintenance of that system.

In order to meeting the objective of a sustainable funding mechanism for the stormwater system contained in item number 7, the City is studying creating a stormwater utility to raise funds for stormwater management projects

**A. Piping—type, length, discharges to**  
N/A

**B. Low Impact Development**

East Bay Park: The City, with the assistance of The Watershed Center, installed three stormwater systems at East Bay Park; each has an oil and grit separator, sediment filter and antibacterial filter. The project received funding from the Great Lakes Restoration Initiative.

Bryant Park: Installed new runoff filtering system at Bryant Park in Traverse City.

Elmwood Avenue: Installing new runoff filtering system

**C. Stormwater Management Plan**

Yes. Stormwater Management Plan/Authority

Ground-Water Protection and Storm-Water Runoff Control Ordinance

## ❖ Transportation

Traverse City is served by customary transportation services. Roads, streets and highways are the main means of transport. These roads, streets and highways provide for about 98 percent of all transportation needs in the area. There are also transit service, air service, rail freight service, ports and non-motorized facilities and services. Highway access from outside the area is provided by a combination of routes. Interstate Route 75 (I-75) links northern Michigan and southeast Michigan. US routes 131 and 31 carry traffic to and from southwestern Michigan. I-75 and US-131 traffic reach the Traverse City area by way of M-72 and M-37. US-31 directly accesses to Traverse City, while M-22 carries traffic to and from the Leelanau Peninsula.

Locally, the east-west routes carry their greatest volumes of traffic. Grandview Parkway, along the Grand Traverse Bay is a popular drive for its scenic value, immediate access to city parks, downtown Traverse City, hotels and motels, and the Old Mission and Leelanau Peninsulas. Other major east-west roadways include South Airport Road, Fourteenth Street and Eighth Street. Major north-south roads include M-22, Division Street (M-37), Cass Road, Garfield Road, Center Road (M-37), Three Mile Road, Barlow Road and Woodmere Street.

### **Traverse City Area Transportation and Land Use Study (TC-TALUS)**

The mission of TC-TALUS is to provide coordinated leadership and direction for the development and conduct of the continuing, cooperative and comprehensive transportation planning process for the Traverse City urban area.

The 24-member board of directors includes members from area units of government, road commissions, Michigan Department Of Transportation (MDOT), Cherry Capital Airport, Traverse City Area Public Schools (TCAPS), Traverse Area Recreation and Transportation (TART) and Bay Area Transportation Authority (BATA), Traverse City Area Chamber of Commerce and citizens-at-large.

#### **A. Complete Streets**

Yes

#### **B. Street Cleaning**

Street cleaning is conducted with brush based equipment. The collected material is reused or composted depending on the type of material.

#### **C. Snow Removal/Storage**

The snow is removed and stored at the Boys & Girls Club location, Wellington Street, South of Eighth Street

#### **D. Non-motorized Transportation Facilities**

The Michigan Department of Transportation (MDOT) commissioned the Northwest Michigan Council of Governments to develop the Northwest Michigan Regional Non-Motorized Transportation Plan and Investment Strategy 2008 for the 13 counties of Emmet, Charlevoix, Antrim, Kalkaska, Grand Traverse, Leelanau, Benzie, Manistee, Wexford, Missaukee, Osceola, Lake, and Mason in northwest, Lower Michigan. MDOT has used the Strategy to prioritize funding projects in the region. The guiding vision of this project is to connect existing trails, offering residents and visitors more opportunities for non-motorized transportation and to enjoy more of the region's natural resources.

## ❖ Transportation Continued

The project gathered information on existing and future trails from the county, township, city and village board members, planning commissions, parks and recreation commissions, and staff. Sub-regional meetings took place with trail organizations, groups, and stakeholders to review the proposed trail maps for their input. Then the compiled maps were presented to the public at sub-regional trail gatherings for input and to prioritize the proposed trails. Please see Appendix H. Northwest Michigan Non-Motorized Strategy 2008 – Grand Traverse County on Page 78.

The City has 76 miles of sidewalk. The TART Trail system, consisting of eight multi-use trails in Grand Traverse and Leelanau counties, contains 5.1 miles of trails within the City's limits.

The Traverse City master plan promotes the goal of an active transportation network providing safe, convenient, inviting and efficient infrastructure serving people of all abilities, on bicycles or on foot both within the City and throughout the region focusing on expanding active transportation as a viable transportation option.

Active Transportation Objectives:

- Improve and expand the active transportation network including bicycle lanes, sidewalks, crosswalks, multi-use trails, etc.
- Focus investment for infrastructure around activity centers. Major nodes shall be represented by activity centers such as significant job hubs, major shopping destinations, primary medical facilities, leisure activity facilities, schools, park and ride lots, major residential developments, other static and intermittent major traffic generators, etc.
- Expansion of maintenance activities focused on four season use of active transportation elements
- Reduction in street maintenance costs

### E. Public Transportation

Bay Area Transportation Authority (BATA) provides a variety of bus services throughout Grand Traverse and Leelanau Counties. Services are focused on feeding passengers into and throughout downtown Traverse City. The 2011 ridership was 539,384.

BATA established a Fixed Route System in the spring of 2013 with the City and Village Loops. For rural riders unable to access a fixed-route stop, Village Link service connects to Village Loop routes for travel to and from Traverse City. BATA Dispatch Services helps riders schedule pick-ups and connections. Traditional dial-a-ride services (City Link) are available for Traverse City and the immediate surrounding area.

### F. Infrastructure Strategy Policy

The City Commission adopted the following goals, priorities and strategies associated with its infrastructure. Three broad principles apply.

- ◆ An Asset Management Plan has been developed.
- ◆ All projects should use the technical resource; "Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities." Context Sensitive Solutions (CSS) is a process of balancing the needs of all users of the system, including non-vehicular uses. It is a "Complete Streets" approach that incorporates methods to reduce vehicular traffic impacts on adjacent neighborhoods.

## ❖ Transportation Continued

- ◆ Infrastructure needs to be managed as a system, including the underground components. Utility upgrades need to be coordinated with aboveground work to minimize the need to disrupt surface improvements. While it is impossible to eliminate utility cuts on new streets due to unknowns associated with the underground system, every effort needs to be made to coordinate aboveground and belowground improvements. Coordination with Traverse City Light and Power on undergrounding electric lines is included in this systemic approach.

Following these principles, the priorities are:

### 1. Sidewalks/bikeways

From the 2006 Pavement Management Report, approximately 10% of the total spending need is for sidewalk and bikeway improvements. As such, the City should dedicate approximately 10% of its resources to this part of the infrastructure system.

Expenditure priorities should be:

- a) Fixing the existing network. Sections of sidewalks that don't meet minimum safety standards should be the first priority. This provision includes sidewalks in commercial areas. Within the DDA, this anticipates DDA cooperation. Streetscape improvements would continue to be 50% cost sharing with the adjacent property owners.
- b) Infill projects. In locations where there is a gap in an otherwise continuous system, that gap should be filled.
- c) New extensions. Extensions to the sidewalk and bikeway system should follow (a) and (b) unless otherwise dedicated grant funds are available.

### 2. Local Streets

Local streets account for approximately 63% of the City's street system. Local streets should receive at least that proportion of available funding. Having allocated approximately 10% of available funding to sidewalks/bikeways, approximately 60% of available funds should be used for local streets and associated storm sewer systems.

All local street construction should include a bias in favor of sidewalk or bikeway construction in conjunction with the street (in addition to the #1 sidewalks above). There may be cause to not include either sidewalks or bikeways but that cause would need to be demonstrated.

- a) Due to the existing condition of the street system, during the first two years of this program, attention is necessary for the very worst streets. Approximately 10% of available funds will be focused on these streets.
- b) Asset Management. An asset management program is not a "worst first" approach. Using a life cycle costing approach, it will be advantageous to invest dollars to improve streets classified as "fair" to "good" and even "very good." Curb and gutter would be included at locations where it currently exists but not on streets where it does not exist unless 1) it is necessary for the City to control storm water or 2) it is included for consistency with the Master Plan or 3) it is petitioned for special assessment.
- c) Economic Development. Infrastructure spending can lead to new economic development opportunities. These opportunities may be limited on the local street system, but to the degree that they exist, they should be pursued.

## ❖ Transportation Continued

- d) Existing Brick Streets. The City maintains a number of brick streets throughout the community. These streets represent a unique situation. In considering the reconstruction of brick streets, the life cycle cost of a brick street will be compared to the life cycle cost of a typical asphalt street. If the residents adjacent to the street desire a brick street and by majority petition to bear the cost difference between the brick and asphalt street as a special assessment, the brick street will be reconstructed in brick. If there is no special assessment for the life cycle cost difference, the street will be reconstructed with asphalt.

### 3. Major Streets

Major streets account for approximately 37% of the City's street system and would receive the balance of funds available. These funds can be matched by grant funds and would be used on major streets and associated storm sewers as follows. All major street construction should include a bias in favor of sidewalk or bikeway construction in conjunction with the street (in addition to the #1 sidewalk above). There may be cause to not include either sidewalks or bikeways but that cause would need to be demonstrated.

- a) Asset Management. An asset management program is not a "worst first" approach. Using a life cycle costing approach, it will be advantageous to invest some dollars to improve streets classified as "fair" "good" and even "very good."
  - (l) Curb and gutter along with associated storm sewer would be included on all major streets.
- b) Economic Development. Infrastructure spending can lead to new economic development opportunities. Woodmere Avenue is an excellent example of private investment following public investment.
- c) Existing Brick Streets. The City maintains a number of brick streets throughout the community. These streets represent a unique situation. In considering the reconstruction of brick streets, the life cycle cost of a brick street will be compared to the life cycle cost of a typical asphalt street. If the property owners adjacent to the street desire a brick street and by majority petition to bear the cost difference between the brick and asphalt street as a special assessment, the brick street will be reconstructed in brick. If there is no special assessment for the life cycle cost difference, the street will be reconstructed with asphalt.

## ❖ Airport

Cherry Capital Airport (TVC) is located within the city limits of Traverse City and offers commercial air service and general aviation facilities. The airport has two runways (Rwy10/28 – 6,500 feet in length, Rwy18/36 – 5,378 feet in length), an FAA operated control tower, and instrument approaches procedures. Currently there are three commercial air carriers offering service at TVC. The United States Coast Guard (USCG) Air Station Traverse City is located at TVC and performs response duties to enforce domestic fisheries law and International fisheries agreements. The USCG Marine Environmental Protection program develops and enforces regulations to avert the introduction of invasive species into the maritime environment, stop unauthorized dumping, and prevent oil and chemical spills. This program is complemented by the Marine Safety program's pollution prevention activities.

As part of the critical infrastructure system that connects people and goods globally, airports are a valuable asset. An airport's impact on Michigan's economy and quality of life can be compared to that of an interstate highway interchange, a railroad station or harbor.

## ❖ Airport Continued

PA 327 of 1945 established the Michigan Aeronautics Code and created the Michigan Aeronautics Commission with general supervisory authority over aeronautics in the state. The Office of Aeronautics within the Department of Transportation carries out the day to day duties of the Commission per statute and rules. One of the primary roles is implementing the provisions of the Federal Aviation Administration (FAA) Modernization and Reform Act of 2012 in regard to the Airport Improvement Program (AIP) which provides federal funding for airport planning and development through 2015.

Asset management is a vital component of any strategy to identify airport improvement projects based on criteria established through a process of prioritization. This is accomplished with the Michigan Airport System Plan (MASP) and the Airport Capital Improvement Plan (AICP), which is included in the MDOT 5-year Transportation Plan.

## ❖ Environmental Data

### Environmental Data Descriptions

#### ◆ National Pollutant Discharge Elimination System (NPDES)

The Clean Water Act (CWA) requires anyone who wants to discharge pollutants from point sources to first obtain an NPDES permit, or else that discharge will be considered illegal. As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. For example, NPDES permits control municipal and industrial sources of wastewater pollution. Permits typically require monitoring and reporting. NPDES permits limit a facility's discharge of water quality parameters, specific chemicals, bulk parameters, and flow.

The permit provides two levels of control: technology-based limits (based on the ability of dischargers in the same industrial category to treat wastewater) and water quality-based limits (if technology-based limits are not sufficient to provide protection of the water body). See EPA's Industrial Water Pollution Controls Web page and Water Quality Standards for Surface Waters Web page for more information. The Water Permits Division of EPA's Office of Wastewater Management directs and organizes the program in cooperation with EPA regional offices, states, tribes, and others.

Since its introduction in 1972, the NPDES permit program is responsible for significant improvements to our nation's water quality.

Source: MDEQ <http://www.deq.state.mi.us/owis/Page/main/Home.aspx>

#### ◆ Discharge Monitoring Report (DMR) Pollutant Loading Tool

The DMR Pollutant Loading Tool ("Loading Tool") is a Web-based tool that calculates and reports facility pollutant discharges in pounds per year or by monitoring period. The tool also weights chemicals by their relative toxicity and calculates the toxic-weighted equivalent amount of each chemical released. With this tool you can rank facilities and pollutants by total amount of each pollutant released each year and by the total amount of toxic-weighted pounds released each year. The tool allows users to quickly identify the facilities that discharge the largest amount of particular pollutants or pollutant groupings with simple filters

Source: EPA [http://cfpub.epa.gov/dmr/ez\\_search.cfm](http://cfpub.epa.gov/dmr/ez_search.cfm)

## ❖ Environmental Data Continued

### ◆ Toxic Release Inventory (TRI)

The Toxics Release Inventory (TRI) program maintains a publicly available database containing information on toxic chemical releases and waste management activities reported annually by certain industries as well as federal facilities. EPA compiles the TRI data each year and makes it available through several data access tools, including the TRI Explorer and Envirofacts. The TRI Comparative Analysis tool uses the most recent official year of TRI data.

This data tool includes wastewater pollutant discharge data from EPA’s Toxics Release Inventory (TRI). Data is available for the years 2007 through 2010. Users can search TRI data to find the facilities with the largest pollutant discharges to surface waters or municipal sewage treatment plants.

Source: EPA [http://iaspub.epa.gov/triexplorer/tri\\_release.facility](http://iaspub.epa.gov/triexplorer/tri_release.facility)

### ◆ Michigan Air Emissions Reporting Systems (MAERS)

The Federal Clean Air Act requires that each state maintain an inventory of air pollution emissions for certain facilities and update this inventory every year. Michigan's emission inventory is the Michigan Air Emissions Reporting System (MAERS). The Michigan Department of Environmental Quality (DEQ), Air Quality Division (AQD) maintains MAERS reports for commercial, industrial, and governmental sources of air pollution in Michigan. Emissions data is submitted to the United States Environmental Protection Agency (U.S. EPA) to be added to the national data bank. This information is used to track air pollution trends, determine the effectiveness of current air pollution control programs, serve as a basis for future year projections of air quality, track source compliance, provide information for permit review, and calculate the emissions portion of the air quality fee.

Source: MDEQ [http://www.deq.state.mi.us/maers/emissions\\_query.asp](http://www.deq.state.mi.us/maers/emissions_query.asp)

### ◆ Waste Data Systems (WDS)

The Waste Data System (WDS) tracks activities at sites regulated by the Solid Waste, Scrap Tire, Hazardous Waste, and Liquid Industrial Waste programs. WDS can provide information on ownership and operation of the site; the status of any required permits, licenses, registrations, or certifications; compliance status; authorized transporters; shipments of hazardous or liquid industrial waste (manifest); and user fees.

Source: MDEQ <http://www.deq.state.mi.us/wdsp/AdvancedSearch.aspx>

### ◆ Environmental Permit Counts

National Pollutant Discharge Elimination Systems (NPDES) 2011	47 permits	
MI Waste Data Systems (WDS) 2013	908 sites	947 permits

## ❖ Environmental Data Continued

### ◆ Environmental Data Report

Discharge Monitoring Report (DMR)	
Pollutant Loading - Top Pollutants by Pounds (2011)	Total Pounds
Phosphorus	4,097.0000
BOD, carbonaceous, 05 day, 20 C	3,747.0000
Ammonia as N	1,224.0000
Copper	12.0100
1,2,4-Trimethylbenzene	0.0380
Lead	0.0160
Mercury	0.0011
Total Residual Chlorine	-
1,3,5-Trimethylbenzene	-
Naphthalene	-
Cumene	-
Benzene, ethylbenzene, toluene, xylene combination	-
Xylene	-
Ethylbenzene	-
Solids, total suspended	-
n-Propylbenzene	-

Toxic Release Inventory (TRI)*		
Reported Disposed of or Otherwise Released in 2011	Total On-site Disposal or other Releases (lbs)	Total Off-site Disposal or other Releases (lbs)
BARIUM COMPOUNDS	-	152,600
ETHYLENE GLYCOL	10,435	-
DICHLOROMETHANE	2,575	-
COPPER COMPOUNDS	-	655
COPPER	-	84
<b>Total</b>	<b>13,010</b>	<b>153,339</b>
<b>Zip Codes Searched: 49684, 49686</b>		

\*TRI data reflect releases and other waste management activities of chemical, not whether (or to what degree) the public has been exposed to those chemicals.

