



Muskegon County **Blueways** and **Greenways** Plan: Public Access Inventory and Linkages

July 2010



WEST MICHIGAN SHORELINE REGIONAL DEVELOPMENT COMMISSION (WMSRDC)

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CHAPTER I: INTRODUCTION & PLAN OVERVIEW

Introduction and Synopsis of the Plan

The Muskegon County Blueways and Greenways Plan: Public Access Inventory and Linkages was funded through a Michigan Coastal Zone Management grant. The premise of the plan is that the preservation and protection of blueways and greenways should be planned for regionally and implemented locally. The plan provides a detailed inventory of public access to both blueways and greenways within Muskegon County. The document also builds upon previous work conducted within the region and proposes linkage corridors to protect and preserve public access to the county's abundant natural resources. Finally, the plan outlines recommendations and tools for local government decision makers to utilize when attempting to implement the findings detailed in this plan.

This plan also includes a companion document entitled Muskegon County Green Infrastructure Inventory. It is a separate planning initiative funded by the Lake Michigan Watershed Academy which was undertaken alongside the Blueways and Greenways Plan. While the Blueways and Greenways Plan is focused on recreation and public access to natural resources, the Green Infrastructure Inventory is focused on the ecological services provided by natural features beyond recreation. It is hoped that the partnership between the two projects will help illustrate the importance of natural resources; not only for recreation, but also for long-term health and prosperity in Muskegon County. The Green Infrastructure Inventory is summarized in Chapter 5, and included in its entirety as an appendix to this plan.

Purpose for the Planning Process

In 2005, community leaders in Muskegon County completed the Muskegon Area-wide Plan (MAP). The MAP represented approximately five years of planning and cooperation which included over 1,000 participants in the process. The mission of the Muskegon Area-wide Plan was to involve citizens in the development of a shared vision for the future of Muskegon County. The document serves as a community vision with nearly all 27 local units of government in the county not only participating in the development of the plan, but also passing formal resolutions to follow the vision. Participants in the development of the MAP embraced the Smart Growth Principles and have worked hard to incorporate each of the ten principles into the



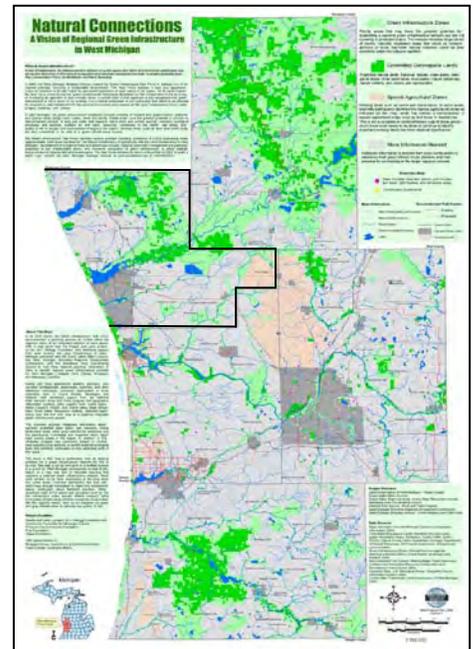
Principles of Smart Growth

- Create a range of housing opportunities and choices
- Create walkable neighborhoods
- Encourage community and stakeholder collaboration
- Foster distinctive, attractive places with a strong sense of place
- Make development decisions predictable, fair, and cost effective
- Mix land uses
- Preserve open space, farmland, natural beauty and critical environmental areas
- Provide a variety of transportation choices
- Strengthen and direct development towards existing communities
- Take advantage of compact building design

(Source: Smart Growth Network)

Muskegon area. The plan even outlines a Smart Growth development scenario for local communities and leaders to follow. The MAP identified five major vision areas including Land Use & Growth; Natural Resources, Open Space, & Environment; Economy & Jobs; Infrastructure; and Quality of Life. The Muskegon County Blueways and Greenways Plan is a direct result of the Natural Resources, Open Space, & Environment Vision. This vision is defined as follows: *Protect and preserve natural resources and continually improve the quality of air, water, and land resources found in Muskegon County.* The development of a Green Infrastructure (Blueways & Greenways) Plan was identified as a goal under this vision. In accordance with the MAP goal, the intent of this document is to create a county-wide plan which can be coordinated and implemented locally.

Community leaders in Muskegon County have also participated in the development of the “Natural Connections, a Vision of Green Infrastructure in West Michigan” spearheaded by the West Michigan Strategic Alliance in 2004. The purpose of the vision was to construct a 25-year vision for permanent protection of open space in West Michigan. The organizers and participants of the Vision believed that green infrastructure in West Michigan is not a luxury or an amenity. In other words, green infrastructure is a critical element of the West Michigan community. In the same way we plan for our gray infrastructure including roads, water/sewer, and utilities, we must also plan for, invest in, and maintain our community’s green infrastructure network.



The purpose of the Muskegon County Blueways and Greenways Plan is to build upon the previous studies and provide an extensive inventory of publicly accessible blueways and greenways in Muskegon County into one document. Each governmental jurisdiction in the county has prepared a Community Recreation Plan which is required by the Michigan Department of Natural Resources to become eligible to receive state recreation grants. However, the Blueways and Greenways Plan differs from a typical community recreation plan in that it identifies public access to blueways and greenways at multiple levels including local, county, state, and federal areas for the entire county. In addition, goals and opportunities were developed through comments received from participants during public forums. The plan then offers suggestions to linking public access points throughout the county, as well as provides tools and techniques for local officials to utilize in implementing the potential linkages.

The purpose of the Muskegon County Green Infrastructure Inventory is to build upon previous planning efforts to provide a foundation for the future development of a Muskegon County green infrastructure plan. The Green Infrastructure Inventory identifies some of the ecological service benefits that Muskegon County communities can derive from the protection, restoration and management of existing forest lands, wetlands, groundwater resources, soils, surface waters, and farm land. A full-scale green infrastructure plan will go beyond the inventory by seeking public and technical input to help identify specific priorities, develop a set of recommendations, and offer strategy to achieve them.

Definition of Blueways, Greenways, and Green Infrastructure

The terms blueway, greenway, and green infrastructure have become more prevalent over the past ten to fifteen years. In addition, the importance and efforts to preserve and protect these valuable areas within communities have also come to the forefront in recent years. There are a number of varying definitions that have been coined and used for each of these terms. The term blueway is fairly self explanatory. However for the purposes of this study, a blueway is defined as a body of water that features public access, recreational opportunities, and promotes interaction with the water.

A Blueway is a body of water that features public access, recreational opportunities, and promotes interaction with the water.

The Natural Resources Defense Council (NRDC) is the source for the greenways definition used in this document. The NRDC is a well known and successful organization founded in 1970. The mission of the NRDC is to safeguard the Earth: its people, its planet and animals and the natural systems on which all life depends. It defines a greenway as undeveloped land usually in cities, set aside or used for recreation or conservation.

The term green infrastructure is more difficult to define. Green infrastructure can in some ways be described as the environmental version of gray infrastructure such as roads and water/sewer lines. The term green infrastructure is used to describe an interconnected network of open spaces and natural areas, such as greenways, blueways, wetlands, parks, and forests, that contribute to the health and quality of life for communities and people. Green infrastructure describes the natural environment's life support system - an interconnected network of protected land and water that supports native species, maintains natural ecological processes, sustains air and water resources, and contributes to healthy communities.

A Greenway is an undeveloped land usually in cities, set aside or used for recreation or conservation.

(source: Natural Resources Defense Council)

Similar to gray infrastructure, green infrastructure needs to be strategically planned for and managed. The foundations of green infrastructure are natural elements such as

woodlands, wetlands, rivers, grasslands that work together as a whole to sustain ecological values and functions. Healthy functioning natural or restored ecological systems are essential to ensure the availability of "ecological services." Ecological services are the benefits that communities derive from natural features. They include benefits such as drinking water from groundwater resources, flood control from wetlands, and recreational opportunities from healthy forests, lakes, and rivers.

In addition to the core natural elements of green infrastructure, other elements can be strategically developed or preserved to enhance a green infrastructure network as well as the ecological services it provides to nearby communities. Such elements could include greenways, blueways, recreational facilities, cultural and historical sites, and agriculture. Often times, these components are interconnected and mutually benefit each other.

Green Infrastructure is an interconnected network of open spaces and natural areas, such as greenways, blueways, wetlands, parks, and forests that contribute to the health and quality of life for communities and people.

CHAPTER II: MUSKEGON COUNTY GROWTH TRENDS AND ENVIRONMENTAL FRAMEWORK

General Description of Muskegon County

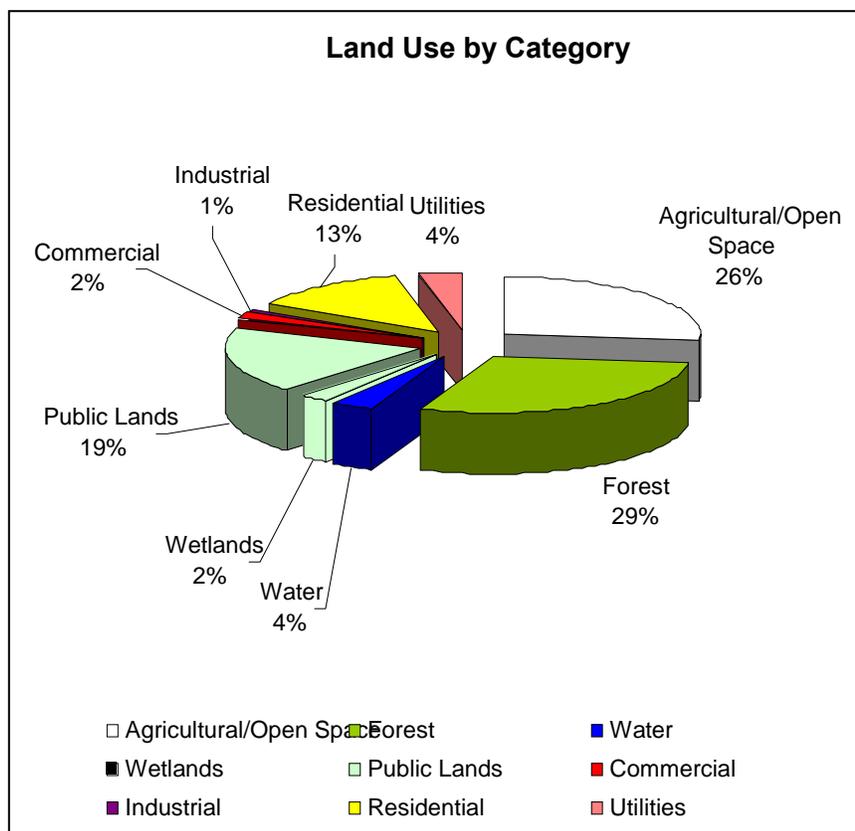
Muskegon County is located on the western side of Michigan, midway up the state's Lower Peninsula, along the shoreline of Lake Michigan. The area is characterized by coastal plains, immense lakeshore sand dunes, inland rolling hills, and high ridges. The county is known for its abundant natural features including productive fruit orchards, expansive forests, and the 27 miles of Lake Michigan waterfront, 20 inland lakes, and more than 400 miles of rivers.



Muskegon County is bordered to the north by Oceana County, to the northeast by Newaygo County, to the east by Kent County, and to the south by Ottawa County. The county is located 197 miles from Detroit, 153 miles from Flint, and 107 miles from the state capitol in Lansing. Additionally, it is 185 miles from Chicago, 276 miles (highway) from Milwaukee, and 224 miles from Toledo.

The County of Muskegon contains sixteen townships, four villages, and seven cities as defined by Michigan law. The county seat is in the City of Muskegon, which is the largest city in the county, as well as the largest city on eastern shore of Lake Michigan.

Muskegon was the 11th largest county in Michigan in 2000, with 170,200 residents. The county has a land area of 509 square miles, or 325,760 acres. The population density in 2000 was 334 people per square mile. Of the total acreage in Muskegon County, 48 percent is forested, 27 percent is agricultural or open space, and water/wetlands account for another 5.9 percent. These combined uses are more than 80 percent of the county. Nearly 30 percent of the county is in uses that are unlikely to be developed, such as forest, water, and state and federal property.



Demographic and Economic Analysis of the County

Official population and demographic counts are provided by the U.S Census Bureau every 10 years with estimated population counts given every year in the interim. Table 1 depicts the total population figures for 1990 and 2000, as well as the actual and percentage difference between the two years. The table also identifies the population distribution for both sex and race in Muskegon County. Between 1990 and 2000, the most significant population increases by race occurred among the Native Hawaiian at 90.9 percent, Hispanic at 65.6 percent, Other at 41.6 percent, and Asian at 29.6 percent.

Table 1

Muskegon County Population by Sex and Race											
	Total	Male	Female	White	Black	American Indian	Asian	Native Hawaiian	Other	2 or More Races	Hispanic
1990	158,983	77,648	81,335	133,931	21,617	1,338	554	11	1,542	NA	3,623
2000	170,200	84,359	85,841	138,291	24,166	1,402	718	21	2,184	3,418	6,001
Difference	11,217	6,711	4,506	4,360	2,549	64	164	10	642	NA	2,378
% Difference	7.1%	8.6%	5.5%	3.3%	11.8%	4.8%	29.6%	90.9%	41.6%	NA	65.6%

Source: U.S. Census Bureau

The West Michigan Shoreline Regional Development Commission prepares population projections for each county within the region. Using bi-annual county population estimates provided by the U.S. Census Bureau, the Regional Commission extrapolates populations of all minor civil division (townships, cities, and villages) within the region. The population is projected in five-year increments from the year 2010 out to the year 2035. The Muskegon County 2010–2035 population projections, prepared by the Regional Commission are listed in Table 2.

Muskegon County grew at a modest rate of 7.1 percent between 1990 and 2000. During this time, Blue Lake Township, the Village of Lakewood Club, and the Village of Ravenna showed the highest rates of growth at 61.1 percent, 52.7 percent, and 31.2 percent respectively. Most other minor civil division within the county are expected to show slow but steady rates of growth out to the year 2035 as projected by the West Michigan Shoreline Regional Development Commission. Between 2000 and 2008, Muskegon County added 4,144 persons to its population, which is a 2.4 percent increase.

It is interesting to note that Muskegon County experienced minimal population increase between 1970 and 1990. However, between 1990 and 2000, the county realized a significant population increase. By 2030, Muskegon County’s population is projected to increase to a total of 198,337 persons. This represents a total population increase of 28,137, or 16.5 percent, since the 2000 Census.

Table 2

**West Michigan Shoreline Regional Development Commission
Demographic Projections**

Population Forecast 2010 to 2035

Muskegon County	Actual Census Figures				Census Estimate 2008	Forecasted Population					
	1970	1980	1990	2000		2010	2015	2020	2025	2030	2035
Total Population	157,426	157,589	158,983	170,200	174,344	176,017	180,271	184,627	189,088	193,657	198,337

Population projections are developed at the County level.
As a result of this, in-county migration from urban to non-urban areas may be understated.

Blue Lake Township	715	1,101	1,235	1,990	2,475	2,499	2,559	2,621	2,684	2,749	2,816
Casnovia Township	1,879	2,158	2,361	2,652	2,764	2,791	2,858	2,927	2,998	3,070	3,144
Cedar Creek Township	1,467	2,454	2,846	3,109	3,473	3,506	3,591	3,678	3,767	3,858	3,951
Dalton Township	5,361	5,897	6,276	8,047	9,270	9,359	9,585	9,817	10,054	10,297	10,546
Egelston Township	6,690	7,310	7,640	9,537	9,786	9,880	10,119	10,363	10,614	10,870	11,133
Fruitland Township	3,200	4,168	4,391	5,235	5,654	5,708	5,846	5,987	6,132	6,280	6,432
Fruitport Township	10,214	10,646	11,485	12,533	12,991	13,116	13,433	13,757	14,090	14,430	14,779
Holton Township	1,499	2,022	2,318	2,532	2,607	2,632	2,696	2,761	2,827	2,896	2,966
Laketon Township	5,440	6,327	6,538	7,363	7,883	7,959	8,151	8,348	8,550	8,756	8,968
Montague Township	1,147	1,359	1,429	1,637	1,664	1,680	1,721	1,762	1,805	1,848	1,893
Moerland Township	1,488	1,521	1,543	1,616	1,925	1,943	1,990	2,039	2,088	2,138	2,190
Muskegon Township	13,754	14,557	15,302	17,737	18,296	18,472	18,918	19,375	19,843	20,323	20,814
Ravenna Township	2,403	2,471	2,354	2,856	2,855	2,882	2,952	3,023	3,096	3,171	3,248
Sullivan Township	2,051	2,356	2,230	2,477	2,525	2,549	2,611	2,674	2,739	2,805	2,872
Whitehall Township	1,064	1,341	1,464	1,648	1,639	1,655	1,695	1,736	1,778	1,821	1,865
White River Township	1,016	1,215	1,250	1,338	1,425	1,439	1,473	1,509	1,546	1,583	1,621

Cities											
Montague	2,396	2,332	2,276	2,407	2,294	2,316	2,372	2,429	2,488	2,548	2,610
Muskegon	44,631	40,823	40,283	40,105	39,401	39,779	40,740	41,725	42,733	43,766	44,823
Muskegon Heights	17,304	14,611	13,176	12,049	11,623	11,735	12,018	12,309	12,606	12,911	13,223
North Muskegon	4,243	4,024	3,919	4,031	3,915	3,953	4,048	4,146	4,246	4,349	4,454
Norton Shores	22,271	22,025	21,755	22,527	23,307	23,531	24,099	24,682	25,278	25,889	26,514
Roosevelt Park	4,176	4,015	3,885	3,890	3,769	3,805	3,897	3,991	4,088	4,187	4,288
Whitehall	3,017	2,856	3,027	2,884	2,803	2,830	2,898	2,968	3,040	3,114	3,189

Villages*											
Casnovia (Part)	198	181	187	139	136	137	141	144	148	151	155
Fruitport	1,409	1,143	1,090	1,124	1,080	1,090	1,117	1,144	1,171	1,200	1,229
Lakewood Club	590	695	659	1,006	1,353	1,366	1,399	1,433	1,467	1,503	1,539
Ravenna	1,048	951	919	1,206	1,211	1,223	1,252	1,282	1,313	1,345	1,378

*Village population included in Township figures
Sources: Census Bureau, Internal Revenue Service and U.S. Department of Health and Human Services
Forecasted by the West Michigan Shoreline Regional Development Commission

August 2009

According to the 2000 U.S. Census, 83.1 percent of Muskegon County residents 25 years or older had attained at least a high school education. During the same year, the county's Per Capita Income (PCI) was \$17,967 compared to the State of Michigan at \$22,168. Per Capita Income reflects the mean income of the county and is derived by dividing the total income of a particular county by the total population of the county. The same is calculated at the state level. Between 1980 and 1990 Muskegon's per capita income increased 78.4 percent and increased another 58.4 percent between 1990 and 2000. In comparison, Muskegon County's Median Family Income (MFI) for 2000 was \$45,710, and the State of Michigan's MFI was \$53,457. Median Family Income refers to the baseline income from which half of the family incomes in a particular area fall below and half of the family incomes rise above. Muskegon County also had an estimated 11.4 percent of persons below the poverty level in 2000.

The Regional Commission continuously retrieves employment statistics from the Michigan Department of Energy, Labor, and Economic Growth's (DELEG) web page. This information includes civilian labor force, employment, and unemployment figures, as well as the previous year's annual average for each of the above mentioned categories. The DELEG provides timely and useful information for evaluating the labor market for every county in the State of Michigan. Table 3 illustrates these annual averages for Muskegon County.

Table 3

Muskegon County Employment 1998 - 2008											
	1998	1999	2000	2001	2002	2003	2004*	2005*	2006*	2007*	2008*
Civilian Labor Force	81,921	84,102	84,984	84,821	83,521	83,506	89,683	90,505	91,040	90,075	89,064
Employed Persons	78,547	80,542	81,159	79,261	75,956	75,030	82,784	84,241	84,799	83,647	81,196
Unemployment Rate	4.4%	4.5%	4.6%	6.9%	9.3%	10.6%	7.7%	6.9%	6.9%	7.1%	8.8%

Source: Michigan Department of Energy, Labor and Economic Growth

* Not seasonally adjusted

Table 4 depicts the major sector employment distribution for Muskegon County in 2001 and 2007. Employment figures from 2001 to 2007, as well as projections through the year 2013, are given in Table 5.