Michigan Air Emissions Reporting Systems (MAERS)	
2010 Emissions	Tons
Ammonia	-
Carbon monoxide (CO)	25.88
Lead (Pb)	-
NOx	48.01
Particulate Matter (PM)	-
PM-2.5	0.44
PM10 FIL	6.80
PM10 PRI	8.94
Sulfur dioxide (SO2)	0.92
Volatile Organic Compounds (VOCs)	19.23

## ❖ Existing Planning Efforts

*The assessment of the Master Plan identified the follow components that addressed environmental stewardship and sustainable economic strategies:*

### Traverse City Comprehensive Plan

#### ◆ VISION

Traverse City is a regional center comprised of connected and related neighborhoods - residential, business, public, recreational and mixed. This plan promotes and protects the vitality, diversity and improvement of our neighborhoods.

#### Core Principles

Seven core principles guide our vision. These principles guide land use decisions, leading us to ask the right questions in our dialog with citizens about their ideas and concerns.

4. The intensity of any land use should be the focus of land use decisions.
5. Social, economic and residential diversity and stability are key to our future.
6. Our neighborhoods need to be preserved and protected as they evolve.
7. Natural and historic resources are limited and need to be protected.
8. Services should be conveniently located.
9. Transportation choices are important to our vitality and environmental health.
10. Maintaining a healthy and vibrant City is important to the region.

#### Goals of the Plan:

These goals presume intentional action toward the accomplishment of our vision to:

1. Enforce compatible intensities within, among and between neighborhoods.
2. Seamlessly link our neighborhoods while allowing each neighborhood's unique character and culture to evolve.
3. Become pedestrian friendly and encourage more, energy efficient, environmentally friendly transportation choices.
4. Be innovative and inventive in developing our neighborhoods through consensus.
5. Protect, conserve and preserve the natural and historic resources of our region.
6. Stabilize neighborhood economies and economic interests.
7. Locate services near users to protect the community's health, safety and welfare.
8. Expand residential choices and multi-generational recreational opportunities.
9. Open regional dialog and develop regional partnerships.

## ❖ Existing Planning Efforts Continued

### ◆ NEIGHBORHOODS

#### TC-1

**Auto** Pedestrian oriented. Limited, informal automobile parking areas.

**Emissions** Low emissions, strictly limited in scope, time, and frequency.

- Our neighborhoods need to be preserved and protected as they evolve. As density of other neighborhood types increase the preservation of natural areas increases in value. Natural areas can reduce infrastructure costs by reducing flooding and sequestering pollutants.
- Natural and historic resources are limited and need to be protected. Conservation of natural features, preservation of fragile environments, protection of local heritage and cultural artifacts.
- Transportation choices are important to our vitality and environmental health. Walking, biking, skiing and other low impact choices with access to an interconnected network of trails. Informal trail head parking.
- Maintaining a healthy and vibrant City is important to the region. Natural and recreational areas are critical to the well being of the community.

#### TC-2

**Auto** Auto accessible. Traffic moderated through street design. Informal access for pedestrians or non-motorized vehicles (trails, paths). Public transportation access on the perimeters.

**Emissions** Moderate daytime emissions and low night or prolonged emissions.

Natural and historic resources are limited and need to be protected. Neighborhood parks, recreation and civic spaces with little formal infrastructure. Naturalistic planting pattern, informal development pattern and informal street edges.

#### TC-3

**Hours** Typically night time sleeping and daytime working with few odd hours.

**Emissions** Typical urban residential emissions levels.

- Natural and historic resources are limited and need to be protected. Neighborhood parks, recreation facilities and civic spaces with more formal infrastructure compared to the Conventional (TC-2) neighborhoods.
- Transportation choices are important to our vitality and environmental health. Formal interconnected street pattern with sidewalks and alleys. Typical Streets are curbed and tree lined. Public transportation is easily accessed.

## ❖ Existing Planning Efforts Continued

### TC-4

**Auto** Geared toward motorized transportation. Should adapt well to multiple, interconnected transit systems. High level of transit services. Bike lanes incorporated with street markings along major streets.

**Emissions** Moderate to high emissions. Design and architectural solutions utilized to minimize effect on adjacent neighborhoods. Higher emissions contained within the neighborhood.

- Natural and historic resources are limited and need to be protected. Development is mitigated by using low impact designs, shared parking and driveways.
- Transportation choices are important to our vitality and environmental health. High volume transit corridors efficiently move goods and people. Access to private transportation is well coordinated with public transportation and a network of sidewalks and trails.

### TC-5

**Auto** Motorized vehicle restrictions in terms of traffic speed, parking costs and access. Pedestrian focused, centralized parking facilities. High level public transit service.

**Emissions** High emission levels carefully managed with design and architectural solutions utilized to minimize effect on adjacent neighborhoods.

- Natural and historic resources are limited and need to be protected. Cultural center, formal infrastructure and civic spaces. Preserve buildings and structures within designated historic districts. Integrate Boardman River and Grand Traverse Bay into the fabric of the neighborhood.
- Transportation choices are important to our vitality and environmental health. Access to a well-established sidewalk network and trail system. High level of transit services. Access to high density parking strategically located within the neighborhood.

## ◆ NATURAL RESOURCES ELEMENT

The protection of Traverse City's natural resources--our Bay Front, the Boardman River, Boardman Lake, the wetlands, the parklands, rolling hills and viewsheds--are vital to our health, safety, welfare, economy and quality of life as a community. The Bay and other water sources provide for our drinking water, residential and commercial uses, fisheries, wildlife habitat and many recreational uses.

This document will prove most effective when the City:

- Views our natural resources as valuable community assets
- Includes discussion of natural resource elements within the Asset Management Committee and Capital Improvement Plan review.
- Plans and communicates across departments
- Works in collaboration with neighboring communities within the region
- Partners with area natural resource management organizations and State and Federal agencies to seek funding, reduce duplicative efforts and leverage local knowledge and expertise.
- Conducts an extensive natural features inventory (NFI), including flora, fauna, soil types, air quality, and water quality, to establish baseline criteria. After the completion of a NFI, specific priorities, goals and standards can be developed.

## ❖ Existing Planning Efforts Continued

### Goals

- *Protect surface and ground water quality, wetlands and shoreline zones.*
- *Protect Natural Landforms and Topography*
- *Protect and Enhance Indigenous Biological Diversity*
- *Protect local and regional human and ecosystem health by meeting or exceeding the National Ambient Air Quality Standards in the Grand Traverse Bay Region.*
- *Protect Human Habitat*

### Objectives

#### ◆ Protect surface and ground water quality, wetlands and shoreline zones

*Objective 1:* Reduce nutrients and sediments entering all waters bodies.

*Objective 2:* Manage stormwater quality and quantity on site.

*Objective 3:* Work with private landowners to protect and restore natural vegetation around all water bodies, including rivers, streams, lakes, and wetlands.

*Objective 4:* Manage the City's public lands, right-of-ways, and facilities to protect water quality.

*Objective 5:* Protect the City's water resources from other threats to water quality.

*Objective 6:* Exemplify sustainable water use.

#### ◆ Protect Natural Landforms and Topography

*Objective 1:* Protect land forms and topography

*Objective 2:* Develop infrastructure standards that protect topography and preserve viewsheds.

#### ◆ Protect and Enhance Indigenous Biological Diversity

*Objective 1:* Protect and/or improve ecosystem services and biological diversity.

*Objective 2:* Partner with other organizations to protect, maintain, and manage natural areas and open spaces on both public and private lands.

#### ◆ Protect local and regional human and ecosystem health by meeting or exceeding the National Ambient Air Quality Standards in the Grand Traverse Bay Region

*Objective 1:* Recognize our responsibility for Climate Change and take rectifying action.

*Objective 2:* Establish criteria for local air pollutants.

#### ◆ Protect Human Habitat

*Objective 1:* Preserve the night sky by limiting outdoor lighting that is misdirected, excessive or unnecessary while permitting reasonable uses of outdoor lighting for safety, security and enjoyment.

*Objective 2:* Reduce the impact of excessive noise on our living environment

*Objective 3:* Reduce the amount of visual pollution within Traverse City

## ❖ Existing Planning Efforts Continued

### Policies

1. Educate City residents about the impacts from the misuse of outdoor fertilizers on water quality.
2. Conduct water quality testing, identify water quality problems, prioritize remediation, and implement water quality treatments for stormwater outfalls into Grand Traverse Bay, Boardman Lake, Boardman River and Kids Creek.
3. Inventory erosion sites and develop specific sediment reduction goals for the human-caused erosion on Grand Traverse Bay, Boardman Lake, Boardman River, and Kids Creek.
4. Continue to monitor for illicit drain connections.
5. Design and implement a stormwater management program to ensure that new development or redevelopment projects use industry-accepted standards for better environmental and health performance to improve the water quality of stormwater before it leaves the site and to reduce the need for hard infrastructure.
6. Review impervious cover standards by each neighborhood type for lot coverage and parking lot size to reduce stormwater runoff and protect water quality.
7. Review the “Site Plan and Site Development Standards” ordinance to ensure that sufficient information about stormwater management, protection of vegetated buffers, trees, other natural features, and natural drainage patterns are provided in the site plan review process.
8. Educate residents and property owners about the importance of riparian areas to water quality protection, erosion control, and wildlife habitat conservation.
9. Encourage and incentivize the establishment of natural vegetation buffers on all sites adjacent to water bodies and wetlands to increase nutrient filtering, erosion control, wildlife habitat, and property values.
10. Identify and prioritize shorelines that need vegetated buffers.
11. Codify the existing stormwater control ordinance guidelines protecting vegetated buffers starting above the ordinary high water mark of any wetland, lake or stream.
12. Based on the NFI, set a standard for maintaining and possibly increasing wetlands.
13. Require new buildings to be set back from the shoreline and the use of vegetative buffers where possible, rather than engineered walls and stone revetments.
14. Based on the NFI, set a standard for limiting and/or mitigating hardened shoreline on Boardman Lake, Boardman River, Kids Creek and Grand Traverse Bay.
15. Limit the use of outdoor fertilizers on City properties to only those properties where soil testing indicates a need for additional nutrients.
16. Maintain excellent wastewater treatment control measures.
17. Regularly review street cleaning and salt/sand application procedures for best management practices to protect water quality.
18. Protect existing naturalized shorelines on surface water bodies and wetlands with a vegetative buffer or other low impact development practices above the ordinary highwater to limit erosion, trap nutrients, and provide fish and wildlife habitat and identify additional shoreline areas that could be naturalized.

## ❖ Existing Planning Efforts Continued

### Policies (cont.)

19. Incorporate green infrastructure approaches into street, sidewalk, path, and other city projects where possible to improve water quality before stormwater enters the stormwater system.
20. Identify environmentally sensitive areas on City properties and protect them as natural preserves or for passive recreation.
21. Monitor identified sites where toxins, pathogens, and thermal impacts have been found above accepted water quality standards and work with all interested parties to implement remediation when standards are exceeded.
22. Protect groundwater quality and surface waters from toxic contamination, pathogens, and thermal impacts including the potential impacts of underground injection wells.
23. Implement measures to ensure that all public swimming areas meet or surpass health standards for E.coli.
24. Develop and implement programs to stop Great Lakes aquatic invasive species from being introduced to the City's water bodies, including adoption of boat washing ordinances and installation of boat washing facilities at City boat launches.
25. Educate institutions, businesses and residents on the proper way to dispose of pharmaceutical by-products through public education and pharmaceutical drop off programs.
26. Track the remediation of leaking underground storage tanks within the City limits.
27. Review the need for and scheduling of irrigation on City properties.
28. Adopt practices and policies to conserve water resources to become a model of water conservation for the Grand Traverse region.
29. Review restrictions on development of sites with slopes of greater than twenty percent.
30. Encourage clustering of residential units.
31. Encourage the design of buildings that fit into sloping sites to minimize alteration of the topography and natural vegetation.
32. Adopt an ordinance to require non-regulated floodplain capacity lost due to proposed development design to be replaced with storage capacity elsewhere.
33. Avoid loss of scenic natural resources.
34. Design roads, driveways, and sidewalks to minimize excessive cutting and filling.
35. Minimize driveway surface area and encourage common driveways.
36. Route utilities away from terrain that requires excessive cutting and filling.
37. Encourage the protection, restoration, creation, and management of native wetlands.
38. Prioritize protection and restoration of natural drainage patterns in review of projects.
39. Identify fish habitat areas and implement restoration and protection measures for those areas.
40. Adopt a "no net loss" tree policy on City properties.
41. Develop a strategic plan for invasive species education, prevention, and mitigation that includes eliminating the presence and use of High Priority Non-Invasive Species on City properties.

## ❖ Existing Planning Efforts Continued

### Policies (cont.)

42. Plant non-invasive canopy trees in City easements to filter rainfall, slow traffic, reduce light trespass and provide neighborhood landscaping.
43. Adopt a management plan for City parklands and natural areas that protects and improves the diversity, quality, and integrity of terrestrial and aquatic ecosystems.
44. Assist regional efforts to connect, consolidate and increase public holdings and the protection of unfragmented habitat.
45. Coordinate and support biodiversity protection measures with regional and neighboring communities.
46. Update City Forestry Plan once a Natural Features Inventory is completed.
47. Continue to work on a formal local action plan for reducing greenhouse gas emissions with specific goals and timelines consistent with the US Mayors' Climate Protection agreement adopted by the City Commission in 2007 and seek funds for implementation.
48. Implement a baseline air quality study of the region including the 6 criteria air pollutants as determined by the EPA
49. Create an action plan to address the results of the baseline air study.
50. Work with area energy providers to create an energy plan that balances our demand for electricity with a supply of energy sources that have the lowest possible net-use of fossil-based carbon fuels.
51. Set maximum illumination levels and lighting hours for each neighborhood type and recreational areas based on best scientific practices.
52. Review and establish height and shield lighting standards by neighborhood types.
53. Require site lighting plans for new construction.
54. Set lighting curfews for commercial businesses during closed hours.
55. Set standards to limit hours and minimize the use of electric signage.
56. Encourage use of motion detector lights to encourage conservation and provide safety and security when necessary.
57. Educate the public on appropriate and safe levels of lighting.
58. Work to shield high intensity municipal lights to eliminate light trespass.
59. Allow for provisions for holiday lighting and special events.
60. Set noise levels based on best scientific practices by neighborhood types.
61. Educate citizens on current noise ordinance.
62. Work in conjunction with utility providers to place utilities underground with a focus on areas of high density when feasible.
63. Work to reduce and limit signage in major corridors.

## ❖ Existing Planning Efforts Continued

### ◆ TRANSPORTATION ELEMENT

#### Introduction

Transportation choices are crucial to the economic, social, and environmental vitality of our community and neighborhoods. Traverse City will design and maintain its transportation networks and public rights-of-way to maintain safe, convenient, inviting and efficient conditions for all who use them to improve the quality of life for its residents and visitors alike. Being cognizant of the importance of place-making when planning, constructing and maintaining our streets, the Urban Design Element must be consulted when considering transportation investments. To provide safe and efficient access to people and goods, all modes of travel and how these modes connect to one another need to be evaluated. In making evaluations of streets, bridges, public transit, bicycle facilities, pedestrian ways, freight facilities and routes, ports and railroads, all legal users of the public rights-of way need to be considered. In addition, transportation projects need to reflect and contribute to the character of the neighborhood they traverse.

#### Goals

- Provide well-planned connections within and throughout the transportation network improving the efficient distribution of travel throughout the network and promoting reduced motorized vehicular trips and lengths. Identify a framework of major streets providing connectivity throughout the City and region with a focus on the access to goods, services, and people. Routinely promote the use of alternatives to the single occupancy vehicle in both trip planning and cost related comparisons to the general public.
- All components of the City's transportation system and its inter-connectivity will be designed and maintained to provide safe, convenient, inviting and efficient movement of people and goods in a manner that is appropriate to the context of the community and neighborhood through which it passes. The City shall consider all legal users of the public rights-of-way in its designs. When planning and designing new or reconstructed streets the City will give consideration to the following: (1) public safety, (2) pedestrians, (3) public transit users, (4) bicyclists, (5) commercial vehicles, (6) car-pooling vehicles, and (7) single occupancy vehicles.
- Develop an active transportation network providing safe, convenient, inviting and efficient infrastructure serving people of all abilities, on bicycles or on foot both within the City and throughout the region focusing on expanding active transportation as a viable transportation option.
- Develop and promote reliable, efficient fixed-route transit services connecting major nodes within the City and throughout the region.
- The City will maintain a comprehensive parking policy that determines decisions on the placement, regulation, and investment in parking.

#### Objectives

1. Use design elements to increase mobility and decrease speed (i.e. Front Street downtown)
2. Fewer emissions (fumes, noise, road pollution, etc.)
3. Fewer single-occupancy motor vehicle miles traveled
4. Increased accessibility and use of mass transit, carpools, and non-motorized modes of transportation

## ❖ Existing Planning Efforts Continued

### Objectives (cont.)

5. Achieve appropriate operating characteristics (i.e. traffic volume, speed, types of vehicles) for all streets
6. Redesign street rights-of-way to reflect the planned character and context of the neighborhood type.
7. Increased use on “framework” streets through designation of a well-connected commercial network. Framework streets serve as regular emergency routes.
8. More efficient distribution of all types of trips
9. Increased use of non-motorized transportation options
10. Develop and refine traffic calming policies and implementation schedules
11. Support regional transportation planning efforts
12. Improve and expand the active transportation network including bicycle lanes, sidewalks, crosswalks, multi-use trails, etc.
13. Focus investment for infrastructure around activity centers. Major nodes shall be represented by activity centers such as significant job hubs, major shopping destinations, primary medical facilities, leisure activity facilities, schools, park and ride lots, major residential developments, other static and intermittent major traffic generators, etc.
14. Expansion of maintenance activities focused on four season use of active transportation elements
15. Reduction in street maintenance costs
16. Increase transit ridership
17. Cooperation and promotion by major employers, retailers, schools, and tourism vendors for the use of mass transit by employees, residents and visitors
18. Strategically locate park-and-ride facilities
19. Timely routes that are convenient and direct
20. Installation of facilities for public transit patrons (all-season bus shelters, route signs at bus shelters depicting services, bicycle racks on buses, reduced headway times, frequency of buses, etc.)
21. Support regional collaboration
22. Adopt a comprehensive parking strategy
23. Reduce land dedicated to the use and investment of parking associated with private uses
24. Increase use of mass transit and active transportation options
25. Increase siting and number of bicycle parking
26. Increase ratio of commercial space to public surface parking

## ❖ Existing Planning Efforts Continued

### ◆ PARKS AND RECREATION ELEMENTS

#### Introduction

In setting our goals we have to make a commitment to maintain and expand our parks and recreational areas to serve a growing and active population. Our parks not only impact the quality of life for our citizens, they play an important role in attracting visitors to our city and add significantly to our economy.

#### Goals

- Goal 1: Design and protect the bay as a recreational resource for residents and tourists. Design and implement our Traverse City Bayfront 2010 plan as means to care for our public waterfront primarily as an urban recreational resource for use by all, with care and attention given for preserving and enhancing the natural and environmental qualities.
- Goal 2: Develop the Boardman Lake and River as natural resources
- Goal 4: Incorporate the need for safe, attractive pedestrian access with private or public development while maintaining and developing additional pedestrian linkages.
- Goal 7: Develop new recreational facilities when supported by the residents, especially in park deficient areas and along waterfronts.
- Goal 9: Work with schools to make recreation facilities and programs part of the education system.

#### Objectives

- Prioritize phases of the Traverse City Bayfront 2010, plan.
- Work on short term improvements that tie in with future revitalization plans
- Utilize Leadership in Energy and Environmental Design (LEED) and green building standards on site and building solutions when feasible.
- Promote water related use of Boardman Lake and River, such as the Traverse Area Community Sailing program and craft rentals on both the lake and the river.
- Explore the possibility of establishing a recreational area on the west side of Boardman Lake
- Support the establishment of public access points along the Boardman Lake and River
- Continue our commitment to extend, repair and replace sidewalks annually as part of our ongoing infrastructure upgrading program
- Plan for sidewalks leading to and where appropriate, within our parks
- Improve overall transportation choices that would also improve recreational access.
- Implement universal accessibility design principals as a design standard for all new facilities
- Continue the Boardman Lake Trail as a top priority for the city and seek grants for new recreational facilities.
- Pursue the possibility of a community park in the Traverse Heights neighborhood possibly on the school-owned land adjacent to Traverse Heights Elementary School.
- Work with Traverse City Area Public Schools (TCAPS) to enhance recreational facilities and programs as part of the education system.

## ❖ Existing Planning Efforts Continued

### Objectives (cont.)

- Continue to work with TCAPS, Grand Traverse County Recreation Department and other municipalities towards developing area-wide recreation plan.
- Support the Safe Routes to School Program.
- Support the use of Thirlby Field for year-round recreational uses.

## ◆ URBAN DESIGN ELEMENT

### TC-2 & TC-3

#### Introduction

The TC-2&3 residential neighborhoods contain a diverse mix of housing types and uses: single and multi-family dwellings; business offices; home occupations; public spaces; recreational opportunities; and retail establishments that meet the daily needs of residents. The goal is to strengthen existing neighborhoods and ensure that housing is accessible to residents of all age and income levels. It is envisioned that new dwellings will be built within existing neighborhoods to increase density and accommodate expected population growth within the city.

### TC-2

#### Streets, Parking And Landscaping

- Retain existing natural features and vegetation, especially along ridgelines and street corridors.
- Open lands used as buffers to contrasting land uses.

### TC-3

#### Streets, Parking And Landscaping

- Streets connected through a complete urban grid system.
- Narrow streets, short blocks tight curb radii to promote pedestrian friendly streets.
- Bus stops located on neighborhood streets.
- Pedestrian scale lighting primarily for sidewalks and street intersections.

#### Connectivity

- Sidewalk network and strong pedestrian orientation.
- Generally a grid pattern of interconnecting streets.
- Links to regional trail systems.

#### Public Spaces

- Neighborhood schools and places of worship.
- Neighborhood parks

## ❖ Existing Planning Efforts Continued

### TC-4

#### **Introduction**

The TC-4 neighborhood is the least formally developed of the two commercially focused neighborhoods. It is envisioned this neighborhood type will provide the nucleus for new development. In some cases these areas are underdeveloped, or could be redeveloped in a more efficient manner to accommodate additional shops and services. The addition of residential units is encouraged. Expansion within existing neighborhoods is looked upon more favorably than developing isolated commercial sites. New buildings should not be compelled to mimic their historic predecessors, but should pay attention to local practices regarding roof pitches, eave lengths, window-to-wall ratios, and the socially significant relationship of buildings to their site and street.

#### **Building Placement**

- Encourage infill development that anchor and define corners at intersections.

#### **Streets And Parking**

- Bike lanes preferred unless near streets can provide superior access.
- Sidewalks along heavily traveled streets.
- Long blocks will have mid-block crossings to enhance pedestrian connectivity.
- Reduce off-street parking requirements in areas served by transit or bike routes and have strong pedestrian links to neighborhoods.

#### **Connectivity**

- Provide sidewalks along streets and construct crosswalks to be highly visible.
- Provide curb side bus stops along transit routes.
- Connect sidewalks to adjacent residential neighborhoods.
- Provide clear and identifiable pedestrian connections from streets to front doors of buildings.

#### **Materials**

- Sustainable

#### **Public Spaces**

- Incorporate civic spaces and squares that serve as activity focal points.
- Encourage streetscape improvements for walkability.

### TC-5

#### **Introduction**

The TC-5 neighborhood is, and is, envisioned to consist of a diverse mix of retail establishments, restaurants, residential housing and offices. This neighborhood type encourages buildings that support a wide mix of uses, and designed to add visual interest and street activity. The emphasis on pedestrian scale development is encouraged and it is important for buildings to maintain pedestrian interest along all sidewalks. A balance must be found that creates variety in the height and bulk of buildings, and satisfy other, equally valid needs (views and increased open space).

## ❖ Existing Planning Efforts Continued

### Streets And Parking

- Parking should be delivered in a manner that is the least obtrusive to the streetscapes and riverfront.
- Surface parking lots should be replaced with buildings and civic spaces as parking structures are constructed and transit service improves.
- Cross walks should be clearly marked and spaced at frequent intervals along the street.
- Provide adequate bike parking and convenient bus stops.

### Connectivity

- Encourage pedestrian travel by creating interesting street edges.
- Sidewalks should be maintained year round and furnished with benches, bike racks, drinking fountains, trees, public transit stops, public restrooms and trash receptacles.

### Materials

- Sustainable.
- Durable, requiring reconstruction or replacement only in the distance future.
- Local to the degree practical.

### Public Spaces

- Incorporate civic spaces and squares a part of the mix-use development in prominent locations.
- Encourage streetscape improvements that create safe and attractive walking environment.

## ◆ ECONOMIC DEVELOPMENT

### TC-4

Maintaining a healthy and vibrant City is important to the region. Movement of goods and people are lifelines to the community and provide a special role in terms providing areas of concentrated employment and large commercial ventures.

### TC-5

Maintaining a healthy and vibrant City is important to the region. Downtown is a key marketing feature for Northwest Lower Michigan and a regional gathering place for public events and celebrations.

## Transportation Element

### Goals

- The City will promote and facilitate high occupancy regional transportation systems including water, air, rail, and private bus and taxi services. It shall be the policy of the City to connect the inter-regional and regional transportation modes to the existing and planned services provided to meet the goals and strategies of this plan. The plan supports enhanced mobility that is beneficial to community livability and the businesses that are directly served.

## ❖ Existing Planning Efforts Continued

### Objectives:

- Support regional transportation planning efforts
- Support and provide input on strategic policies for air transportation that recognizes the economic impact of the Cherry Capital Airport to the local economy. Support the location of the airport within the city limits and the integration of air transportation with multi-modal transportation options.
- Develop strategic plan for the integration and support of rail and water transport including employees, passengers, and goods. This plan will outline specific cooperative support for the integration of local mass transit, taxi, commercial, and shuttle support for employees, passengers and goods arriving and departing rail and water transport facilities.

### Parks and Recreation Elements

#### Goals

- Goal 3: Continue a strong, flexible recreational program affording a variety of recreational activities and experiences for a wide range of users.
- Goal 5: Encourage cooperative governmental relationships to establish an adequate and equitable method for financing development, operation, and maintenance of recreation facilities and programs.
- Goal 8: Maximize the use of existing facilities.

#### Objectives:

- Continue to support the location of a senior center on the bay.
- Continue to support the Grand Traverse Commission on Aging to provide recreational programs, education and assistance to seniors.
- Support revenue enhancing activities at Hickory Hills, to diversify winter sports and promote year round use.
- Encourage growth of passive and active recreational opportunities at the Grand Traverse Commons.
- Encourage the county owned civic center to remain in Traverse City.
- Continue to work with the Traverse City- Garfield Recreational Authority to maintain and purchase key recreational lands within the two jurisdictions
- Seek financial support from adjacent units of government whose residents are significant users of Hickory Hills.
- Encourage regional support of the Heritage Center.
- Develop a marketing plan that promotes the use of city parks and recreational programs.
- Recognize July as National Parks Month and celebrate by holding special events during the month.
- Use the high school tennis courts and the tennis courts at the senior center for city sponsored tennis and pickle ball lessons for city residents.

## ❖ Existing Planning Efforts Continued

### Future Land Use Map Descriptions

#### TC-1 NEIGHBORHOOD

The TC-1 *Conservation* Neighborhood represents our least intensely developed neighborhoods. The focus is on conservation and protection of natural resources. The level of intensity generated within the confines of each property in this neighborhood type tends to be low.

#### TC-2 NEIGHBORHOOD

The TC-2 *Conventional* Neighborhood is the least formally developed of the two types of residential neighborhoods. The focus is on single family residential. Multiple family is minimally interspersed and low in density. The level of intensity generated within the confines of each property in this class of neighborhood tends to be the lowest of residential uses.

#### TC-3 NEIGHBORHOOD

The TC-3 *Traditional* Neighborhood is the most formally developed of the two types of residential neighborhoods. The focus is on historic patterns. The level of intensity generated within the confines of each property in this class of neighborhood tends to be closely spaced single family residences.

#### TC-4 NEIGHBORHOOD

The TC-4 *Corridor* Neighborhood is the least formally developed of the two types of commercial neighborhoods. The focus is on commercial innovation. The overall level of intensity generated within the confines of each district in this class of neighborhood tends to be the lower of commercial uses.

#### TC-5 NEIGHBORHOOD

The TC-5 *Downtown* Neighborhood is the most formally and intensely developed of the two types of commercial neighborhoods. The focus is on high intensity, regional, commercial activity. The overall level of intensity generated within the confines of each district in this class of neighborhood tends to be the highest of commercial uses.

#### TC-C NEIGHBORHOOD

The TC-C *Campus* Neighborhood is for those campuses that are unique within the community. The focus tends to be inward and specific to the campus. These neighborhoods will have individualized special plans approved by the Planning Commission. At the boundaries of the campus the level of intensity can not exceed the level of intensity of the adjoining neighborhoods.

❖ **Existing Planning Efforts Continued**

Please see Appendix D. Future Land Use Map

❖ **Existing Zoning Efforts**

*The assessment of the Zoning Ordinance identified the follow components that addressed environmental stewardship and sustainable economic strategies:*

**Traverse City Zoning Ordinance Assessment**

◆ **DISTRICTS**

- OS Open Space District
- RC Residential Conservation District
- R-1a & R-1b Single Family Dwelling Districts
- R-2 Two-Family Dwelling District
- R-9, R-15 & R-29 Multiple Family Dwelling Districts
- HR Hotel Resort District
- C-1 Office Service District
- C-2 Neighborhood Center District
- C-3 Community Center District
- C-4 Regional Center Districts
- D Development Districts
- T Transportation District
- GP Government/Public District
- PRD Planned Redevelopment District
- I Industrial District
- NMC-1 & NMC-2 Northwestern Michigan College Districts
- H-1 & H-2 Hospital Districts

**A chart of all setbacks, etc. found in CHAPTER 1368 Size and Area Requirements**

◆ **OS - Open Space District**

The Open Space (OS) District is for the purpose of accommodating natural or park-like settings including parks, playgrounds, athletic fields, wetlands, floodplains, natural areas and cultural buildings, often linked with pedestrian and bicycle paths.

**1328.03 LOT, DENSITY AND IMPERVIOUS SURFACE PROVISIONS.**

Lot width (min.)	Lot area (min.)	Density (maximum)	Impervious surface
20 feet	No minimum.	Not applicable.	20% maximum.

**1328.04 SETBACKS.**

(e) Water setbacks: Except for bathhouses and buildings which need to be on or in close proximity to the water (such as harbormaster offices, marina fueling facilities and boathouses), buildings shall be set back 50 feet inland from the ordinary high water mark of Grand Traverse Bay and Boardman Lake and 25 feet from ordinary high water mark of the Boardman River. Where the dock line is established by City ordinance, the setback shall be measured inland from the dock line.

## ❖ Existing Zoning Efforts Continued

### ◆ RC - Residential Conservation District

The Residential Conservation (RC) District is for the purpose of classifying property susceptible to erosion or flooding for clustered, low-density development in the least sensitive portions of such property.

#### 1330.01 USES ALLOWED.

- OS district uses, with buildings less than 3,000 square feet gross floor area;
- R-1a and R-1b district uses;

#### 1330.03 LOT, DENSITY AND IMPERVIOUS SURFACE PROVISIONS.

Lot width (min.)	Lot area (min.)	Density (maximum)	Impervious surface
20 feet	No minimum.	4.4 dwelling units/acre	20% maximum

#### 1330.04 SETBACKS.

(e) Water setbacks: 50 feet inland from the ordinary high water mark of Grand Traverse Bay and Boardman Lake and 25 feet from the ordinary high water mark of Boardman River. Where the dock line is established by City ordinance, it shall be measured inland from the dock line.

#### 1330.08 PARKING, LOADING AND DRIVEWAYS.

Driveways for residential lots must access from a publicly maintained alley if available. Other requirements for parking, loading and driveways are contained in Chapter 1374. In addition, athletic fields may provide up to 50% of the required number of organized parking on an area developed in turf grasses. Grassed parking areas are considered as providing one parking space for every 350 square feet of continuous turf-covered area. All grassed parking areas shall be maintained in a healthy, vigorous growing condition and shall not be used more than 12 times per calendar year. When use requires more frequent parking, an impervious surface or approved pervious hard surface parking area shall be developed.

### ◆ R-1a and R-1b-Single Family Dwelling Districts

The Single Family Dwelling – Large Lot (R-1a) District is for the purpose of primarily accommodating conventional single family dwellings.

The Single Family Dwelling – Small Lot (R-1b) district is for the purpose of accommodating single family dwellings on small lots.

Clustering (e.g. single-family attached, zero-lot-line detached dwellings) may be allowed in either district on larger parcels within the designated density guidelines as a means to protect sensitive soils and provide usable open space.

#### 1332.04 SETBACKS.

(e) Water setbacks: 50 feet inland from the ordinary high water mark of Grand Traverse Bay and Boardman Lake and 25 feet from the ordinary high water mark of Boardman River. Where the dock line is established by City ordinance, it shall be measured inland from the dock line.

## ❖ Existing Zoning Efforts Continued

### ◆ R-2 - Two-Family Dwelling District

The Two Family Dwelling (R-2) District is for the purpose of allowing two-family dwellings designed to be architecturally compatible with surrounding housing.