In 2007, the Retail Trade sector contained the largest percentage of the total employment with 15.8 percent, followed closely by Manufacturing at 15.7 percent. Health Care and Social Assistance, and Government sectors followed with 14.4 percent and 11.1 percent respectively. These four sectors combined total 57 percent of Muskegon County's employment. The remaining sectors each contributed 7.8 percent or less of the county's total employment.

Table 4

Muskegon County Employment By Sector 2001 & 2007				
Sector	2001	2007	% of Total 2001	% of Total 2007
Manufacturing	14,793	13,230	18.1%	15.7%
Retail Trade	11,669	13,264	14.3%	15.8%
Health Care and Social Assistance	9,525	12,125	11.7%	14.4%
Government	9,883	9,368	12.1%	11.1%
Accommodation/Food Services	6,240	6,616	7.6%	7.9%
Other Services, Except Public Administration	4,203	4,420	5.1%	5.3%
Construction	4,640	4,374	5.7%	5.2%
Administrative/Waste Services	2,425	3,674	3.0%	4.4%
Real Estate/Rental and Leasing	2,806	3,382	3.4%	4.0%
Professional and Technical Services	2,913	2,466	3.6%	2.9%
Total Employment	81,627	84,181	-	-

Source: Regional Economic Information System

Table 5

**West Michigan Shoreline Regional Development Commission
Regional Economic and Demographic Projections
Muskegon County
Employment Projections**

CODE	MUSKEGON COUNTY	Actual Figures					Growth Rate	Estimate 2008	Forecasted Employment					
		2003	2004	2005	2006	2007			2008	2009	2010	2011	2012	2013
	Employment:													
10	Total employment	82,411	84,287	84,951	85,418	84,181	0.54%	84,637	85,095	85,556	86,019	86,485	86,953	
	By Type:													
20	Wage and salary	67,494	68,691	68,544	68,639	67,148	-0.12%	67,068	66,989	66,909	66,830	66,751	66,672	
40	Proprietors	14,917	15,596	16,407	16,780	17,033	3.38%	17,609	18,205	18,821	19,458	20,116	20,797	
50	- Farm	465	462	465	463	460	-0.27%	459	458	456	455	454	453	
60	- Nonfarm	14,452	15,134	15,942	16,317	16,573	3.49%	17,152	17,752	18,372	19,014	19,679	20,366	
	By Industry:													
70	Farm	686	692	671	652	679	-0.21%	678	676	675	673	672	670	
80	Nonfarm	81,725	83,595	84,280	84,767	83,502	0.55%	83,960	84,420	84,883	85,348	85,816	86,287	
90	- Private	71,725	73,853	74,597	75,127	74,134	0.84%	74,757	75,386	76,020	76,659	77,303	77,953	
100	- Forestry, fishing, related activities, and other	(D)	(D)	(D)	(D)	(D)	*	*	*	*	*	*	*	
200	- Mining	(D)	(D)	(D)	(D)	(D)	*	*	*	*	*	*	*	
300	- Utilities	(D)	(D)	(D)	(D)	(D)	*	(D)	(D)	(D)	(D)	(D)	(D)	
400	- Construction	4,236	4,411	4,567	4,497	4,374	0.85%	4,411	4,449	4,486	4,525	4,563	4,602	
500	- Manufacturing	13,229	14,108	13,897	13,560	13,230	0.07%	13,240	13,249	13,259	13,268	13,278	13,288	
600	- Wholesale trade	1,997	1,685	1,735	1,704	1,664	-4.20%	1,594	1,527	1,463	1,402	1,343	1,287	
700	- Retail trade	12,874	13,184	13,518	13,683	13,264	0.77%	13,367	13,470	13,575	13,680	13,786	13,893	
800	- Transportation and warehousing	(D)	(D)	(D)	(D)	(D)	*	(D)	(D)	(D)	(D)	(D)	(D)	
900	- Information	1,228	1,149	1,183	1,161	1,216	-0.15%	1,214	1,212	1,211	1,209	1,207	1,205	
1000	- Finance and insurance	2,074	2,091	2,091	2,059	2,038	-0.43%	2,029	2,020	2,012	2,003	1,994	1,986	
1100	- Real estate and rental and leasing	2,837	3,002	3,257	3,193	3,382	4.57%	3,536	3,698	3,867	4,043	4,228	4,421	
1200	- Professional and technical services	2,878	2,733	2,634	2,531	2,466	-3.78%	2,373	2,283	2,196	2,113	2,033	1,956	
1300	- Management of companies and enterprises	168	165	157	166	173	0.83%	174	176	177	179	180	182	
1400	- Administrative and waste services	3,377	3,804	3,965	3,828	3,674	2.35%	3,760	3,849	3,939	4,032	4,126	4,223	
1500	- Education Services	1,163	1,199	1,265	1,325	1,421	5.15%	1,494	1,571	1,652	1,737	1,826	1,920	
1600	- Health care and social assistance	11,246	11,515	11,631	12,173	12,125	1.92%	12,357	12,594	12,835	13,081	13,332	13,588	
1700	- Arts, entertainment, and recreation	1,776	1,764	1,893	1,981	1,842	1.07%	1,862	1,882	1,902	1,922	1,942	1,963	
1800	- Accommodation and food services	6,451	6,693	6,398	6,689	6,616	0.70%	6,662	6,709	6,756	6,803	6,851	6,899	
1900	- Other services, except public administration	4,273	4,386	4,444	4,449	4,420	0.86%	4,458	4,496	4,535	4,573	4,613	4,652	
2000	- Government and government enterprises	10,000	9,742	9,683	9,640	9,368	-1.61%	9,217	9,068	8,922	8,778	8,637	8,497	
2001	- Federal, civilian	417	398	379	374	367	-3.13%	356	344	334	323	313	303	
2002	- Military	355	354	339	338	341	-0.98%	338	334	331	328	325	321	
2010	- State and local	9,228	8,990	8,965	8,928	8,660	-1.57%	8,524	8,391	8,259	8,130	8,002	7,877	
2011	- State government	1,181	1,196	1,173	1,176	1,178	-0.06%	1,177	1,177	1,176	1,175	1,175	1,174	
2012	- Local government	8,047	7,794	7,792	7,752	7,482	-1.79%	7,348	7,216	7,087	6,960	6,835	6,713	

Source: Regional Economic Information System (REIS), based on the North American Industry Classification System (NAICS) Estimates and Projections by: West Michigan Shoreline Regional Development Commission

(D) - According to NAICS data source, data not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

(L) - Less than 10 jobs, but the estimates for this item are included in the totals.

(*) - Data not available due to the lack of historical trends in this category.

Numbers may not add due to rounding.

Growth rates are based on actual years of figures, as shown.

Growth rates are computed only if more than 2 years of data is present.

Environmental Review and History of Muskegon County

Muskegon County is part of the Great Lakes coastal wetland system and a part of the largest assemblage of fresh water sand dunes in the entire world. The county's exceptional recreational opportunities and quality of life depends on the quality and abundance of its natural resources. With large, coastal sand dunes, abundant forests, lakes and naturally impounded freshwater river harbors, the protection of Muskegon County's environment is a top priority for residents and community leaders.

Pre-settlement vegetation maps illustrate that Muskegon County was once dominated by white pine/white oak forests, and a mosaic of beech/sugar maple, mixed conifer and hardwood swamps, oak/pine barren, coastal marshes, lakes and streams. The name "Muskegon" is

derived from the Ottawa Indian term “Masquigon” meaning “marshy river” or “swamp.” During the mid-1700’s, Muskegon County was inhabited by semi-nomadic Ottawa and Pottawatomie Indian bands. In the late 1700’s and early 1800’s, French fur trading posts were present along Muskegon Lake and at the mouth of Duck Lake. In 1859, Muskegon County’s population was 3,947 and included the townships of Muskegon, Norton, Ravenna, White River, Dalton, and Oceana.

Muskegon County’s lumber era began in 1837 with sawmills on Muskegon Lake and the White River. The lumber era reached its peak in the mid-1880’s, with forty-seven sawmills on Muskegon Lake and seventeen on White Lake. The effect of lumbering within the river systems resulted in accelerated stream bank erosion and sedimentation, smothering aquatic habitats. Without a market for sawmill slab wood and sawdust, both were disposed of in large quantities directly into the lakes. In Muskegon Lake, this resulted in a significant loss of shallow water wetland habitat, and the associated degradation of fish and wildlife populations. With the loss of shoreline wetlands, the resulting stormwater runoff degraded water quality and nearshore benthic habitats.

The lumber era virtually ended along with the nineteenth century. During the early 1900’s, new industries began to locate in the area. These industries made use of the area’s natural resources, including sand for foundries, timber for furniture and paper, and surface water for industrial waste disposal. Industries located along shorelines for easy access to transportation and water for industrial waste disposal. When industrial development needed more land to expand, waste material was used to fill in adjacent shallow waters and wetlands. This practice continued for decades. It resulted in polluted surface water, contaminated sediments and the loss, isolation and fragmentation of fish and wildlife habitat in the county’s three major lake systems. These practices eventually resulted in Muskegon Lake and White Lake being designated as two of the Great Lakes Areas of Concerns (AOC). The AOC designations occurred in 1985 as a result of guidance contained in the Great Lakes Water Quality Agreement between the United States and Canada. During the 1990’s and 2000’s, the Muskegon and White Lake AOC communities developed plans for restoration and set measurable targets for the eventual de-listing of the AOCs.

During the 1950’s and 1960’s, many locally-owned industries closed or were sold to national and international corporations. During the 1970’s industries diversified and the local economy has continued to evolve ever since. The 1990’s brought a strong emphasis on the development of tourism and recreation, with a major focus on attracting sustainable industries and development in the 2000’s. Brownfield cleanup and redevelopment has been a priority for cities and economic developers. In rural areas, soil conditions and the temperate climate along Lake Michigan have continued to offer excellent conditions for the development of fruit orchards.