#### 1334.03 LOT, DENSITY AND IMPERVIOUS SURFACE PROVISIONS.

Lot width (min.)	Lot area (min.)	Density (maximum)	Impervious surface
35 feet	4,000 sq. feet	Not applicable	45% maximum

### ◆ R-9, R-15 and R-29 - Multiple Family Dwelling Districts

These Multiple-Family Dwelling districts allow for multiple family uses in varying densities, have pedestrian scale and are located in close proximity to major activity and employment centers, on transit routes, or in transitional areas.

#### 1336.03 LOT, DENSITY AND IMPERVIOUS SURFACE PROVISIONS.

	Lot width (min.)	Lot area (min.)	Density (maximum)	Impervious surface
R-9	50 feet	7,500 sq. feet	9/dwelling unit/acre	35% maximum
R-15	50 feet	7,500 sq. feet	15/dwelling unit/acre	40% maximum
R-29	50 feet	7,500 sq. feet	29 dwelling unit/acre	50% maximum

#### 1336.04 SETBACKS.

(e) Water setbacks: 50 feet inland from the ordinary high water mark of Grand Traverse Bay and Boardman Lake and 25 feet from the ordinary high water mark of Boardman River. Where the dock line is established by City ordinance, it shall be measured inland from the dock line.

#### 1336.08 PARKING, LOADING AND DRIVEWAYS.

In addition, athletic fields may provide up to 50% of the required number of organized parking on an area developed in turf grasses. Grassed parking areas are considered as providing one parking space for every 350 square feet of continuous turf-covered area. All grassed parking areas shall be maintained in a healthy, vigorous growing condition and shall not be used more than 12 times per calendar year. When use requires more frequent parking, an impervious surface or approved pervious hard surface parking area shall

### ◆ HR - Hotel Resort District

The Hotel Resort (HR) District is for the purpose of accommodating tourist-related land uses along the major routes near tourist attractions. It is important that motor vehicle access be limited and land uses are compatible with peak traffic flows. Uses for these zones include multi-family housing, lodging facilities, accessory offices, and limited uses that are functionally integrated as part of the development.

#### 1338.03 LOT, DENSITY AND IMPERVIOUS SURFACE PROVISIONS.

Lot width (min.)	Lot area (min.)	Density (maximum)	Impervious surface
50 feet	7,500 sq. feet	44/rooms/acre	70% maximum

#### 1338.04 SETBACKS.

(e) Water setbacks: 50 feet inland from the ordinary high water mark of Grand Traverse Bay and Boardman Lake and 25 feet from the ordinary high water mark of Boardman River. Where the dock line is established by City ordinance, it shall be measured inland from the dock line.

## ❖ Existing Zoning Efforts Continued

### 1338.08 PARKING, LOADING AND DRIVEWAYS.

Requirements for parking, loading and driveways are contained in Chapter 1374. In addition, athletic fields may provide up to 50% of the required number of organized parking on an area developed in turf grasses. Grassed parking areas are considered as providing one parking space for every 350 square feet of continuous turf-covered area. All grassed parking areas shall be maintained in a healthy, vigorous growing condition and shall not be used more than 12 times per calendar year. When use requires more frequent parking, an impervious surface or approved pervious hard surface parking area shall be developed.

### ◆ C-1 - Office Service District

The Office Service (C-1) District is for the purpose of accommodating smaller offices and related services. These districts are intended for low intensity commercial areas sensitively designed to have a residential flavor so as to integrate with adjacent residential areas. These are generally low traffic-generating offices and small personal service shops, rather than large office complexes. These areas may also be used for multiple-family dwellings. It is intended that existing residential structures be preserved and adaptively reused without substantially altering the appearance of building exteriors. New structures, signs and lighting should be sensitive and respectful to adjacent residential properties.

### 1340.03 LOT, DENSITY AND IMPERVIOUS SURFACE PROVISIONS.

Lot width(min.)	Lot area(min.)	Density (maximum)	Impervious surface
20 feet	3,750 sq. ft.	N/A	60% maximum

### 1340.04 SETBACKS.

(e) Water setbacks: 50 feet inland from the ordinary high water mark of Grand Traverse Bay and Boardman Lake and 25 feet from the ordinary high water mark of Boardman River. Where the dock line is established by City ordinance, it shall be measured inland from the dock line.

### 1340.08 PARKING, LOADING AND DRIVEWAYS.

Requirements for parking, loading and driveways are contained in Chapter 1374. In addition, athletic fields may provide up to 50% of the required number of organized parking on an area developed in turf grasses. Grassed parking areas are considered as providing one parking space for every 350 square feet of continuous turf-covered area. All grassed parking areas shall be maintained in a healthy, vigorous growing condition and shall not be used more than 12 times per calendar year. When use requires more frequent parking, an impervious surface or approved pervious hard surface parking area shall be developed. Additional parking is not required for upper story dwellings above a first floor commercial or office use if the commercial or office use is in compliance with the parking requirements of this Code

### ◆ C-2 - Neighborhood Center District

The Neighborhood Center district is for the purpose of accommodating small businesses primarily serving adjacent neighborhoods with day-to-day retail goods and services. These small centers are comprised of residentially-scaled buildings with limited parking areas and a strong pedestrian orientation. Existing buildings and quality vegetation should be retained. New buildings are to be designed to reflect a residential flavor and minimize impacts (e.g., noise, light, traffic) on neighborhood residences. Overall density of up to 29 dwellings per acre is allowed.

❖ **Existing Zoning Efforts Continued**

**1342.01 USES ALLOWED.**

C-1 District uses except drive-throughs;

**1342.03 LOT, DENSITY AND IMPERVIOUS SURFACE PROVISIONS.**

Lot width (min.)	Lot area (min.)	Density (maximum)	Impervious surface
20 feet	3,750 sq. ft. min.	NA	70% maximum

**1342.04 SETBACKS.**

(e) Water setbacks: 50 feet inland from the ordinary high water mark of Grand Traverse Bay and Boardman Lake and 25 feet from the ordinary high water mark of Boardman River. Where the dock line is established by City ordinance, it shall be measured inland from the dock line.

**1342.08 PARKING, LOADING AND DRIVEWAYS.**

Requirements for parking, loading and driveways are contained in Chapter 1374. In addition, athletic fields may provide up to 50% of the required number of organized parking on an area developed in turf grasses. Grassed parking areas are considered as providing one parking space for every 350 square feet of continuous turf-covered area. All grassed parking areas shall be maintained in a healthy, vigorous growing condition and shall not be used more than 12 times per calendar year. When use requires more frequent parking, an impervious surface or approved pervious hard surface parking area shall be developed.

◆ **C-3 - Community Center District**

The Community Center (C-3) district is for the purpose of accommodating a wide range of retail goods and services available to the community. These uses are intended to be developed compactly and have coordinated access, preferably with limited driveways and shared parking facilities. More intense uses such as twenty-four-hour stores and drive-through establishments are appropriate.

**1344.01 USES ALLOWED.**

- HR District uses;
- C-2 District uses;

**1344.03 LOT, DENSITY AND IMPERVIOUS SURFACE PROVISIONS.**

Lot width (min.)	Lot area (min.)	Density (maximum)	Impervious surface
20 feet	3,750 sq. ft	N/A	80% maximum

**1344.04 SETBACKS.**

(E) Water setbacks: 50 feet inland from the ordinary high water mark of Grand Traverse Bay and Boardman Lake and 25 feet from the ordinary high water mark of the Boardman River. Where the dock line is established by City ordinance, it shall be measured from the dock line.

**1344.08 PARKING, LOADING AND DRIVEWAYS.**

Requirements for parking, loading and driveways are contained in Chapter 1374. In addition, athletic fields may provide up to 50% of the required number of organized parking on an area developed in turf grasses. Grassed parking areas are considered as providing one parking space for every 350 square feet of continuous turf-covered area. All grassed parking areas shall be maintained in a healthy, vigorous growing condition and shall not be used more than 12 times per calendar year. When use requires more frequent parking, an impervious surface or approved pervious hard surface parking area shall be developed.

## ❖ Existing Zoning Efforts Continued

### ◆ C-4 - Regional Center Districts

Of retail, office and residential uses integrated with hotels, convention centers, and integrated common parking facilities. Internal linkage between stores is encouraged. It is extremely important that new development be integrated with historically significant buildings. The first floors of buildings are primarily for retail, financial services and restaurants. Dominant and striking visual features of the central area of the City should be maintained and enhanced. The upper stories of buildings are generally to be occupied by offices, services and residences. High density housing is also appropriate.

It is the intent of these districts to create streets which encourage pedestrian activity. Buildings along Boardman River should be designed to integrate with both the sidewalk and riverwalk systems. Driveways crossing sidewalks should be limited to public parking areas.

#### 1346.01 USES ALLOWED.

- C GP district uses;
- C C-3 district uses, except the following: drive-ins, drive-throughs, sexually-oriented businesses, vehicle wash facilities, veterinary services and kennels;

#### 1346.03 LOT, DENSITY AND IMPERVIOUS SURFACE PROVISIONS.

Lot width (min.)	Lot area (min.)	Density (maximum)	Impervious surface
No minimum.	No minimum.	N/A	100% maximum.

#### 1346.04 SETBACKS

(e) Water setbacks: May build to the edge of a public easement; if no public easement, then 10 feet inland from the ordinary high water mark or any dockline established by City ordinance.

### ◆ D - Development Districts

The Development Districts are for the purpose of accommodating a mixture of land uses in areas traditionally known as the “Traverse City Ironworks” area, the “Depot” area and the “Red Mill” area. Residential uses are to be combined with shopping, restaurant, office and entertainment uses to create a village-like atmosphere. Compact, pedestrian-friendly developments which integrate well with adjacent properties are characteristic of these projects.

#### 1347.01 USES ALLOWED.

C-2 uses without drive-throughs

#### 1347.03 LOT, DENSITY AND IMPERVIOUS SURFACE PROVISIONS.

Area	Lot width (min.)	Lot area (min.)	Density (maximum)	Impervious surface
Depot:	--	--	N/A	70%
Ironworks:	--	--	N/A	80%
Red Mill:	--	--	N/A	80%

#### 1347.04 SETBACKS.

(e) Water setbacks:

Ironworks: 25 feet from dock line established by City ordinance.

## ❖ Existing Zoning Efforts Continued

### ◆ T - Transportation District

The Transportation (T) District is for the purpose of accommodating special areas for the moving of goods and people.

#### 1348.01 USES ALLOWED.

- OS District uses, including buildings 3,000 square feet or larger in gross floor area;
- GP District uses;

#### 1348.03 LOT, DENSITY AND IMPERVIOUS SURFACE PROVISIONS.

Lot width (min.)	Lot area (min.)	Density (maximum)	Impervious surface
20 feet	No minimum.	No maximum.	70% maximum.

#### 1348.08 PARKING, LOADING AND DRIVEWAYS.

Requirements for parking, loading and driveways are contained in Chapter 1374. In addition, athletic fields may provide up to 50% of the required number of organized parking on an area developed in turf grasses. Grassed parking areas are considered as providing one parking space for every 350 square feet of continuous turf-covered area. All grassed parking areas shall be maintained in a healthy, vigorous growing condition and shall not be used more than 12 times per calendar year. When use requires more frequent parking, an impervious surface or approved pervious hard surface parking area shall be developed.

(Ord. 476. Passed 7-6-99)

### ◆ GP - Government/Public District

The Government/Public (GP) District is for the purpose of accommodating specialized public buildings while encouraging that the public properties reflect the community's values in the design and maintenance of the buildings and grounds.

#### 1350.03 LOT, DENSITY AND IMPERVIOUS SURFACE PROVISIONS.

Lot width (min.)	Lot area (min.)	Density (maximum)	Impervious surface
20 feet	No minimum.	No maximum.	70% maximum.

The surface parking area shall not exceed the total floor area of all buildings on the lot.

#### 1350.04 SETBACKS.

- (d) Water setback: 25 feet inland from the ordinary high water mark or any dockline established by City ordinance.

#### 1350.08 PARKING, LOADING AND DRIVEWAYS.

Requirements for parking, loading and driveways are contained in Chapter 1374. In addition, athletic fields may provide up to 50% of the required number of organized parking on an area developed in turf grasses. Grassed parking areas are considered as providing one parking space for every 350 square feet of continuous turf-covered area. All grassed parking areas shall be maintained in a healthy, vigorous growing condition and shall not be used more than 12 times per calendar year. When use requires more frequent parking, an impervious surface or approved pervious hard surface parking area shall be developed.

## ❖ Existing Zoning Efforts Continued

### ◆ PRD - Planned Redevelopment District

#### **1352.01 PURPOSE.**

The purpose of the Planned Redevelopment District is to further the objectives of 1941 Public Act 250 through a land development project review process based on the application of site planning criteria to foster integration of proposed land development projects with the characteristics of the project areas.

By establishing a Planned Redevelopment District (PRD), the City will guide development so as to:

- (a) Provide the Planned Redevelopment District the benefits of a thorough planning, review and development process and provide that such planning be documented in an Act 250 Development Plan, as amended, which conforms to the goals of the Adaptive Reuse Plan.
- (b) Promote a sensitive and creative approach to the comprehensive use of land and related physical facilities that results in consistent design and development, with the inclusion of aesthetic amenities.
- (c) Combine and coordinate architectural styles, historic preservation, landscape design, building forms, and building relationships with a mixing of possible different but compatible uses in an appropriate and harmonious design.
- (d) Preserve and/or rehabilitate architectural, natural and historic landmarks.
- (e) Enhance the appearance of commercial, institutional and residential environments through the preservation of natural vegetation, significant topographic and geological features and environmentally sensitive features.
- (f) Use best management practices to control soil erosion, surface flooding, and the protection of subsurface water.
- (g) Preserve common open space for the continuous use and enjoyment of the residents and users of the development as well as the public.
- (h) Ensure the phased development of subareas of the Planned Redevelopment District are integrated with the overall development program for the PRD, to avoid disjointed development.
- (i) Permit the transfer of development capacity between and within the Subareas of the District, and outside the District under limited circumstances, in order to stimulate and accommodate appropriate overall development or redevelopment of the District while protecting natural resources.
- (j) Minimize any adverse impact of the development process on the community through planned phasing of the Subareas appropriate to the scale, complexity and sensitivity of the site.
- (k) Provide for recreational public and private facilities, which are necessary and appropriate to the proposed development, and which benefit the broader community.
- (l) Promote efficient use of the land, public utilities, traffic circulation, parking, storm-water management and other facilities.
- (m) Encourage land use which promotes the public health, safety, convenience, and welfare by removing substandard and insanitary conditions as those conditions are defined in 1941 Public Act 250 and otherwise facilitate the redevelopment of land and protect it from blighting influences.
- (n) Provide coordinated and comprehensive infrastructure development.

## ❖ Existing Zoning Efforts Continued

### **1352.03 STANDARDS**

(b) Common Open Space in the development shall be integrated into the overall design. Such spaces shall have a direct functional and visual relationship to the main buildings and not be of isolated or leftover character.

(d) Through bylaws, covenants, private associations, or other means, the Planned Redevelopment shall ensure the continued maintenance of the properties and of the various amenities, conservation and design features of the Planned Redevelopment in its entirety.

(e) The landscape in a Planned Redevelopment shall be conserved and enhanced, insofar as practical, by minimizing tree and soil removal, and the conservation of special landscape features such as streams, wetlands, ponds, groves and land forms. The addition or use of trees, shrubs, flowers, fountains, ponds, special paving materials, benches and seating areas, special lighting fixtures and other amenities will be encouraged to the extent of their appropriateness and usefulness to the development and the likelihood of their continued maintenance.

(g) Special attention shall be given to proper site surface drainage to meet Grand Traverse County ordinance requirements and best engineering and storm-water management practices so that release of surface waters will not adversely affect neighboring properties or the public storm drainage system.

### **1352.05 PERMITTED USES.**

The uses which may be permitted in a Planned Redevelopment District include any combination of individual uses allowable within districts described elsewhere in the zoning ordinance, provided that those uses are identified in an original or amended District Plan.

### **1352.06 DEVELOPMENT CAPACITY AND TRANSFERS.**

(a) Total Development Capacity.

(1) The Total Development Capacity of the PRD shall be established based on the existing Impervious Surface area. The total Development Capacity shall be subject to plan restrictions set forth in an Adaptive Reuse Plan, and an Act 250 Development Plan, as amended, adopted by the City for the Subject Area, and shall be limited by the requirements to provide capacity for infrastructure, Open Space, parking, and stormwater management. The total Development Capacity shall be comprised of District Building Volume Capacity and District Impervious Surface Area Capacity which, upon approval, shall be set forth in a District Plan adopted by the City, and shall not be subject to modification.

### **1352.08 SUBMITTAL REQUIREMENTS.**

(a)

(8) A utility concept plan, including the location of all existing sanitary sewers, storm sewers and water lines on the site and on property immediately adjacent to the site. Similar information shall be provided for gas, electric, telephone, and cable television utilities.

(9) Existing and proposed topography of the land with contours shown at intervals no greater than two feet (2'). Topographic data shall refer to the USGS North American Datum-Mean Sea Level Elevation and a written description of environmental characteristics of the site prior to development (i.e. soils, vegetative cover, drainage, streams, creeks or ponds).

## ❖ Existing Zoning Efforts Continued

(b) Subarea Development Plan.

(1) A storm-water drainage plan, identifying portions of the site in the flood plain or in flood plain fringe areas, the existing and proposed flow and storm drainage, and the location of drainage ditches, culverts, standing water, and proposed detention/retention facilities.

(2) Soil borings data identification of soil problem areas as provided by a registered engineer.

(3) Existing and proposed landscape features including significant tree groupings, isolated preservable trees 4 inches or more in diameter at one foot above ground level, scenic views, and other natural features such as wood lots, lakes, ponds, springs, waterways, wetlands, flood plains, etc.

(4) Wetlands delineation, including a plan for their preservation, enhancement, or mitigation.

(5) Landscape design guidelines addressing right-of-ways, screening walls and fences, lighting facilities, outdoor trash storage area, building/entry areas, Impervious Surface, Open Space, View Corridors, and Pedestrian Access.

### ◆ I - Industrial District

The Industrial (I) District is for the purpose of accommodating light manufacturing, research and development plants, warehousing, and similar clean industries. Industrial areas are envisioned to be attractively developed and landscaped with emphasis placed on maintaining and enhancing existing vegetation. Linkages with pedestrian walkways and recreational trails are also important.

#### 1354.01 USES ALLOWED.

GP District uses;

C-2 District uses for existing buildings more than five years old, based upon the date of the initial certificate of occupancy issued. Minor additions are allowed provided the addition is for barrier free access, fire safety or to improve the energy efficiency of the building;

#### 1354.03 LOT, DENSITY AND IMPERVIOUS SURFACE PROVISIONS.

Lot width (min.)	Lot area (min.)	Density (maximum)	Impervious surface
100 feet	No minimum.	No maximum.	80% maximum.

### ◆ NMC-1 & NMC-2 - Northwestern Michigan College Districts

The Northwestern Michigan College (NMC) Districts are for the purpose of accommodating universities, colleges and other advanced learning institutions. Such uses often incorporate residential, office, recreational, and cultural activities.

#### 1356.01 USES ALLOWED.

(b) Uses allowed in the NMC-1 district.

- OS district uses;
- R-15 district uses;

Uses permitted in the NMC-2 district:

- OS district uses;
- R-29 district uses;
- NMC-1 district uses, without the gross square foot limitations;

❖ Existing Zoning Efforts Continued

**1356.03 LOT, DENSITY AND IMPERVIOUS SURFACE PROVISIONS.**

	Lot width (min.)	Lot area (min.)	Density (maximum)	Impervious surface
NMC-1	20 feet	No minimum.	15 dwelling units/acre	30% maximum(1)
NMC-2	20 feet	No minimum.	29 dwelling units/acre	50% maximum(1)

(1) The surface parking area shall not exceed fifteen percent (15%) of the total area of any lot over ten acres. Hard surface recreational areas shall not be included as impervious surface for determining the percentage of allowable impervious surface. (Ord. 475. Passed 7-6-99. Ord. 533. Passed 6-4-01.)

**1356.04 SETBACKS.**

(e) Water setbacks: 50 feet inland from the ordinary high water mark of Grand Traverse Bay except marina buildings up to 3,000 square feet gross floor area may be located at the water’s edge.

**1356.08 PARKING, LOADING AND DRIVEWAYS.**

Requirements for parking, loading and driveways are contained in Chapter 1374. In addition, athletic fields may provide up to 50% of the required number of organized parking on an area developed in turf grasses. Grassed parking areas are considered as providing one parking space for every 350 square feet of continuous turf-covered area. All grassed parking areas shall be maintained in a healthy, vigorous growing condition and shall not be used more than 12 times per calendar year. When use requires more frequent parking, an impervious surface or approved pervious hard surface parking area shall be developed.

(Ord. 475. Passed 7-6-99.)

◆ **H-1 and H-2 - Hospital Districts**

The H-1 and H-2, Hospital Districts are for the purpose of accommodating medical centers, hospitals and all their normally related functions, if properly sited in relation to each other and pursuant to an approved plan for that district. The difference between the H-1 and H-2 districts are fewer uses but greater size allowed in the H-2 district. Developments in the H-2 district shall be functionally integrated with other buildings and parking areas and be in substantial conformity with the Hospital Master Site and Facilities Plan.

**1358.01 USES ALLOWED.**

(C) H-2 District. The following uses of land and buildings, together with accessory uses, are allowed in the H-2 District:

- H-1 District uses;

**1358.03 LOT, DENSITY AND IMPERVIOUS SURFACE PROVISIONS.**

Lot width (min.)	Lot area (min.)	Density (maximum)	Impervious surface
20 feet	No minimum.	29 dwelling units/acre	H-1: 70% maximum H-2: 60% maximum

## ❖ Existing Zoning Efforts Continued

### **1358.08 PARKING, LOADING AND DRIVEWAYS.**

(A) Requirements for parking, loading and driveways are contained in Chapter 1374. In addition, athletic fields may provide up to 50% of the required number of organized parking on an area developed in turf grasses. Grassed parking areas are considered as providing one parking space for every 350 square feet of continuous turf-covered area. All grassed parking areas shall be maintained in a healthy, vigorous growing condition and shall not be used more than 12 times per calendar year. When use requires more frequent parking, an impervious surface or approved pervious hard surface parking area shall be developed.

### **1362 Planned Unit Developments**

The purpose of planned unit developments is to permit flexibility in zoning regulations so that developments conserve environmental resources, economic investment and the community's social fabric while reclaiming marginal and abandoned areas. Where appropriate, new development contiguous to urban boundaries should be organized as compact, pedestrian-friendly, mixed-use neighborhoods characteristic of Traverse City's historic areas.

Approval of a planned unit development shall not be considered an ordinance amendment.

### **1362.01 STANDARDS FOR APPROVAL.**

Approval will not be granted when the planned unit development is sought primarily to avoid the imposition of standards and requirements of existing zoning classifications. A planned unit development shall be approved if it is shown that the land use and development meet all of the following standards:

(b) The use is compatible with adjacent land use, the natural environment and the capacities of affected public services and facilities. The use is consistent with the public health, safety and welfare of City residents.

(h) The project emphasizes pedestrian circulation and access. The circulation system is composed of short blocks, narrow streets, sidewalks and alleys, where appropriate and practical. The vehicular and pedestrian circulation shall be well-defined and safe.

(j) The natural landscape features will be preserved and integrated as an integral part of the overall design. Building placement and design represents thoughtful responses to the specific site features and the climate to create interesting and desirable outdoor spaces.

### **1362.03 PLANNED UNIT DEVELOPMENT APPLICATION.**

(b) Additional Information. Upon the request of the Planning Director within 35 days of accepting the application, the applicant shall provide such additional information and items pertinent to the development or use:

(1) A description of the developer's intent and objectives (physical, social and environmental);

(5) A description of the impact of development on local streets, natural features, schools and utilities;

(6) Identification of any waste emissions and methods of handling smoke, dust, noise, odors, liquids, solids and vibrations;

## ❖ Existing Zoning Efforts Continued

### ◆ SPECIAL LAND USE REGULATIONS

#### **1364.02 GENERAL STANDARDS FOR APPROVAL.**

(c) The use shall be served adequately by existing or proposed public infrastructure and services, including but not limited to, streets and highways, police and fire protection, refuse disposal; water, waste water, and storm sewer facilities; electrical service, and schools. (e) The use shall not involve any activities, processes, materials, equipment or conditions of operation that would be detrimental to any person or property or to the general welfare by reason of excessive production of traffic, noise, smoke, fumes, glare, odors or water runoff.

#### **1364.08 SPECIAL LAND USE PERMITS GRANTED BY THE CITY COMMISSION.**

(c) Communication towers. The intent of this section is to ensure communication towers are constructed and placed in a manner which will protect the public health, safety and welfare and where visual impact will be minimized. Communication towers are permitted if all of the following requirements are met:

(8) Existing mature trees and natural land forms on the site are preserved to the maximum extent possible.

(r) Wind energy system, pole or tower-mounted structures. The intent of this section is to ensure that free-standing wind energy systems are constructed and placed in a manner which will protect the public health, safety and welfare and where visual impact is minimized. Free-standing wind energy systems are permitted if all of the following requirements are met:

(9) Existing mature trees and natural land forms on the site are preserved to the maximum extent possible.

#### **1364.08 SPECIAL LAND USE PERMITS GRANTED BY THE CITY COMMISSION.**

The City Commission may grant a special land use permit for the following uses in any district, except as herein qualified:

(b) Clustered single family dwellings. The purpose of clustered housing is to provide owners of large parcels of single or two-family residential property the alternative to develop their properties in an environmentally sensitive and cost-effective manner by clustering single-family homes or townhouses rather than spreading development over the entire site. By clustering development, sensitive and attractive environmental features can be preserved as common open space to be enjoyed by future residents. Clustered housing is subject to the following:

### ◆ SITE PLANS AND SITE DEVELOPMENT STANDARDS

#### **1366.03 SITE PLAN REQUIREMENTS.**

(a) Requirements. A land use permit application shall be accompanied by a filing fee established by resolution of the City Commission. Site plans shall be sealed by a registered architect or engineer, except site plans to be referred to the Planning Commission for approval may defer this requirement until receiving Planning Commission approval. Site plans shall be drawn to scale, rendered on a minimum sheet size of 24 inches by 36 inches and shall include the following:

(12) The proposed location and dimensions of site drainage areas, walkways, landscaped areas, recreation areas, open space and screen walls;

## ❖ Existing Zoning Efforts Continued

(13) Natural features, such as unique topographic features, wetlands, 100-year flood plain elevations, creeks, springs and others, with an indication as to which are proposed to be maintained, altered or removed during site development; and

(16)

B. A tree location survey signed by an engineer, surveyor, landscape architect, showing all existing trees having a diameter at breast height of six inches or greater, the common and/or scientific names and the diameter at breast height of these trees, plus an indication of trees to be preserved, to be transplanted, or to be removed during site development. Closely grouped trees shall be designated by the predominate species represented, the number present and the diameter at breast height range of the group or clump;

### **1366.08 MASTER SITE AND FACILITIES PLANS.**

(c) Master Site and Facilities Plan requirements.

(1)

(H) Natural features, such as unique topographic features, boundaries of regulated wetlands, 100-year flood plain elevations, creeks, springs and others.

(M) A conceptual plan in a narrative or graphic plan that describes the central storm-water features, if any.

### **1366.05 CONDITIONAL APPROVALS.**

(a) (2) Would protect the built and natural environment.

## ◆ LANDSCAPING

The process of development may require the alteration of existing topography and soil structure, the disruption of native vegetation and the expansion of impervious surface area over the development site. The cumulative effects of the land-altering process extend far beyond the property lines of an individual development site and if development is not undertaken within the context of the broader community, it will not only degrade the individual development, but also the community of which it is a part. It is, therefore, the intent of this Chapter to protect and manage vegetation to:

(a) Aid in the stabilization of the environmental balance through air purification, oxygen regeneration, groundwater protection and recharge and the control of stormwater runoff.

(c) Enhance community appearance, identify unique natural beauty, and promote quality development at a suitable scale.

(e) Prevent reductions in the City's urban forest.

(f) Provide for the preservation of larger native trees which are valuable amenities to the urban environment that, once destroyed, can only be replaced after generations; and

(g) Ensure that the local stock of native trees and vegetation is replaced.

## ❖ Existing Zoning Efforts Continued

### **1372.03 STANDARDS AND MATERIALS.**

(a) General Performance Standards The following general performance standards shall apply whenever compliance is required:

(1) All areas not covered by buildings, parking areas, driveways, walkways, pedestrian plazas or other pedestrian-oriented impervious surfaces or water surfaces shall be planted with living vegetation, including canopy trees, shrubbery and ground covers. The combination of plant materials selected shall be placed in harmonious and natural associations and represent the approved indigenous landscape materials and their cultivars listed in Appendix 3.

(2) Not less than 80 percent of any landscape area shall be covered by plant materials. Stone and other mulches, grass and other ground covers, pedestrian walks, other impervious surfaces or water surfaces may cover the remaining 20 percent of the landscape area.

(3) The general site topography and any natural landforms unique to the property shall be maintained and made part of the development whenever possible to reinforce the local and regional character.

(e) Existing vegetation. The following standards shall apply to existing site vegetation whenever compliance is required:

(1) Existing healthy trees, of an approved species listed on Appendix 3, shall be preserved and incorporated into the final development plan.

(2) Existing healthy trees and shrubs located within required setbacks and areas not required for development shall be preserved.

(3) Trees to be preserved shall be pruned to remove dead, diseased or irregular branching, but the crown form characteristic of the respective species shall be maintained.

(4) Preserved trees shall be protected with sturdy, highly visible barriers around the tree or group of trees, at approximately the critical root zone or dripline and a tree preservation plan shall be submitted and approved by the Planning Director.

(5) The critical root zone of the tree shall remain undisturbed by cutting, filling or storage of materials and equipment during the development process.

(6) Healthy, younger trees on development sites shall be preserved wherever possible to allow normal succession as older trees are lost.

### **1372.05 LANDSCAPE DEVELOPMENT INTERNAL TO A PARKING AREA.**

(b) All internal landscape areas shall be protected from vehicular encroachment by permanent granite, concrete curb or curb and gutter, except that portions of the curb maybe omitted where approved by the Planning Director to accommodate the secondary use of landscape areas for stormwater detention and snow storage.

### **1372.06 LANDSCAPE REQUIREMENTS FOR STREET RIGHTS-OF-WAY.**

The following landscape requirements for street rights-of-way shall apply when compliance is required:

(c) Subsequent or replacement trees shall conform to the type of existing trees in a given area, provided that, if any deviation is anticipated, it must be done only with the permission of the City Forester. In a newly planted area, only one type of tree may be used on a given street unless otherwise specified by the City Forester.

## ❖ Existing Zoning Efforts Continued

### ◆ CIRCULATION AND PARKING

The purpose of chapter is:

- To make Traverse City safe and accessible by pedestrians, cyclists, drivers and passengers.
- To give equal consideration to the pedestrian in the design of all public and private parking areas.
- To promote site designs that help to reduce crashes and conflicts between pedestrians and vehicles.
- To maintain the utility of the public rights-of-way to move goods and people safely and adequately.
- To promote interesting street edges that invite people to walk.
- To encourage a healthier transportation mix.

#### **1374.01 PEDESTRIAN TRAVEL WAYS.**

(a) Compliance required. All developments except for one and two-family dwellings, shall provide clearly defined pedestrian travelways from the public sidewalk to main entrances of the buildings or uses of the land.

(b) Requirements. A sidewalk a minimum of five feet wide free from obstructions shall be constructed from the public walk to main entries of buildings. On lots where there are multiple principal buildings or main entries, sidewalks meeting the requirements above shall be provided.

(c) Construction standards. Pedestrian travelways shall be physically separate from the parking area except where they cross a vehicle maneuvering lane, in which case the travelway shall be defined with a separate and contrasting material such as the use of a textured concrete or brick paver.

#### **1374.02 BICYCLE PARKING.**

(a) Compliance required. Whenever full off-street parking compliance is required, a minimum of one bicycle rack or locker is required and shall be located within 50 feet of the main entrance of a building or inside a building in a location that is easily accessible by bicyclists. For sites that require more than 25 motor vehicle spaces, the ratio is one rack for every 25 motor vehicle spaces.

When units of measurement determining the number of required parking spaces result in a fractional space, any fraction up to and including one-half shall be disregarded and fractions over one-half shall require one parking space.

#### **1374.03 MOTOR VEHICLE PARKING.**

(g) (4) Storm-Water Management. All parking areas shall provide for storm water management pursuant to Traverse City Code Chapter 1068, Groundwater Protection and Stormwater Runoff Control.

### ◆ RENEWABLE ENERGY

The purpose of this chapter is to provide regulations governing wind energy systems to provide for appropriate locations for wind energy systems, to ensure compatibility with surrounding uses, and to promote safe, effective and efficient use of wind energy systems to increase opportunities for generation of renewable energy.

## ❖ Existing Zoning Efforts Continued

Please see Appendix E. Zoning District Map

## ❖ Recreational Resources

### ◆ East And West Grand Traverse Bays (Lake Michigan)

The bays are an important natural resource for Traverse City. It is used for fishing, sailing, boating, swimming, wind-surfing, diving, and simply viewing from the shore. There is a desire to link all the City bay front parks together, featuring trails, walkways, etc. with interpretive educational centers as part of the trail. Several historical and watershed educational stations have been added in the past few years. There also is a push to enhance "shore-based" fishing, with an emphasis on more public fishing without need for a boat. One location in the planning stage is at the mouth of the Boardman River where it empties into West Grand Traverse Bay.

Management of the City's shorelines and riparian areas must include protection and enhancement of fish habitat to improve this fishery. Removing or controlling several invasive species of plants and animals is also at the forefront of environmental efforts. The re-establishment of native vegetation in some disturbed habitat areas is the best defense against the growth of invasive plants. About half of Traverse City's shoreline is sandy beach. Other parts of the shoreline have been altered with protective shoreline measures from rock revetments to broken concrete slabs to steel sheet pilings.