CHAPTER III: MUSKEGON COUNTY BLUEWAYS INVENTORY

Introduction of Blueways in Muskegon County

The term “Blueway” has been defined in this study as a body of water that features public access, recreational opportunities, and promotes interaction with the water. With extensive areas of shoreline along Lake Michigan, numerous inland lakes, rivers and streams, Muskegon County boasts a significant number of locations that fit this definition. Many of the county’s blueways are large enough to navigate, while some are only large enough to wade through. Table 6 lists the largest lakes of Muskegon County.

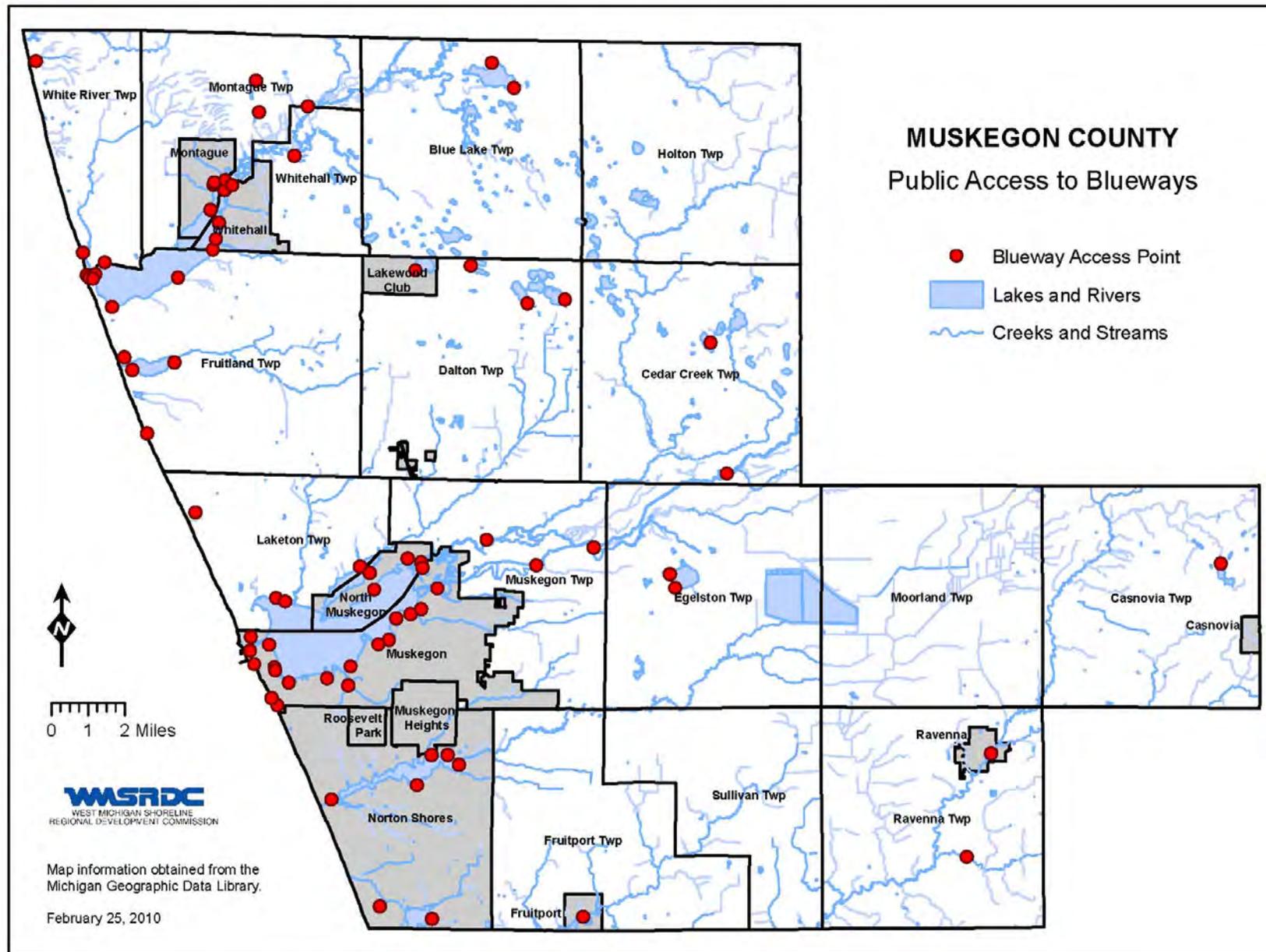
Table 6

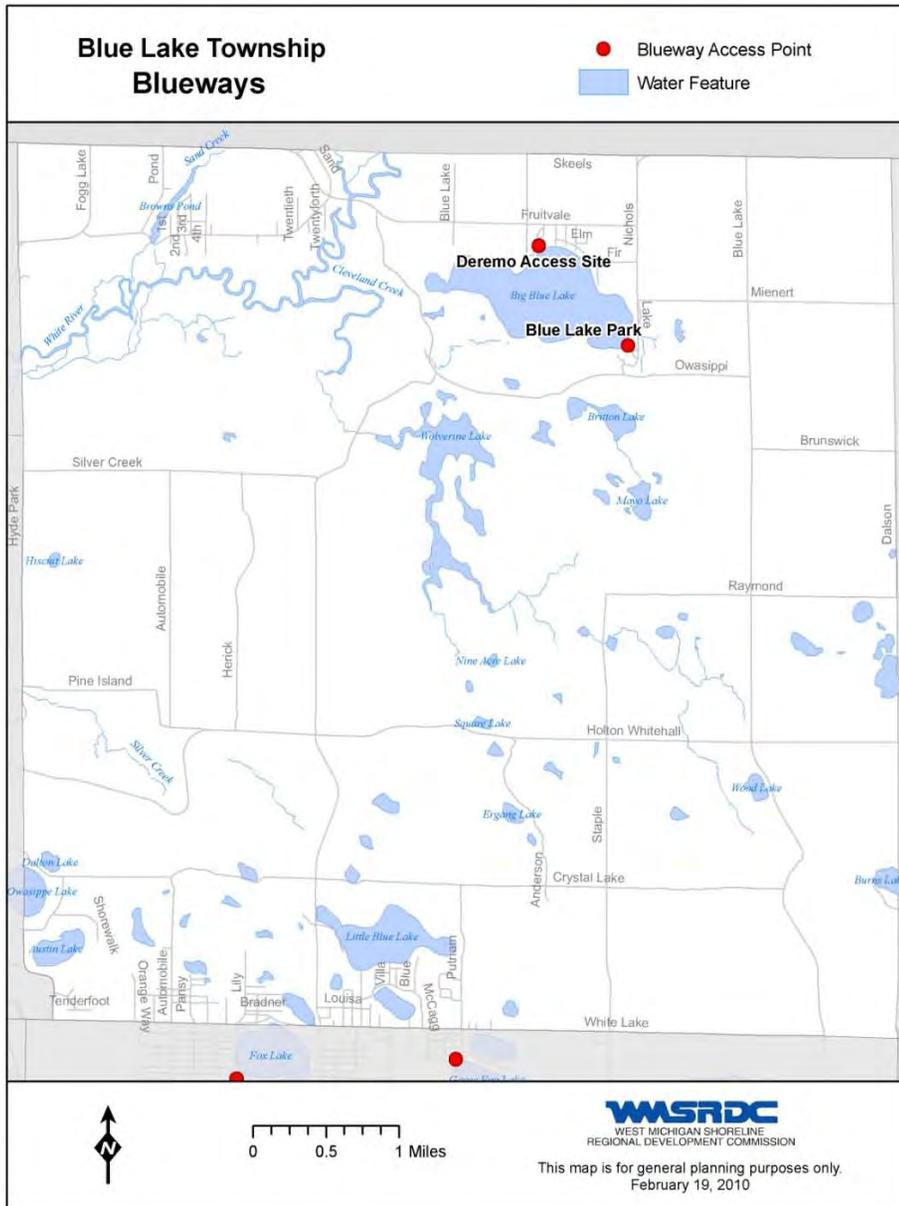
Lakes of Muskegon County		
Name	Size	Location
Lake Michigan	22,178 acres, 923 ft max depth	Cities: Norton Shores, Muskegon; Townships: Fruitland, Laketon, White River
Muskegon Lake	4,150 acres, 79 ft max depth	Cities: Muskegon, North Muskegon; Laketon Township
White Lake	2,571 acres, 71 ft max depth	Cities: Montague, Whitehall; Townships: Fruitland, Montague, White River
Spring Lake	1,253 acres (mostly in Ottawa County)	Village of Fruitport; Fruitport Township
Mona Lake	695 acres, 42 ft max depth	City of Norton Shores
Bear Lake	415 acres	City of North Muskegon; Laketon Township
Big Blue Lake	330 acres, 50 ft max depth	Blue Lake Township
Duck Lake	313 acres	Fruitland Township
Wolf Lake	207 acres	Egelston Township
Little Black Lake	200 acres	City of Norton Shores
Twin Lakes (Middle, North, Twin, and West lakes)	177 acres, 19 ft max depth	Dalton Township
Lake Wolverine	135 acres	Blue Lake Township
Fox Lake	80 acres	Village of Lakewood Club
Half Moon Lake	58 acres, 70 ft max depth	Casnovia Township

In addition to lakes, Muskegon County also contains two navigable rivers, the Muskegon and the White. These rivers are important features of their respective communities, Muskegon and Whitehall/Montague, and mirror each other in numerous ways. Not only do both flow east to west, they also terminate in lakes that feed into Lake Michigan. Also of note is the fact that the Muskegon River is the second longest river in Michigan, and that the White River is an MDEQ-designated “Natural River.”

The blueways inventory is organized by municipal city, village, or township boundaries. Each Muskegon County community is listed in alphabetical order along with a map revealing the location of each blueway, and followed by brief descriptions of each blueway found within that municipality. Blueway descriptions typically include information of each site’s location, waterway, size, owner/operator, and water uses. Below is the inventory of Muskegon County Blueways.

Detailed BLUEWAYS Inventory





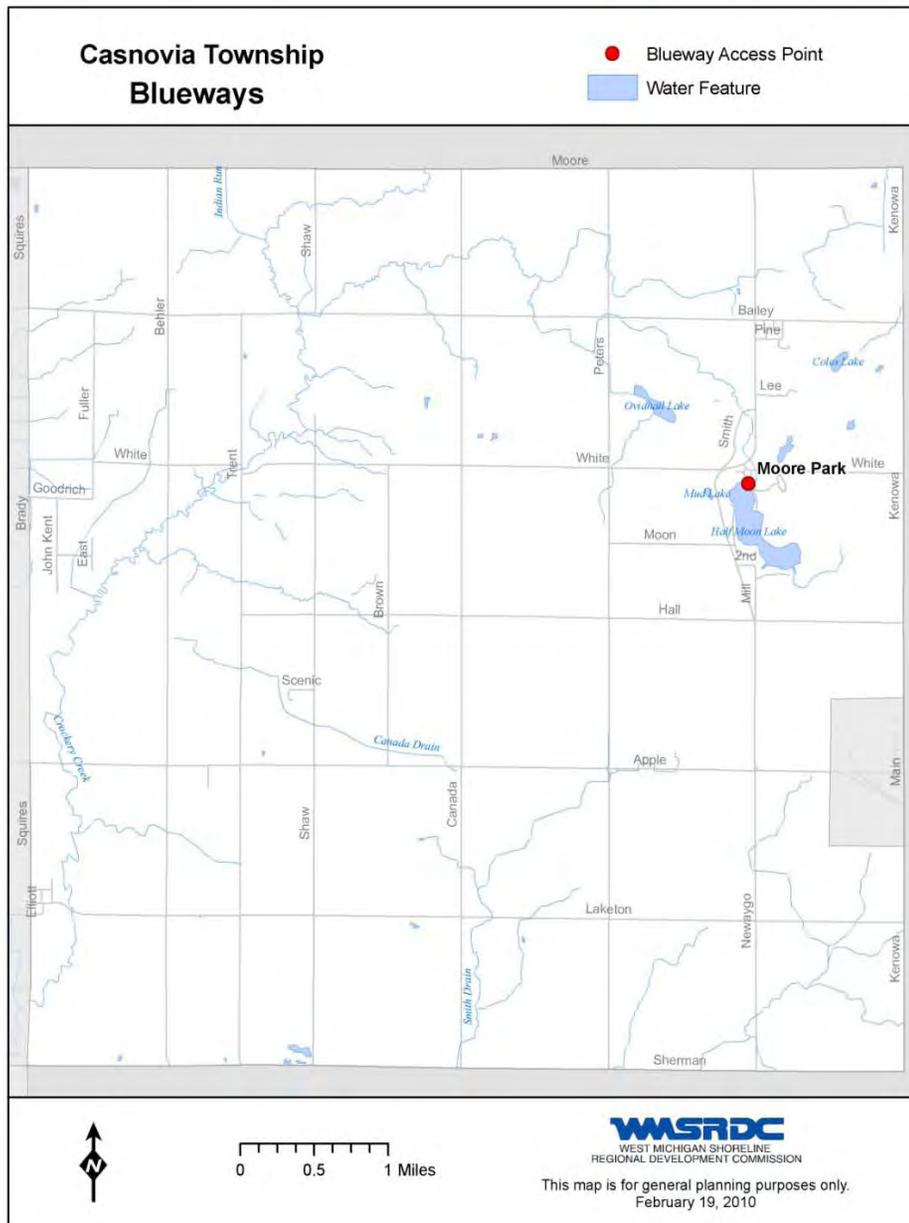
Blue Lake Township

Blue Lake Park

Location: Nichols Road
 Waterway: Big Blue Lake
 Size: 25 acres
 Owner/Operator: Muskegon County
 Water Uses: Fishing, swimming, 600 feet of Big Blue Lake shoreline

Deremo Access Site

Location: Fruitvale Road
 Waterway: Big Blue Lake
 Size: 5 acres
 Owner/Operator: Muskegon County
 Water Uses: Paved boat launch, 550 feet of Big Blue Lake shoreline



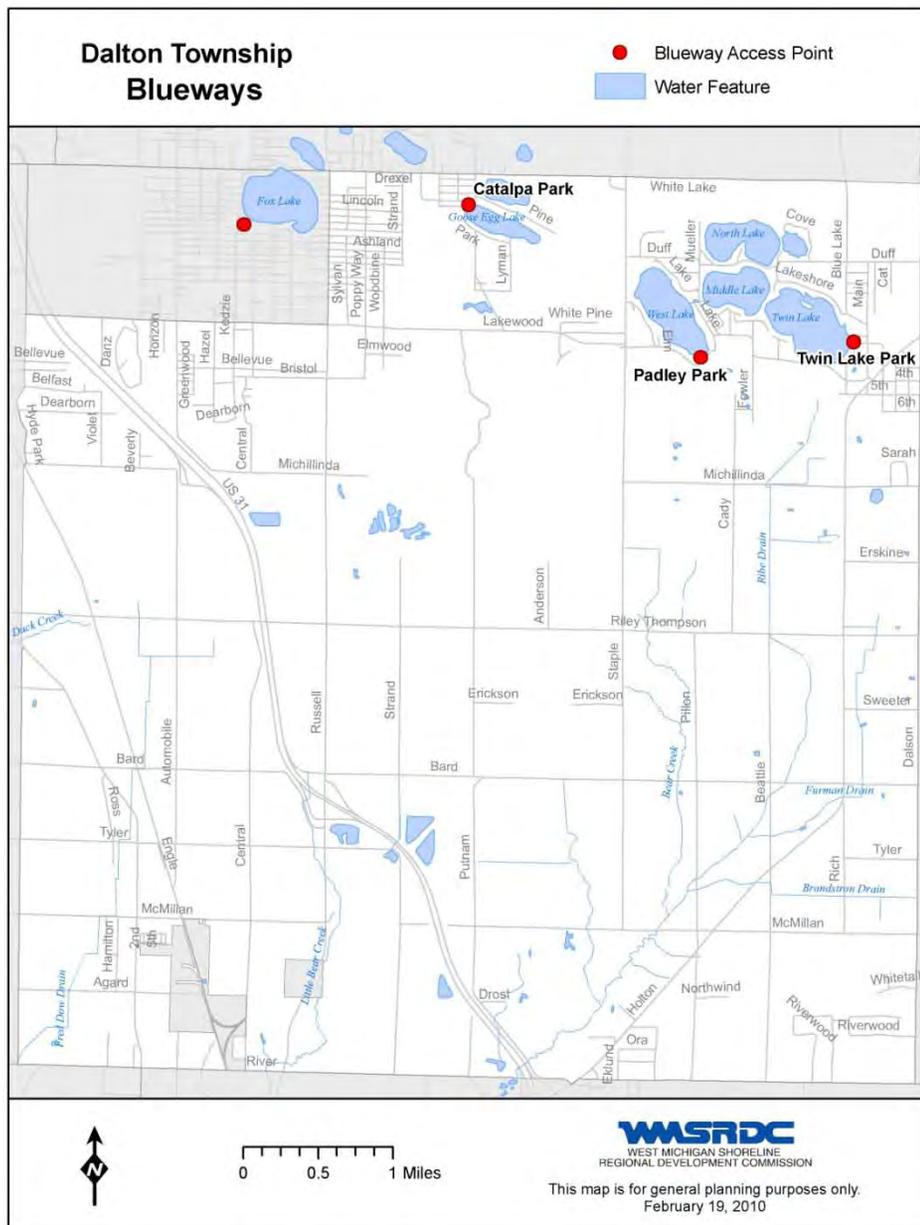
Casnovia Township

Moore Park

Location: White Road and M-37
 Waterway: Half Moon Lake
 Size: 36 acres
 Owner/Operator: Muskegon County
 Water Uses: Boat launch, fishing, swimming,
 1,500 feet of Half Moon Lake shoreline

Village of Casnovia

*** No points of public access to water identified ***



Dalton Township

Padley Park

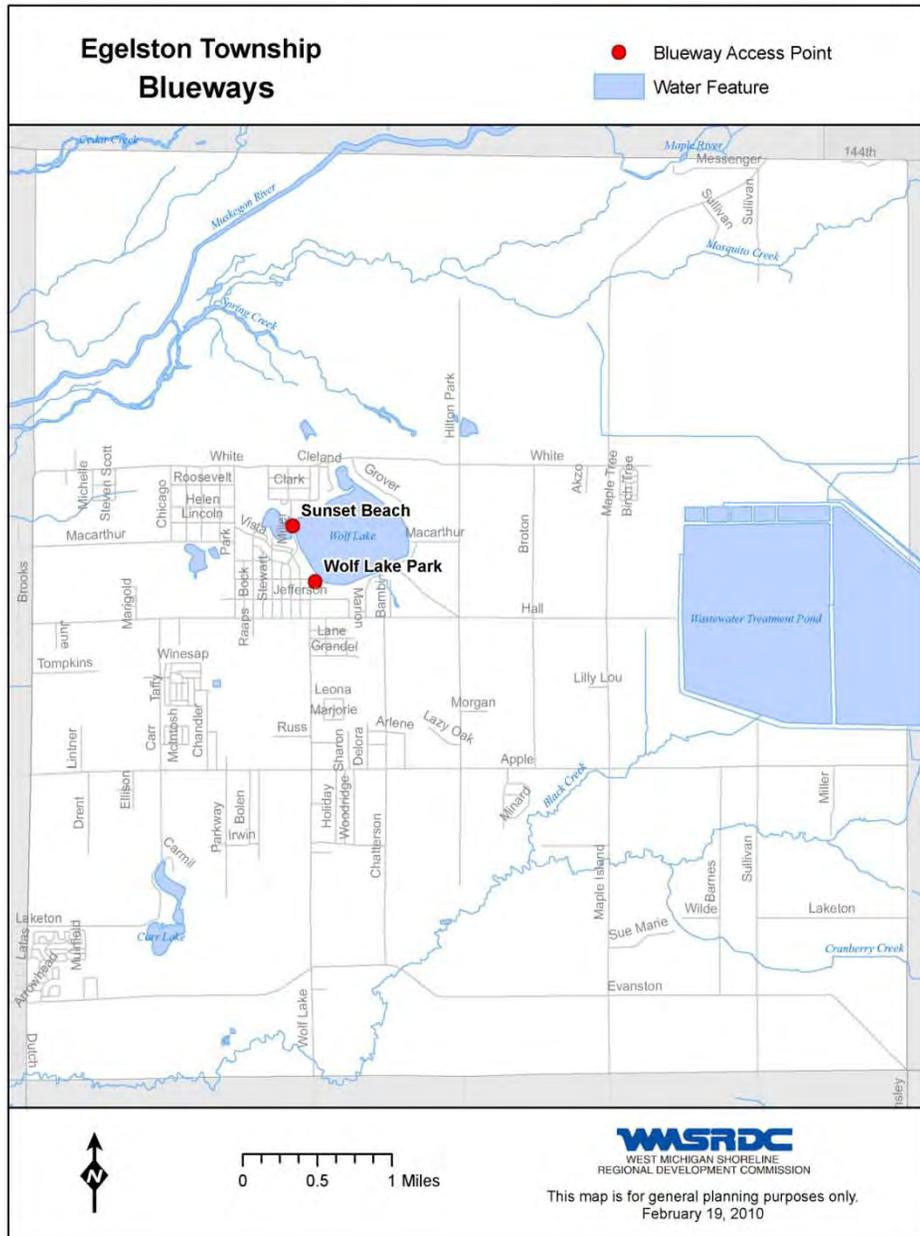
Location: West Lake Road
 Waterway: West Lake
 Size: 1.7 acres
 Owner/Operator: Dalton Township
 Water Uses: Swimming, 250 feet of West Lake shoreline