### ◆ Boardman River System

The Boardman River passes through the City of Traverse City including Boardman Lake. This lake level is enhanced approximately nine feet by the Union Street Dam right in the center of the City. The lake and river both offer many recreational opportunities both land based and water based. With the bays so close at hand, Boardman Lake and River do not see the level of use that they would have if located in a community away from the Great Lakes. The potential is great for development of facilities that will enhance the uses of the Boardman River system as it passes through the City.

### ◆ Parks And Recreation Commission

The Parks and Recreation Commission, formed in 1992, serves as an advisory body to the City Commission in Parks, Recreation, and Cemetery matters. Six of the seven commissioners are appointed by the City Commission and serve staggered terms of three years. The seventh member is the City Manager's representative. This body is an important liaison between the citizens of Traverse City and the City Commission, along with other groups and governmental units. The Commission was formed under the authority of Section 30 of the Charter of the City of Traverse City.

### Staff

The Parks and Recreation staff develops and organizes recreation programs and directs the operation and maintenance of parks, cemetery, and special facilities. The Parks and Recreation Division is under the direction of the Parks and Recreation Superintendent who reports to the Director of Public Services who reports directly to the City Manager. The City Manager is responsible to the City Commission which consists of six citizens elected for staggered four year terms and an elected Mayor that serves a two year term. The Mayor and the City Commission are, in turn, ultimately responsible to the citizens which they serve. The Brown Bridge Advisory Group makes recommendations to the City Manager on issues related to the Brown Bridge Quiet Area.

## ❖ Recreational Resources Continued

The Parks and Recreation Division is responsible for recreation programming and facilities, Hickory Hills Ski Area, Oakwood Cemetery, the urban forestry program, public park operations and maintenance, the steam train at the Clinch Park and marina area, three outdoor ice skating rinks and snow removal from several City parking lots. The City's Senior Citizen Center and Duncan L. Clinch Marina are under the direction of the Department of Public Services Director.

### ◆ Recreation Programs

Traverse City prides itself on a well maintained and diversified parks system. Using these areas, along with school and county facilities, the Parks and Recreation Division has developed a variety of programs for youth and adults. The City recreation programs are coordinated with other area agencies so as not to compete or conflict with their activities and programs. The programs run throughout the year and are available to residents and non-residents alike. Below is a summary of offerings available through the City to residents in the area.

1. Women's Softball. There is one league in this program, a church slow pitch league.
2. Day Camp. Children 7-12 years of age may attend this summer program held at the Grand Traverse County Civic Center. The program emphasizes outdoor recreation, arts and crafts, nature education, and beach activities. The program is a cooperative effort between the City of Traverse City and Grand Traverse County. The City provides the registration, administration and staffing and the County makes the space available at a low rental rate and provides some logistical support. The ten week program has a maximum of 50 children per week and is full most weeks.
3. Volleyball Leagues. The City uses elementary school gyms for this program which currently features six men's, women's, and co-ed leagues that play from October through March.
4. Hershey Track and Field Meet. This meet is held in June for ages 9-14. Winners of the local meet advance to the state meet held in July.
5. The Traverse Area Community Sailing (T.A.C.S.) Program. This summer program gives children an opportunity to learn to sail and is located at the north end of Boardman Lake at Hull Park.
6. The Grand Traverse Area Ski Club. The GTSC offers children the opportunity to learn how to ski and snowboard in a non-competitive format and then become involved in the Club's ski racing program.
7. The Northern Michigan Disc Sports Organization. This group first approached the City with the offer to design and set up a 24 hole disc golf course at the City's Hickory Hills ski area in 1998. The course was completed in 1999. The NMDSO continues to be involved in the program with tournaments, weekly leagues and work bees to improve and maintain the course.
8. Music In the Park Series. The City holds free concerts during the summer at F & M and Hull Parks. The entertainment varies in talent from the Interlochen Music Academy to Jazz, Rock, Bluegrass and Country.
9. Badminton. An area resident organized and now coordinates this program with the City. This indoor, fall and winter program involves many age and ability levels.

## ❖ Recreational Resources Continued

### ◆ Regional Recreation

Probably the greatest attraction of the Traverse City area is its abundance of recreational opportunities in a varied, interesting landscape. Within a one-half hour driving distance from the City are a preserved National Lakeshore, three State parks, two smaller ski resorts (Holiday Hills and Hickory Hills), a large expanse of State forest lands, a State game area, many public swimming areas, inland lakes, biking trails, and within 1 to 1 1/2 hours you have seven major ski resorts (Crystal Mountain, Nub's Nob, Shanty Creek, Boyne Mountain, and Boyne Highlands, The Homestead and Caberfae Peaks). In addition, numerous historic sites, as well as the beauty of the peninsulas, bays, and various orchards and vineyards, attract people from all over the State of Michigan and the country to the Traverse City region. These areas provide an unlimited array of recreational opportunities to the residents of Traverse City as well as to the outside visitor. The map identifies the locations of many recreational opportunities in the region.

### ◆ City Facilities

Traverse City owns 33 parks and recreational properties, ranging from a small downtown parcel to the larger Hickory Hills Ski Area, the Grand Traverse Commons and the Brown Bridge Quiet Area. The City enjoys a broad range of recreational opportunities. Much of the park land is heavily concentrated along the Boardman River and along the shoreline of the West Grand Traverse Bay. In total, over 1,600 City-owned acres are currently dedicated to recreational pursuits including Hickory Hills Ski Area and Grand Traverse Commons that are each approximately 125 acres and Brown Bridge Quiet Area, located 10 miles southeast of the City, has nearly two square miles (1,310 acres) of natural area along the Boardman River and Brown Bridge pond.

## ❖ The Waterfront

### ◆ TRAVERSE CITY'S WATERFRONT PLAN – "YOUR BAY YOUR SAY" 2007

#### Key Recommendations of the Plan

1. Connect the downtown and neighborhoods to the waterfront
2. Create a new Central Park, a "town square" on the water
3. Promote mixed use infill to reinforce the edges of the park
4. Provide a variety of activities and public spaces along the waterfront
5. Respect the natural beauty and ecological integrity of the bay and Boardman River
  - Open Views
  - Landscape Character
  - Sustainable Design
  - Stormwater Management

## ◆ TRAVERSE CITY BAYFRONT 2010

### Summary & Purpose

The Traverse City Bayfront Preliminary Engineering design project addresses improvements to public parkland recreational facilities for over two miles of shoreline from the intersection of Grandview Parkway (M-72) and M-22 east to the Traverse City Senior Center. The plan is a detailed refinement of the Traverse City Waterfront Concept Plan developed by the “Your Bay, Your Say” project in 2007.

The proposed improvements developed from stakeholder and public input includes a balance of enhancements to both the urban and natural environments along the Traverse City Bayfront.

### Goals

The specific goals addressed by the Preliminary Engineering Plan include:

- Provision of designs for crosswalks and gateways that enhance pedestrian circulation and provide connectivity between the Bayfront and the downtown districts and residential neighborhoods located south of Grandview Parkway.
- Provision of designs for the public spaces on the Bayfront that are responsive to the hopes and desires of the community which were embodied in the preferred Traverse City Waterfront Concept Plan, developed by the “Your Bay, Your Say” project.
- Provision of drawings and renderings that illustrate the Preliminary Bayfront Engineering plan provide understanding and seek endorsement from stakeholders.
- A professional and transparent process that supported stakeholder and community involvement in furthering the design of the improvements for the Traverse City Bayfront.
- Provision of preliminary engineering plans, phasing plans, a cost estimate and supporting documentation.

### Investigations

In order to understand the expectations, goals and issues of the stakeholders and community, the Bayfront project team reviewed relevant reports and other documentation. These documents included the following:

- Key Recommendations – Traverse City’s Waterfront Plan “Your Bay. Your Say”
- West Bay Image and Character Study – Small Town Design initiative Michigan State University, May 2006
- Across Grandview Parkway – Traverse City Character Study prepared by Masters Students from the University of Michigan
- Engineering plans for existing infrastructure on file with the City of Traverse City
- Grand Traverse Bay Watershed Protection Plan
- FEMA Flood Plain Maps and TCLP Flood Inundation Mapping and Modeling
- City of Traverse City Master Plan, 2009
- New Designs for Growth Development Guidebook
- Low Impact Development (LID) in the Grand Traverse Region

## ❖ **Marinas**

### ◆ **Michigan Clean Marina Program**

The Michigan Clean Marina Program was developed to protect water resources and wildlife habitat by promoting environmentally sound marina and boating best practices. This is a voluntary stewardship program open to all public and private marinas in Michigan. The Michigan Clean Marina Program encourages marinas to develop environmentally sound and economically feasible approaches to reduce waste and prevent the release of hazardous substances. Marinas pledge to join the program, and then follow a 10-step process to achieve Clean Marina certification.

#### **Program Objectives**

The Michigan Clean Marina Program was developed through a public-private partnership involving the marine industry, academic institutions and state government in an effort to sustain and improve water quality in Michigan and the Great Lakes.

#### **Objectives include:**

- Promoting voluntary implementation of pollution prevention strategies, environmental risk reduction and fish and wildlife habitat enhancement.
- Encouraging industry compliance with environmental laws and regulations.
- Developing economic incentives and recognition for environmentally proactive marina operations.
- Fostering communication among marina operators, state government, universities and the boating industry.

#### **Benefits for Certified Clean Marinas:**

- Reducing pollution and protecting water quality, fish, plant and wildlife habitat in Michigan's waterways and the Great Lakes.
- Enhancing the public image of boating and marinas by promoting environmentally sound best practices.
- Saving money, such as a reducing insurance costs and reducing waste disposal fees through recycling. In fact, some marinas are generating revenue through oil reclamation programs.
- Accessing free boater education information and marketing tips through program outreach and promotions.

### ◆ **Michigan Clean Marina Program Participation**

- ◆ Clinch Park Marina – Not currently certified
- ◆ Great Lakes Maritime Academy – Not currently certified

## ❖ Watershed Protection

### Grand Traverse Bay Watershed Protection Plan

Goals, objectives, actions

**Goal 1.** Protect the integrity of aquatic and terrestrial ecosystems within the watershed.

- Objective 1: Protect and restore desirable habitat areas for aquatic organisms in streams and lakes throughout the watershed and the Grand Traverse Bay and preserve the biodiversity of populations and communities of aquatic organisms in the watershed.
- Objective 2: Protect shoreline habitats by minimizing artificial shoreline alteration, including hardening and grooming.
- Objective 3: Minimize hydrologic flow fluctuations
- Objective 4: Work to stop wetland and other types of lowland filling.
- Objective 5: Reduce the magnitude of overland stormwater runoff to streams.
- Objective 6: Promote the reduction of potential global warming factors to limit projected evaporative losses from the bay and inland lakes.
- Objective 7: Reduce and/or minimize sediment inputs to streams and lakes in watershed.
- Objective 8: Prevent the spread of existing invasive species and the introduction of new ones in area watersheds.
- Objective 9: Maintain terrestrial habitat and preserve the biodiversity of populations and communities of terrestrial organisms in the watershed.
- Objective 10: Minimize the negative effects of recreational boating and other types of watercraft from pollutants such as sediment, toxins, and pathogens.

**Goal 2.** Protect and improve the quality of water resources within Grand Traverse Bay and its watershed.

- Objective 1: Control and/or minimize the input of nutrients, pathogens, and toxic compounds (herbicides, pesticides, heavy metals, etc.) into surface water and groundwater.
- Objective 2: Maintain current levels of phosphorus and nitrogen in Grand Traverse Bay.
- Objective 3: Control and reduce the amount of stormwater runoff entering Bay and tributaries; control and reduce the amount of pollutant in stormwater as well.
- Objective 4: Control and reduce thermal pollution in the watershed resulting from stormwater inputs, impervious surfaces, lack of stream canopy, dams and lake-level control structures, and reduced groundwater inputs.
- Objective 6: Protect groundwater and surface water recharge areas and discourage water withdrawals that negatively impact the sustainability of the aquatic system and water supply.
- Objective 7: Minimize air deposition into surface water from sources including vehicles and industrial, commercial, and municipal facilities.

## ❖ Watershed Protection Continued

**Goal 3.** Establish and promote land and water management practices that conserve and protect the natural resources of the watershed.

Objective 1: Establish and promote land management practices that conserve natural resources and protect water quality throughout the watershed.

Objective 2: Promote voluntary arrangements and regulatory tools that help prevent degradation of natural resources.

Objective 3: Assist townships/villages with zoning and master plans in developing ordinances to protect water quality and natural resources, where an interest has been expressed.

Objective 4: Establish and support stormwater best management practices that reduce the amount and harmful effects of stormwater entering waterways. Improve stormwater management throughout the watershed.

Please see Appendix A. Grand Traverse Bay Watershed Map

### Lake Michigan Lakewide Management Plan

**VISION:** A sustainable Lake Michigan ecosystem that ensures environmental integrity and that supports and is supported by economically viable, healthy human communities.

**STATUS:** Lake Michigan is an outstanding natural resource of global significance, under stress and in need of special attention.

**GOAL:** To restore and protect the integrity of the Lake Michigan ecosystem through collaborative, place-based partnerships.

## ❖ Watershed Protection Continued

**Table 2-1. End Point Subgoals**

<i>End Point Subgoals</i>		
Endpoint subgoals describe the desired levels of ecosystem integrity and ecological services required to restore beneficial uses and provide for healthy human and natural communities in the basin.		
Subgoal 1	We can all eat any fish.	
Subgoal 2	We can all drink the water.	
Subgoal 3	We can all swim in the water.	
Subgoal 4	All habitats are healthy, naturally diverse, and sufficient to sustain viable biological communities.	
Subgoal 5	Public access to open space, shoreline, and natural areas is abundant and provides enhanced opportunities for human interaction with the Lake	
Subgoal 6	Land use, recreation, and economic activities are sustainable and support a healthy ecosystem.	

**Table 2-2. Means to End-Point Subgoals**

<i>Means to End-Point Subgoals</i>		
Means subgoals describe the natural and organizational processes required to achieve the endpoint subgoals.		
Subgoal 7	Sediments, air, land, and water are not sources or pathways of contamination that affect the integrity of the ecosystem.	
Subgoal 8	Exotic species are controlled and managed.	
Subgoal 9	Ecosystem stewardship activities are common and undertaken by public and private organizations in communities around the basin.	
Subgoal 10	Collaborative ecosystem management is the basis for decision-making in the Lake Michigan basin.	
Subgoal 11	We have enough information/data/understanding/indicators to inform the decision-making process.	

## ❖ Economic Development

### ◆ Grand Traverse Next Michigan Development Corporation:

The Next Michigan Development Act was established by PA 275 of 2010 to allow for the creation of a Next Michigan Development Corporation, by interlocal agreement, that fosters economic opportunities in this State, prevents conditions of unemployment and underemployment, and promotes economic growth focused on multi-modal transportation.

Grand Traverse County, City of Traverse City, Garfield Charter Township, East Bay Charter Township and Blair Township received designation as the Grand Traverse Next Michigan Development Corporation (GTNMDC) by the Michigan Strategic Fund Board in February, 2012. Only five regions in Michigan have such designation. A representative of each community comprises the GTNMDC Board.

GTNMDC is a set of economic development tools and incentives that focus on bringing businesses or expanding current businesses that utilize multimodal commerce, meaning a business must use two or more modes of transportation to ship its products. In the case of Grand Traverse County, the current focus is on air and road transportation but may include rail and water in the future. The goal of the Next Michigan designation is to best utilize current incentive tools and transportation infrastructure, particularly Cherry Capital Airport, to create job opportunities for the people of the Grand Traverse region.

Key partners in the GTNMDC include Cherry Capital Airport, Northwestern Michigan College, Traverse City Area Chamber of Commerce, Traverse Bay Economic Development Corporation, Grand Traverse County Road Commission, Traverse City-Transportation and Land Use Study (TC-TALUS) and the Michigan Economic Development Corporation.

#### **The Objectives**

- Encourage local cooperation
- Enable the incentives to be used in a coordinated approach -- not piecemeal
- Take advantage of existing regional transportation assets
- Use economic incentive tools with proven track record
- Streamline permitting processes

#### **The Benefits**

- Create jobs
- Allows additional tools to be utilized to attract NEW businesses (including start-ups)
- Connects business growth with current infrastructure – airport / roads
- Allows local governments to work together on economic development
- MEDC will market NMDC communities

#### **Specifically, the GTNMDC offers the following tools:**

- Establish a multi-jurisdictional local development financing authority (LDFA) with the ability to utilize state tax capture, with the approval of the State Treasurer, for public infrastructure improvements
- Designate renaissance tax-free zones as allowed by the State of Michigan
- Grant real and personal property tax abatements

## ◆ DDA

### **Purpose and Governance**

The Traverse City Downtown Development Authority was created in 1978 to halt property value deterioration and to increase property valuation where possible in the business district of the City; and to eliminate the causes of deterioration and to promote economic growth. The DDA was created under Michigan Public Act 197 of 1975.