Catalpa Park

Location: Park Road at Washington Road
 Waterway: Goose Egg Lake
 Size: 3 acres
 Owner/Operator: Dalton Township
 Water Uses: Gravel boat launch

Twin Lake Park

Location: 6231 Main Street
 Waterway: Twin Lake
 Size: 15 acres
 Owner/Operator: Muskegon County
 Water Uses: Swimming, boat launch, 800 feet of Twin Lake shoreline



Egelston Township

Sunset Beach

Location: West end of Wolf Lake
 Waterway: Wolf Lake
 Size: 1 acre
 Owner/Operator: Egelston Township
 Water Uses: Boat launch, swimming

Wolf Lake Park

Location: Wolf Lake Road
 Waterway: Wolf Lake
 Size: 6 acres
 Owner/Operator: Egelston Township
 Water Uses: Swimming



Fruitland Township

White River Light Station

Location: 6199 Murray Road
 Waterway: White Lake Channel
 Size: 2.75 acres
 Owner/Operator: Fruitland Township
 Water Uses: Fishing

Marcus Park

Location: Scenic Drive south of Duck Lake
 Waterway: Duck Lake
 Size: 1.28 acres
 Owner/Operator: Fruitland Township
 Water Uses: Fishing, swimming

Fruitland Township Park

Location: Nestrom Road
 Waterway: Duck Lake
 Size: 36.72 acres
 Owner/Operator: Fruitland Township
 Water Uses: Swimming

Duck Lake State Park

Location: Scenic Drive north of Duck Lake
 Waterway: Lake Michigan, Duck Lake
 Size: 728 acres
 Owner/Operator: Michigan Department of Natural Resources
 Water Uses: Fishing, swimming, boat launch

Muskegon County Road Ending

Location: McMillan Road
 Waterway: Lake Michigan
 Size: -
 Owner/Operator: -
 Water Uses: Swimming

Muskegon County Road Ending

Location: Nestrom Road
 Waterway: White Lake

Size: -
 Owner/Operator: -
 Water Uses: Portage boat launch, fishing, swimming

Muskegon County Road Ending

Location: White Lake Drive
 Waterway: White Lake
 Size: -
 Owner/Operator: -
 Water Uses: Boat launch, fishing, swimming

Muskegon County Road Ending

Location: Dock Road
 Waterway: White Lake
 Size: -
 Owner/Operator: -
 Water Uses: Portage boat launch, fishing, swimming

Muskegon County Road Ending

Location: Scenic Drive
 Waterway: White Lake
 Size: -
 Owner/Operator: -
 Water Uses: Boat launch, fishing, swimming

Fruitport Township

*** No points of public access to water identified ***

Village of Fruitport

Pomona Park

Location: Park and Third Street
 Waterway: Spring Lake
 Size: 5 acres
 Owner/Operator: Village of Fruitport
 Water Uses: Boat launch, fishing



Holton Township

* No points of public access to water identified *

Laketon Township

Horton Park

Location: Glenwood Avenue and Lake Street
Waterway: Bear Lake
Size: 300 ft x 100 ft
Owner/Operator: Laketon Township
Water Uses: Swimming, boat launch for smaller watercraft, 100 feet of Bear Lake shoreline

Pioneer Park

Location: Scenic Drive
Waterway: Lake Michigan
Size: 145 acres
Owner/Operator: Muskegon County
Water Uses: Swimming, 2,000 feet of Lake Michigan shoreline

Muskegon State Park

Location: 3560 Memorial Drive (at Scenic Drive)
Waterway: Lake Michigan, Muskegon Lake, Muskegon Channel
Size: 1,165 acres
Owner/Operator: Michigan Department of Natural Resources
Water Uses: Swimming, fishing, boat launch

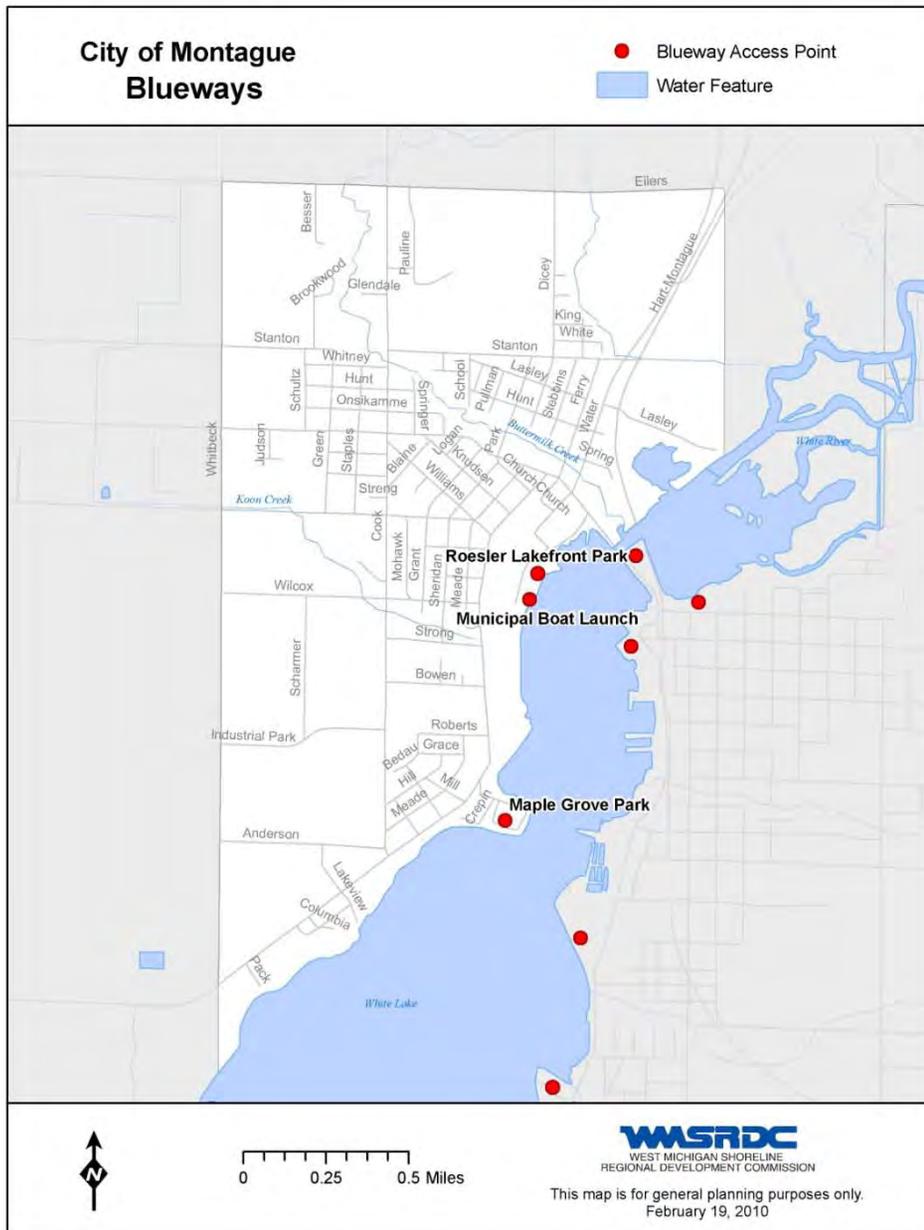
Muskegon County Road Ending

Location: Weber Road (at Scenic Drive)
Waterway: Muskegon Lake
Size: -
Owner/Operator: -
Water Uses: -

Muskegon County Property

Location: Between Pinewood Road and Beech Tree Court
Waterway: Muskegon Lake
Size: 8 acres
Owner/Operator: Muskegon County
Water Uses: -





City of Montague

Municipal Boat Launch

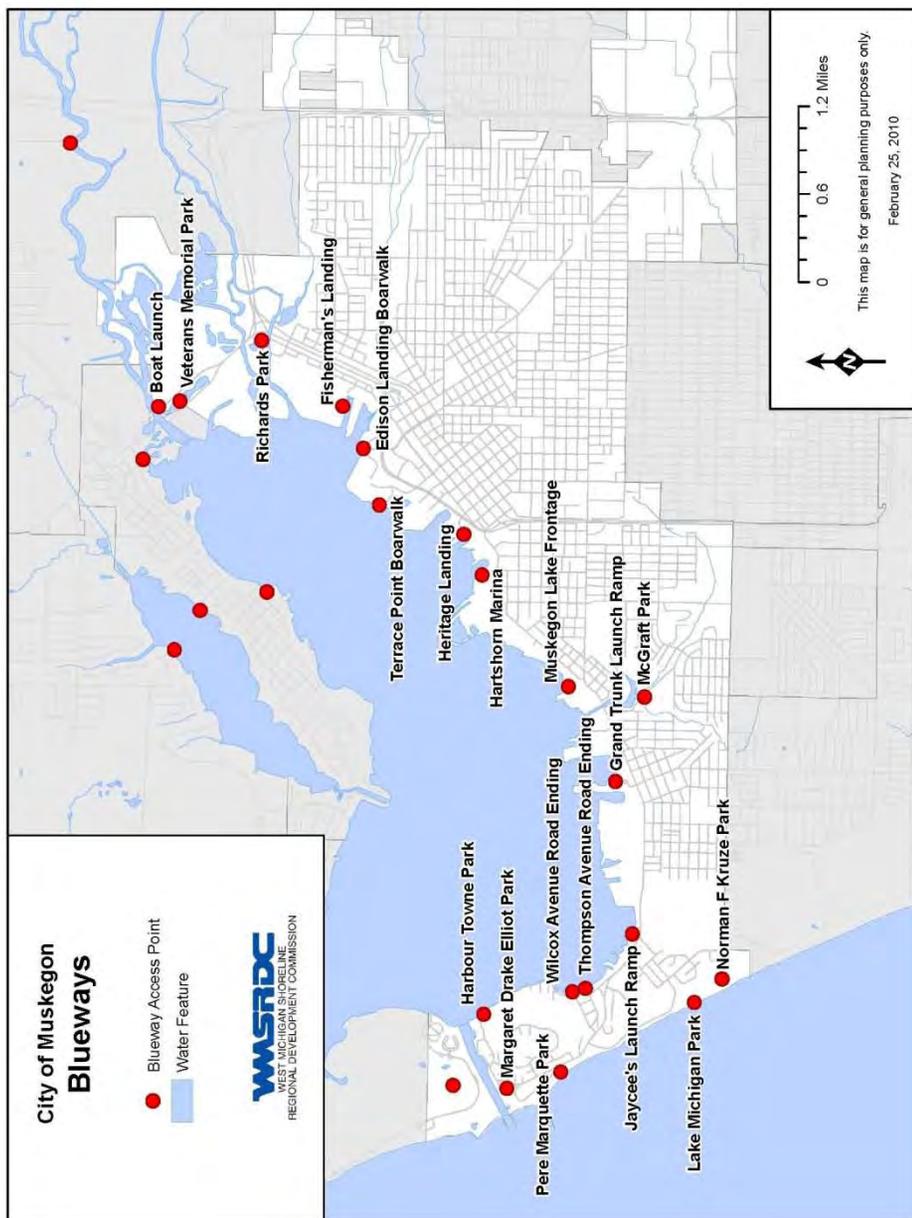
Location: Water Street
 Waterway: White Lake
 Size: 3 acres
 Owner/Operator: City of Montague
 Water Uses: Boat launch
 \$10 daily fee (\$30-50 yearly permits available)

Maple Grove Park

Location: Goodrich Street
 Waterway: White Lake
 Size: 4.5 acres
 Owner/Operator: City of Montague
 Water Uses: Swimming

Roesler Lakefront Park

Location: Water Road
 Waterway: White Lake
 Size: 3 acres
 Owner/Operator: City of Montague
 Water Uses: Lakefront access
 Park includes the Whitehall Rotary Band Shell



City of Muskegon

Boat Launch

Location: Northbound Causeway (M-120)
 Waterway: Muskegon River
 Size: -
 Owner/Operator: Privately owned
 Water Uses: Boat launch

Edison Landing Boardwalk

Location: Waterfront at Edison Landing in downtown Muskegon
 Waterway: Muskegon Lake
 Size: -
 Owner/Operator: -
 Water Uses: Fishing

Fisherman's Landing

Location: Giddings Avenue at Ottawa Street
 Waterway: Muskegon Lake
 Size: 18.6 acres
 Owner/Operator: City of Muskegon
 Water Uses: Boat launch, swimming

Grand Trunk Launch Ramp

Location: Lakeshore Drive and McCracken Street
 Waterway: Muskegon Lake
 Size: 4.6 acres
 Owner/Operator: Site owned by the State of Michigan, but leased by the City of Muskegon
 Water Uses: Boat launch

Harbour Towne Park

Location: Fulton Avenue
 Waterway: Muskegon Lake
 Size: -
 Owner/Operator: City of Muskegon
 Water Uses: Portage boat launch, swimming

Hartshorn Marina

Location: Division Street at Western Avenue
 Waterway: Muskegon Lake
 Size: 10.3 acres
 Owner/Operator: City of Muskegon
 Water Uses: Boat launch, 143 major boat slips, 30 small slips, 102 boat moorings

Heritage Landing

Location: Shoreline Drive
 Waterway: Muskegon Lake
 Size: -
 Owner/Operator: Muskegon County
 Water Uses: Fishing pier, channel walkway

Jaycee's Launch Ramp

Location: Lakeshore Drive at Cottage Grove Avenue
 Waterway: Muskegon Lake
 Size: 0.6 acre
 Owner/Operator: City of Muskegon
 Water Uses: Boat Launch

Lake Michigan Park

Location: Lake Michigan shoreline and dunes between Pere Marquette and Kruze Park
 Waterway: Lake Michigan
 Size: 54.5 acres
 Owner/Operator: City of Muskegon
 Water Uses: Swimming

Margaret Drake Elliot Park

Location: Beach Street
 Waterway: Muskegon Lake Channel
 Size: 5 acres
 Owner/Operator: City of Muskegon
 Water Uses: Fishing pier, channel walkway

McGraft Park

Location: Wickam Drive and Glen Avenue
 Waterway: Ruddiman Creek

Size: 92 acres
 Owner/Operator: City of Muskegon
 Water Uses: Fishing

Muskegon Lake Frontage

Location: Below Lakeshore Drive north of Laketon
 Waterway: Muskegon Lake
 Size: 10 acres
 Owner/Operator: City of Muskegon
 Water Uses: Fishing
 Accessible by Muskegon's Lakeshore Trail

Norman F. Kruze Park

Location: Sherman Boulevard
 Waterway: Lake Michigan
 Size: 52.3 acres
 Owner/Operator: City of Muskegon
 Water Uses: Swimming

Pere Marquette Park

Location: Beach Street
 Waterway: Lake Michigan
 Size: 27.5 acres
 Owner/Operator: City of Muskegon
 Water Uses: Swimming, non-motorized watercraft access

Richards Park

Location: North end of Ottawa Street
 Waterway: Muskegon River
 Size: 7.5 acres
 Owner/Operator: City of Muskegon
 Water Uses: Boat launch, fishing

Terrace Point Boardwalk

Location: Terrace Point Marina
 Waterway: Muskegon Lake
 Size: -
 Owner/Operator: -
 Water Uses: Fishing

Muskegon Township

Creston Boat Launch

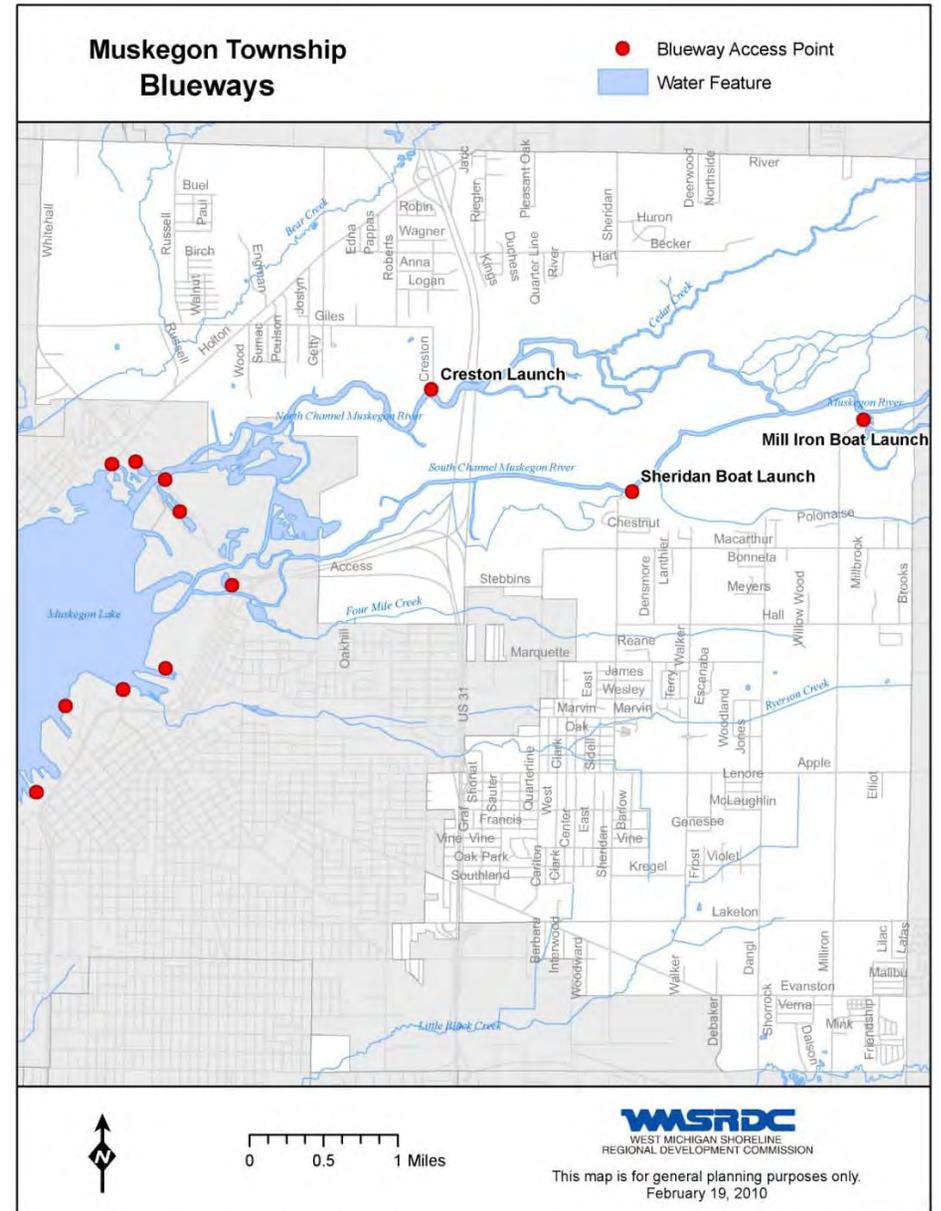
Location: South end of Creston Rd
 Waterway: North Branch Muskegon River
 Size: -
 Owner/Operator: -
 Water Uses: Unimproved boat launch

Mill Iron Boat Launch

Location: North end of Mill Iron Road
 Waterway: South Branch Muskegon River
 Size: -
 Owner/Operator: -
 Water Uses: Swimming, fishing, boat launch