The Traverse City DDA completed a downtown market analysis, prepared by Economics Research Associates, in 2007. This analysis looked at retail, office and residential in downtown and offered core strategy recommendations addressing DDA operational focus, downtown infrastructure improvements, and market opportunities and positioning.

### **Recommendations:**

#### **DDA Operational Focus**

- Develop a non-profit foundation to raise funds for and manage specific strategies downtown
- Reduce tenant turnover through systematic assistance to new business seeking space downtown
- Consistent store hours
- Identify priority infill sites and identify incentives to spur their redevelopment
- Act as a real estate intermediary to facilitate downtown revitalization
- Expand regional marketing support

#### **Downtown Infrastructure Improvements**

- More parking to address current needs and future development
- Wayfinding and gateway improvements
- Streetscape improvements including facilitating more outdoor dining and public art
- Evaluate conversion of one-way streets to two-way
- Bayfront park connections

#### **Market Opportunities and Positioning**

- Facilitate more entertainment in downtown
- Increase residential density downtown
- Enhance the Farmers Market's role as a destination
- Adjust downtown store mix to focus on more successful retail segments such as home renovation and art galleries
- Seek new store types such as wine tasting, olive oil, grocery, fair trade and cereal stores
- Add certain national retailers to expand the draw of downtown and as a hedge against a suburban lifestyle center
- Discourage street level office
- Promote additional festivals and special events to enhance traffic downtown

## ❖ Sustainable Business Practices

The Traverse City Area Chamber of Commerce distributed a sustainable business practices survey to the coastal communities in their service area - Traverse City, Suttons Bay, Northport, Empire, and Frankfort. The results were not broken down by community and those results are a summary of all the responses. Please see Appendix K. Sustainable Business Practices Survey.

## ❖ Other Stewardship Efforts

### ◆ Boardman River Restoration

Boardman River Restoration is the largest river restoration project in Michigan's history. The removal of Brown Bridge, Boardman and Sabin dams on the Boardman River will restore more than three river miles of native coldwater fisheries habitat, more than 250 acres of wetlands and nearly 60 acres of up-land habitat.

As part of the Boardman River Restoration, a new watershed plan is being developed that will establish a blueprint for the stewardship, economic well-being and quality of life of the Boardman watershed. By integrating economic, social and environmental objectives, this new Prosperity Plan will serve as a model for long-term stewardship of critical watersheds throughout Michigan and the nation. The plan also builds on the success of the Grand Vision and will result in on-the-ground projects that support the Grand Vision's guiding principles.

The Boardman River is a significant resource to the Traverse City region. It is the second largest tributary to Grand Traverse Bay, supplying 30 percent of the Bay's surface water. The Boardman is also hailed as a Blue Ribbon trout stream, being one of the top 10 trout streams in Michigan.

Restoring the river will also bring positive economic benefits to the region of more than \$3 million from increased recreation, tourism and property values.

### ◆ Kids Creek Restoration

Kids Creek is on the state of Michigan's list of impaired waters due to being overloaded with sediments and high water flows. The Kid's Creek Restoration Project began in July 2003. Made possible through a grant from the Great Lakes Commission Soil Erosion and Sedimentation Control Program, this project showcases how urban communities can protect and restore their streams by using urban planning techniques like planned unit developments (PUDs) to help fund such activities.

Additional phases include restoring the section of Kids Creek that runs through Munson Medical Center. This phase will be funded by a \$627,000 grant from the Michigan Department of Environmental Quality and \$500,000 from the U.S. Environmental Protection Agency's Great Lakes Restoration Initiative. The funding will be used to daylight and naturalize a section of Kids Creek running through the Munson campus, and the installation of Low Impact Development green infrastructure

### ◆ Grand Traverse Stewardship Initiative

The Grand Traverse Stewardship Initiative (GTSI) can trace its origins to the Great Lakes Water Studies Institute at Northwestern Michigan College. In 2004, a professional development initiative began, first as RIPPLE and later as the DTE Freshwater Institute for Teachers. The goal was to help teachers launch place-based education in K-12 classrooms as a strategy to inspire lifelong stewardship of freshwater.

In 2007, inspired by these efforts in the Grand Traverse region, the Great Lakes Fishery Trust (GLFT) established and funded a state-wide initiative called the Great Lakes Stewardship Initiative (GLSI) with the mission of providing educators with the training and experience needed to help Michigan's young people gain knowledge about the Great Lakes watershed, and become future stewards of the environment.

The GLSI's infrastructure is made up of eight regional "hubs" in Michigan who provide leadership, expertise, and support for the GLSI's three key strategies: Place-based education, school-community partnerships, and sustained professional development for teachers.

## ❖ Other Stewardship Efforts Continued

In 2009, the GLFT provided funds to establish the Grand Traverse Stewardship Initiative. Since its inception, the GTSI has been one of the education programs of the Grand Traverse Conservation District, and is an integral part of the Conservation District's mission to inspire exploration, appreciation, and conservation of our natural world.

### ◆ Grand Traverse Baykeeper

The Grand Traverse Baykeeper, a program of the Watershed Center, serves as a resource to citizens, planners and municipalities throughout the region. The focus is on finding sustainable solutions to protect the environmental health of the Grand Traverse region's water resources.

Activities include:

- Advocates for the environmental health of Grand Traverse Bay and its watershed
- Leads a visible role as an advocate for the watershed – on the water and in the community
- Serves as a liaison between concerned citizens and regulatory bodies
- Monitors area waters
- Assists local governments
- Conducts outreach and education programs
- Pursues action against polluters when necessary

### ◆ TAAR Green Solutions 4 (GS4)

In November of 2007 the Traverse Area Association of Realtors (TAAR) in collaboration with the regional Homebuilders Association developed criteria for the Multiple Listing Service that would reflect green building efforts. Out of this exercise came the realization that in conjunction with this undertaking an educational effort needed to take place as well. In 2008 this program has expanded to include many other areas of sustainable philosophies beyond the original scope of the GS4 to assist in providing real solutions for people to live better healthier lives, save money, reduce their ecological impact, and save our precious resources.

## IV. Appendices

Appendix A. Grand Traverse Bay Watershed Map

Appendix B. Grand Traverse Bay Subwatersheds Map

Appendix C. Boardman River Watershed Map

Appendix D. Future Land Use Map

Appendix E. Zoning Map

Appendix F. Traverse City Water System Map

Appendix G. Recreational Facilities Map

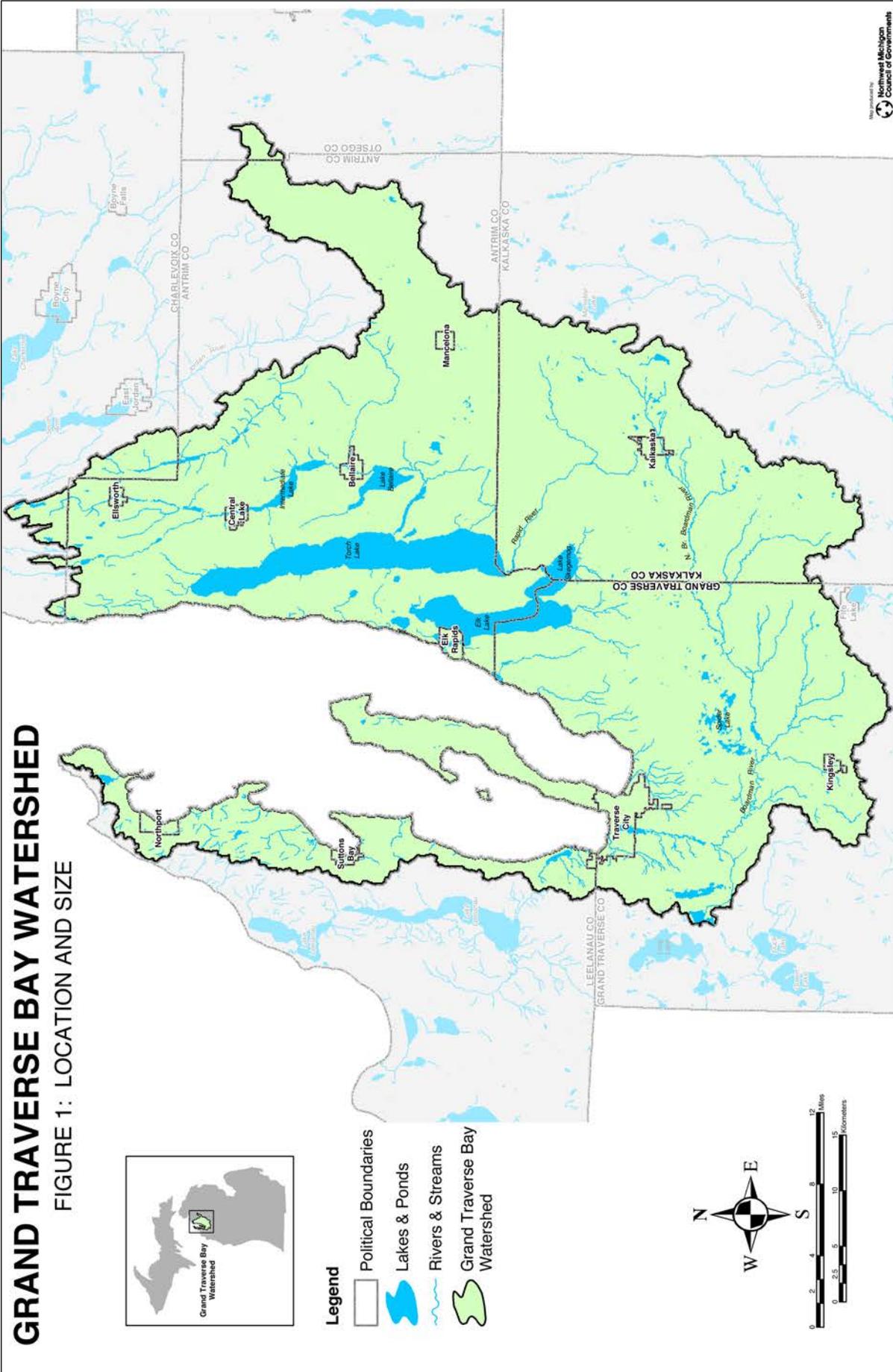
Appendix H. Northwest Michigan Non-Motorized Strategy 2008 – Grand Traverse County

Appendix I. DDA Districts Map

Appendix J. TART Trail Map (Downtown Inset)

Appendix K. Sustainable Business Practices Survey

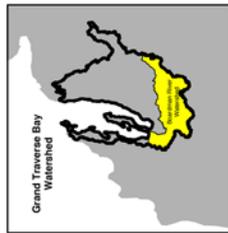
# Appendix A. Grand Traverse Bay Watershed Map





# GRAND TRAVERSE BAY WATERSHED

FIGURE 12: BOARDMAN RIVER WATERSHED

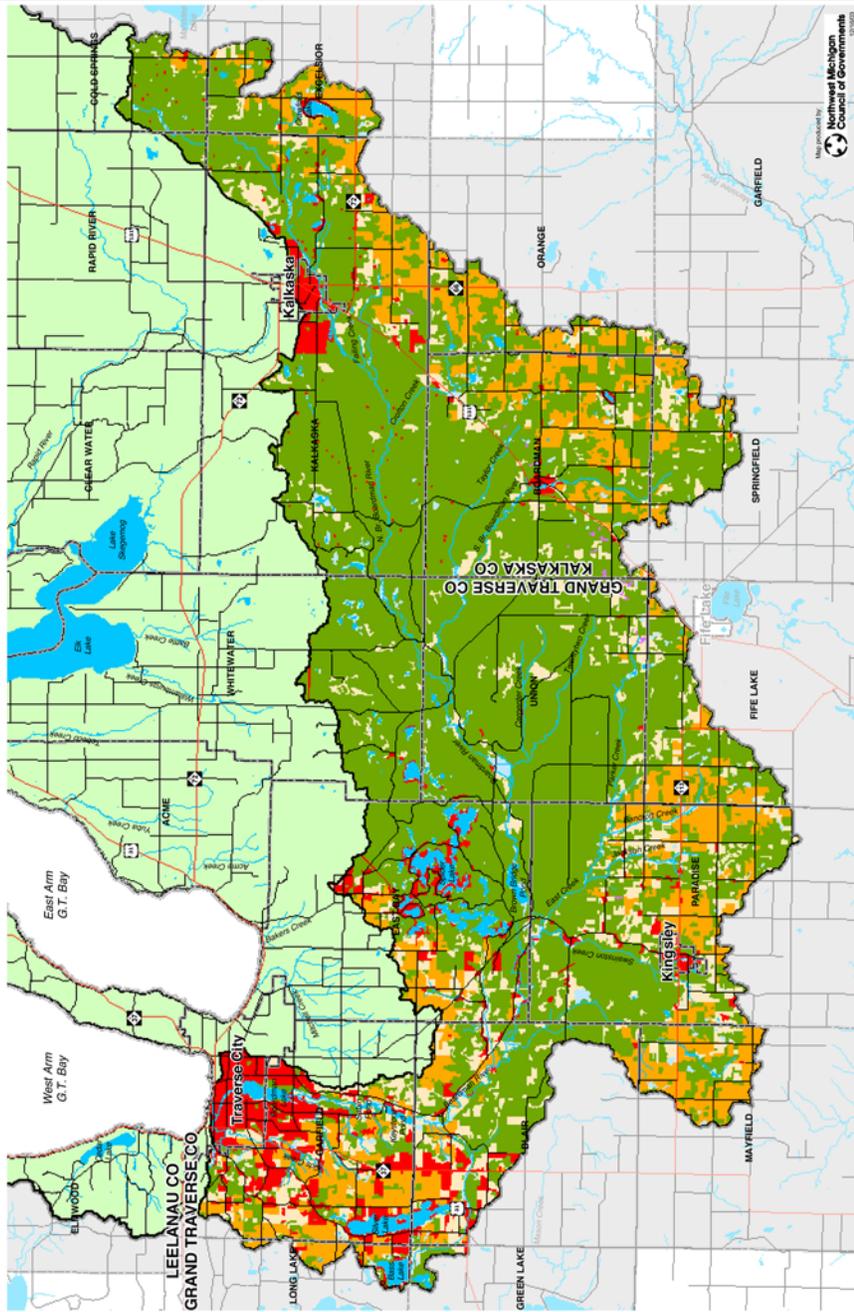


**Legend**

- Political Boundaries
- Highways
- Major Roads
- Lakes & Ponds
- Rivers & Streams
- Grand Traverse Bay Watershed

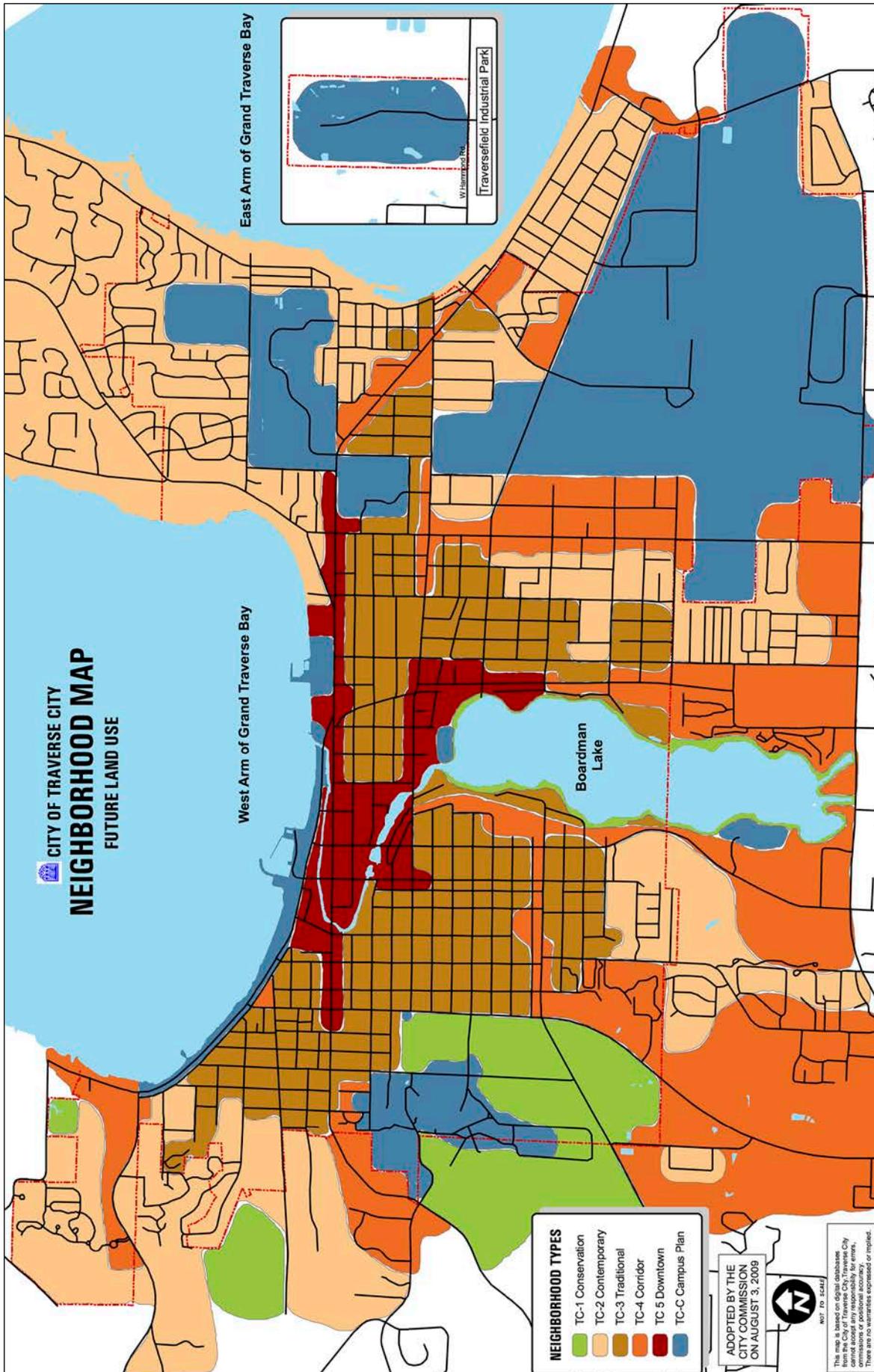
**Land use/cover categories:**

- Urban
- Agricultural
- Nonforested (open shrub & grassland)
- Forested
- Wetlands
- Barren

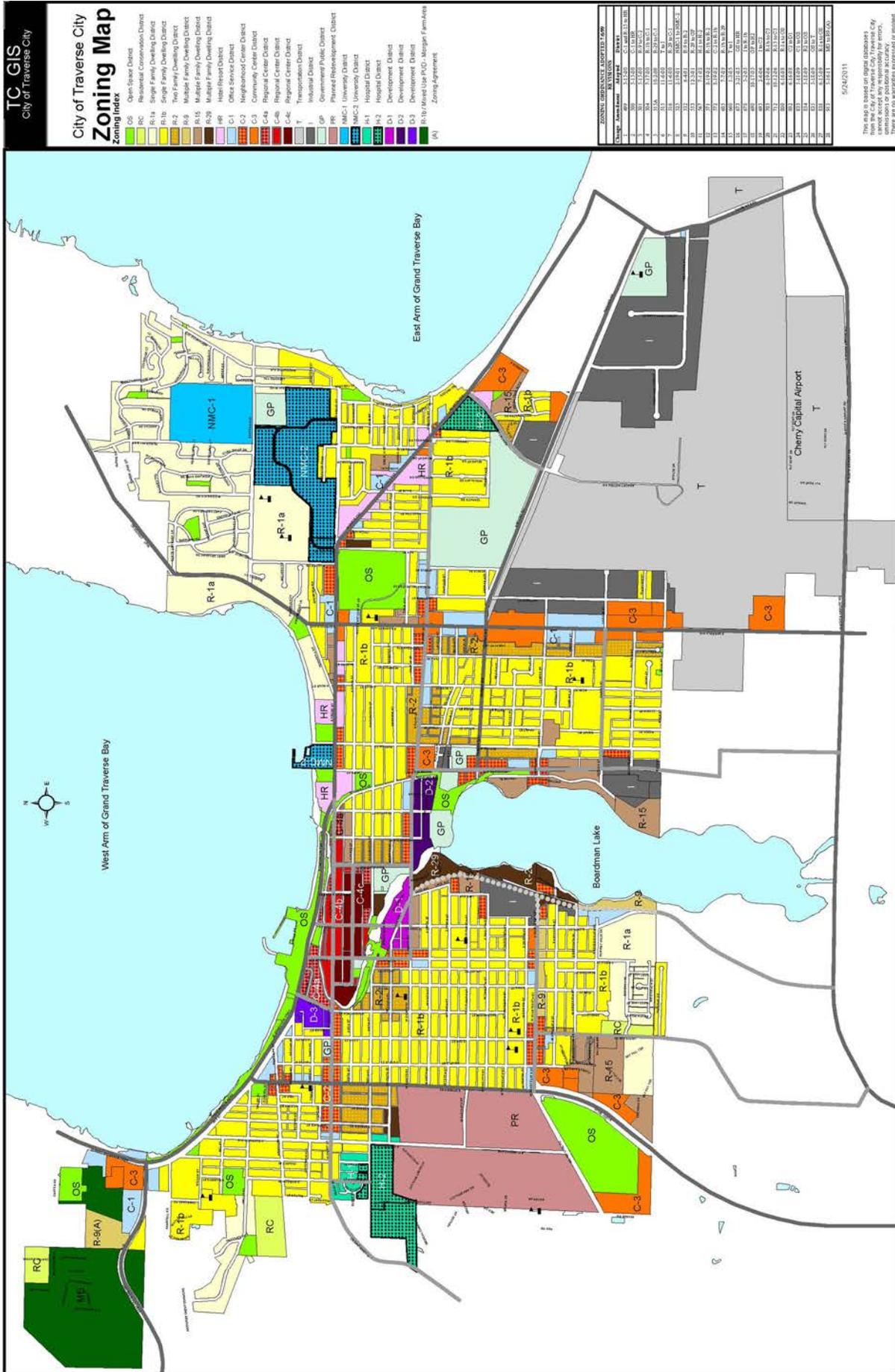


The Boardman River  
Council of Governments  
© 2000

# Appendix D. Future Land Use Map



# Appendix E. Zoning Map





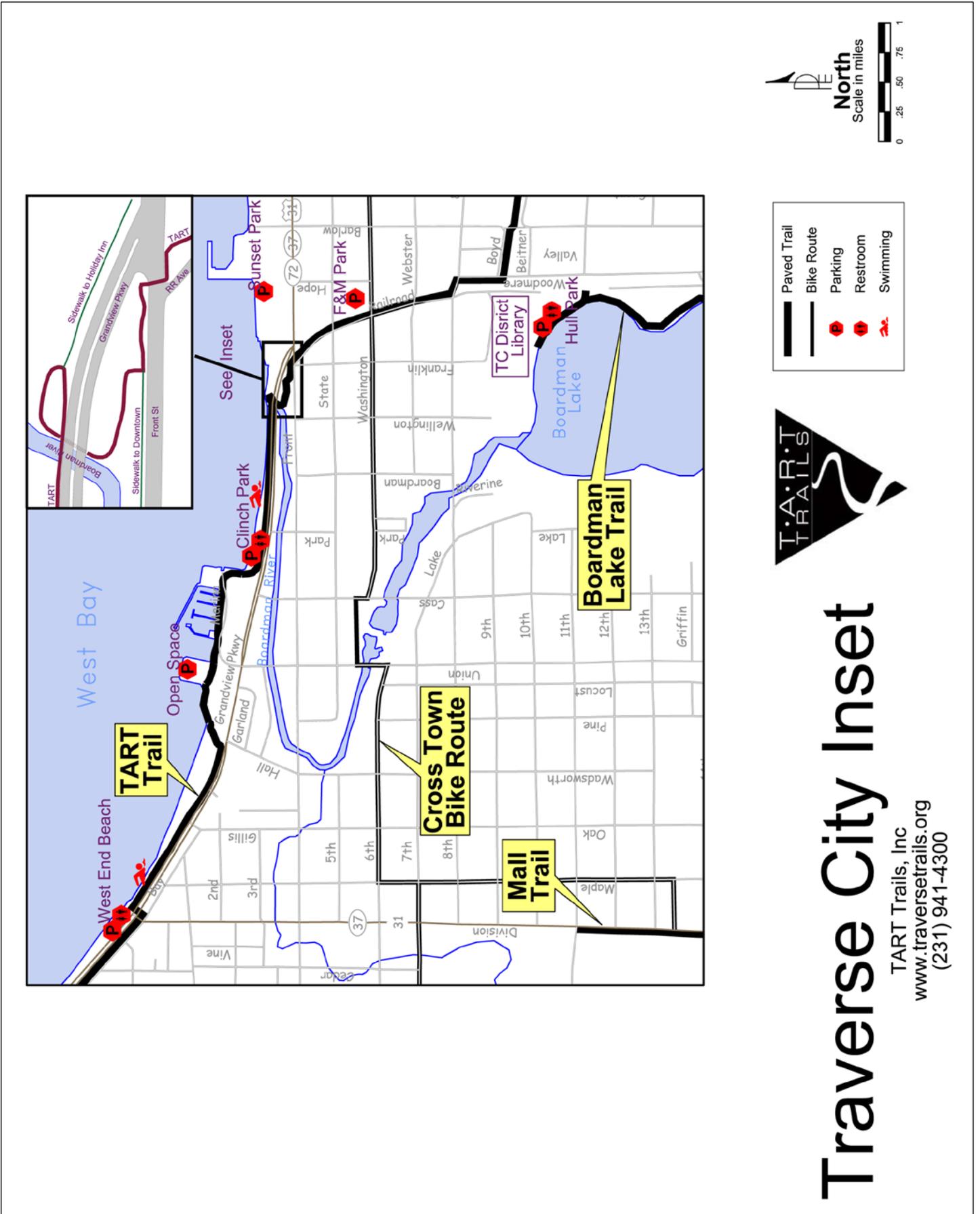




# Appendix I. DDA Districts Map



Appendix J. TART Trail Map (Downtown Inset)



# Traverse City Inset

TART Trails, Inc  
[www.traversetrails.org](http://www.traversetrails.org)  
 (231) 941-4300



## Appendix K. Sustainable Business Practices Survey

### Lake Michigan Coastal Communities-Business Practices TBEDC

#### 1. Has your business ever had an energy audit performed?

Answer Options	Response Percent	Response Count
Yes	36.1%	22
No	63.9%	39
<i>answered question</i>		<b>61</b>
<i>skipped question</i>		<b>0</b>

#### 2. Has your business ever replaced lighting with more energy efficient bulbs?

Answer Options	Response Percent	Response Count
Yes	80.0%	48
No	20.0%	12
<i>answered question</i>		<b>60</b>
<i>skipped question</i>		<b>1</b>

#### 3. Has your business ever replaced heating or cooling devices with more energy efficient systems?

Answer Options	Response Percent	Response Count
Yes	55.7%	34
No	44.3%	27
<i>answered question</i>		<b>61</b>
<i>skipped question</i>		<b>0</b>

#### 4. Has your business ever reduced heating or increased cooling temperatures?

Answer Options	Response Percent	Response Count
Yes	70.5%	43
No	29.5%	18
<i>answered question</i>		<b>61</b>
<i>skipped question</i>		<b>0</b>

#### 5. Has your business ever insulated hot water pipes?

Answer Options	Response Percent	Response Count
Yes	50.8%	31
No	49.2%	30
<i>answered question</i>		<b>61</b>
<i>skipped question</i>		<b>0</b>

6. Has your business ever converted to low flow water fixtures?		
Answer Options	Response Percent	Response Count
Yes	51.7%	31
No	48.3%	29
<i>answered question</i>		<b>60</b>
<i>skipped question</i>		<b>1</b>

7. Has your business ever purchased energy efficient equipment?		
Answer Options	Response Percent	Response Count
Yes	71.2%	42
No	28.8%	17
<i>answered question</i>		<b>59</b>
<i>skipped question</i>		<b>2</b>

8. Has your business ever reduced phantom energy loads: for example, completely turning off power to equipment that may always be on standby?		
Answer Options	Response Percent	Response Count
Yes	44.3%	27
No	55.7%	34
<i>answered question</i>		<b>61</b>
<i>skipped question</i>		<b>0</b>

9. Has your business ever created an energy operations and maintenance plan?		
Answer Options	Response Percent	Response Count
Yes	21.3%	13
No	78.7%	48
<i>answered question</i>		<b>61</b>
<i>skipped question</i>		<b>0</b>

10. Has your business ever optimized roof performance?		
Answer Options	Response Percent	Response Count
Yes	26.2%	16
No	73.8%	45
<i>answered question</i>		<b>61</b>
<i>skipped question</i>		<b>0</b>

11. Has your business ever installed a solar generation system?		
Answer Options	Response Percent	Response Count

Yes	4.9%	3	
No	95.1%	58	
<b>answered question</b>			<b>61</b>
<b>skipped question</b>			<b>0</b>

**12. Has your business ever installed a wind generator?**

Answer Options	Response Percent	Response Count	
Yes	1.7%	1	
No	98.3%	59	
<b>answered question</b>			<b>60</b>
<b>skipped question</b>			<b>1</b>

**13. Has your business ever installed a geothermal heating/cooling system?**

Answer Options	Response Percent	Response Count	
Yes	13.3%	8	
No	86.7%	52	
<b>answered question</b>			<b>60</b>
<b>skipped question</b>			<b>1</b>

**14. Has your business ever insulated or re-insulated your building?**

Answer Options	Response Percent	Response Count	
Yes	50.0%	30	
No	50.0%	30	
<b>answered question</b>			<b>60</b>
<b>skipped question</b>			<b>1</b>

**15. Has your business ever installed more energy efficient windows/doors?**

Answer Options	Response Percent	Response Count	
Yes	44.3%	27	
No	55.7%	34	
<b>answered question</b>			<b>61</b>
<b>skipped question</b>			<b>0</b>

**16. Has your business ever installed systems that reduce discharges of toxic materials into the water or air?**

Answer Options	Response Percent	Response Count	
Yes	23.3%	14	
No	76.7%	46	
<b>answered question</b>			<b>60</b>
<b>skipped question</b>			<b>1</b>

17. Has your business ever found ways to recycle or reuse waste?		
Answer Options	Response Percent	Response Count
Yes	75.4%	46
No	24.6%	15
<i>answered question</i>		<b>61</b>
<i>skipped question</i>		<b>0</b>

18. Has your business ever use recycled materials in your business?		
Answer Options	Response Percent	Response Count
Yes	80.3%	49
No	19.7%	12
<i>answered question</i>		<b>61</b>
<i>skipped question</i>		<b>0</b>

19. Has your business ever used “green” supplies in your business?		
Answer Options	Response Percent	Response Count
Yes	76.7%	46
No	23.3%	14
<i>answered question</i>		<b>60</b>
<i>skipped question</i>		<b>1</b>

20. Has your business ever created a “Green Team” made up of employees and supervisors?		
Answer Options	Response Percent	Response Count
Yes	16.7%	10
No	83.3%	50
<i>answered question</i>		<b>60</b>
<i>skipped question</i>		<b>1</b>

21. Has your business ever developed an Environmental Management System?		
Answer Options	Response Percent	Response Count
Yes	14.8%	9
No	85.2%	52
<i>answered question</i>		<b>61</b>
<i>skipped question</i>		<b>0</b>

22. Is your business ISO 14000 certified?		
---	--	--

Answer Options	Response Percent	Response Count
Yes	4.9%	3
No	95.1%	58
<b><i>answered question</i></b>		<b>61</b>
<b><i>skipped question</i></b>		<b>0</b>

**23. Is your business certified as a “clean corporate citizen”?**

Answer Options	Response Percent	Response Count
Yes	3.3%	2
No	96.7%	58
<b><i>answered question</i></b>		<b>60</b>
<b><i>skipped question</i></b>		<b>1</b>

**24. Where is your business located? (select all locations that apply)**

Answer Options	Response Percent	Response Count
Traverse City	92.7%	51
Suttons Bay	5.5%	3
Northport	1.8%	1
Empire	3.6%	2
Frankfort	3.6%	2
Elberta	1.8%	1
<b><i>answered question</i></b>		<b>55</b>
<b><i>skipped question</i></b>		<b>6</b>

## V. Resources

### ❖ Information Collection

The Northwest Michigan Council of Governments collected information about the community through document review of included published information from federal, state and local agencies and organizations. This involved sources of information such as the U.S. Environmental Protection Agency's Toxics Release Inventory (TRI) database, CERCLIS database, pollutant loading; State of Michigan Department of Environmental Quality reports, the City's master plans and zoning ordinances, and watershed management plans. Also, interviews were conducted of government staff together with the completion of information checklists.

Based on the information gathered, an outline of preliminary findings was developed that summarized the information collected in very general terms and then identified opportunities to enhance environmental stewardship in the coastal community. The City of Traverse City Environmental Stewardship Assessment was then presented to the Planning Commission where the public, businesses, and organizations were invited to attend.

1. Traverse City Website
2. City of Traverse City Master Plan 2009
3. Traverse City Zoning Ordinance
4. Northwest Michigan Council of Governments. *Green Infrastructure Manual*. 2009
5. Northwest Michigan Council of Governments. *Northwest Michigan Regional Non-Motorized Strategy 2008*
6. Grand Traverse Bay Watershed Protection Plan. 2005 Update. Watershed Center Grand Traverse Bay
7. The Watershed Center Website
8. Michigan Clean Marina Program Website
9. Traverse City Light & Power Website
10. The Traverse City Downtown Development Authority Website
11. Traverse Area Association of Realtors Website