Sheridan Boat Launch

Location: North end of Sheridan Road
 Waterway: South Branch Muskegon River
 Size: -
 Owner/Operator: -
 Water Uses: Boat launch



City of North Muskegon

North Muskegon Waterfront Sports Park

Location: First Street
 Waterway: Muskegon Lake
 Size: 7.1 acres
 Owner/Operator: City of North Muskegon
 Water Uses: Boat Launch, fishing, boardwalk and pier, 500 feet of Muskegon Lake shoreline

Bear Lake Park

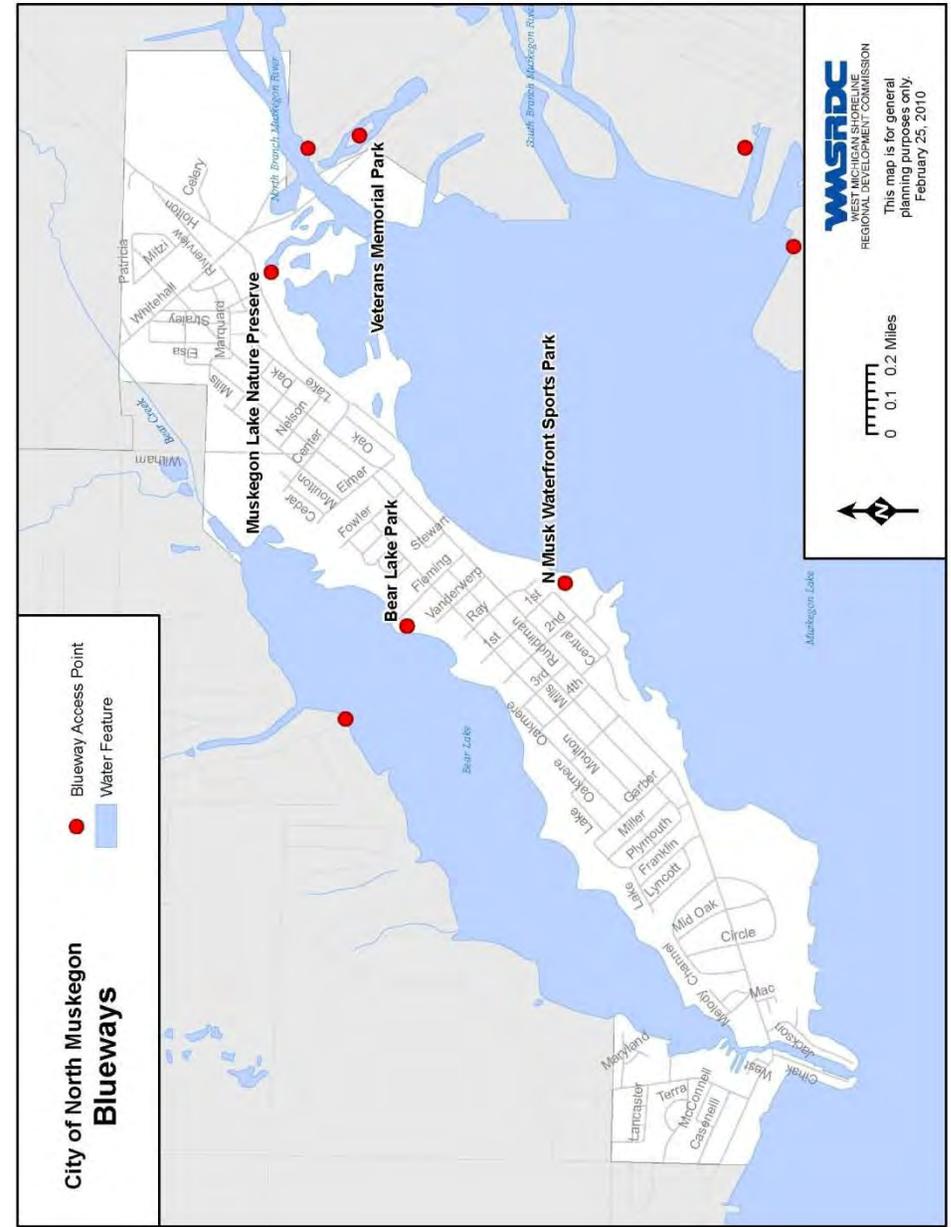
Location: Fleming Street
 Waterway: Bear Lake
 Size: 7 acres
 Owner/Operator: City of North Muskegon
 Water Uses: Swimming, 475 feet of Bear Lake shoreline

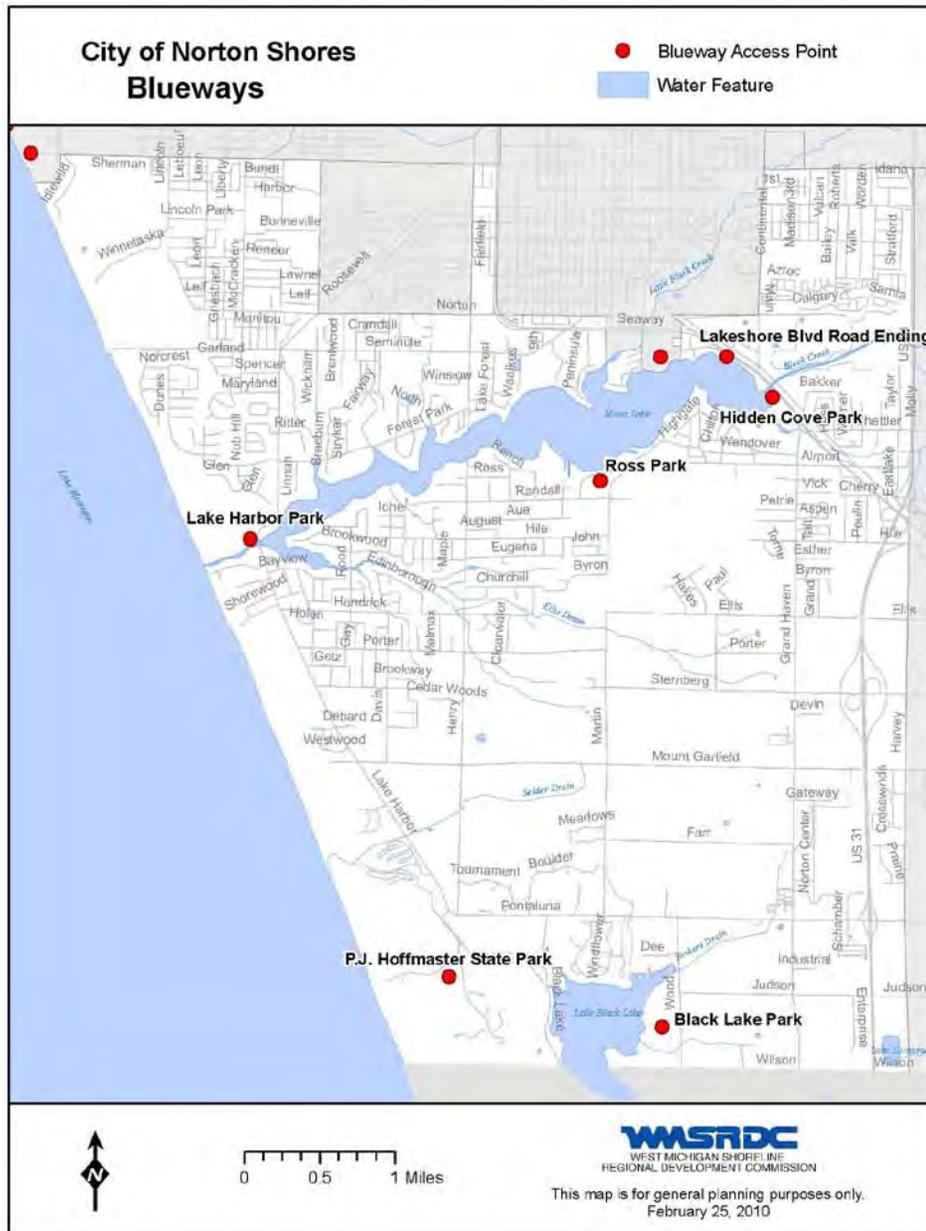
Muskegon Lake Nature Preserve

Location: Lake Street
 Waterway: Muskegon River
 Size: 15 acres
 Owner/Operator: Muskegon Environmental Research and Education Society
 Water Uses: Fishing, viewsheds of Muskegon River and Muskegon Lake

Veterans Memorial Park

Location: Causeway (M-120)
 Waterway: Muskegon River
 Size: 50 acres
 Owner/Operator: Owned by Muskegon County. Area north of the river maintained by the City of North Muskegon.
 Water Uses: Fishing





City of Norton Shores

Hidden Cove Park

Location: 3941 Grand Haven Road
 Waterway: Mona Lake
 Size: 20 acres
 Owner/Operator: City of Norton Shores
 Water Uses: Fishing

Lake Harbor Park

Location: 4635 Lake Harbor Road
 Waterway: Lake Michigan, Mona Lake, Mona Lake Channel
 Size: 182 acres
 Owner/Operator: City of Norton Shores
 Water Uses: Fishing, Swimming
 Water frontages include: 4,000 feet on Lake Michigan; 2,000 feet on Mona Lake Channel; and 1,500 feet on Mona Lake

Ross Park

Location: 82 Randall Road
 Waterway: Mona Lake
 Size: 43 acres
 Owner/Operator: City of Norton Shores
 Water Uses: Swimming

Black Lake Park

Location: Wood Road
 Waterway: Black Lake
 Size: 46 acres
 Owner/Operator: City of Norton Shores
 Water Uses: -

P.J. Hoffmaster State Park

Location: 6585 Lake Harbor Road
 Waterway: Lake Michigan
 Size: 1,200 acres
 Owner/Operator: Michigan Department of Natural Resources
 Water Uses: Swimming, 3 miles Lake Michigan shoreline

City of Norton Shores Cont.

Lakeshore Blvd Road Ending

Location: East end of Lakeshore Boulevard
Waterway: Mona Lake
Size: -
Owner/Operator: -
Water Uses: Fishing

Ravenna Township

Patterson Park

Location: Blackmer Road
Waterway: Little Rio Grande Creek
Size: 28 acres
Owner/Operator: Muskegon County
Water Uses: -

Village of Ravenna

Thatcher Park

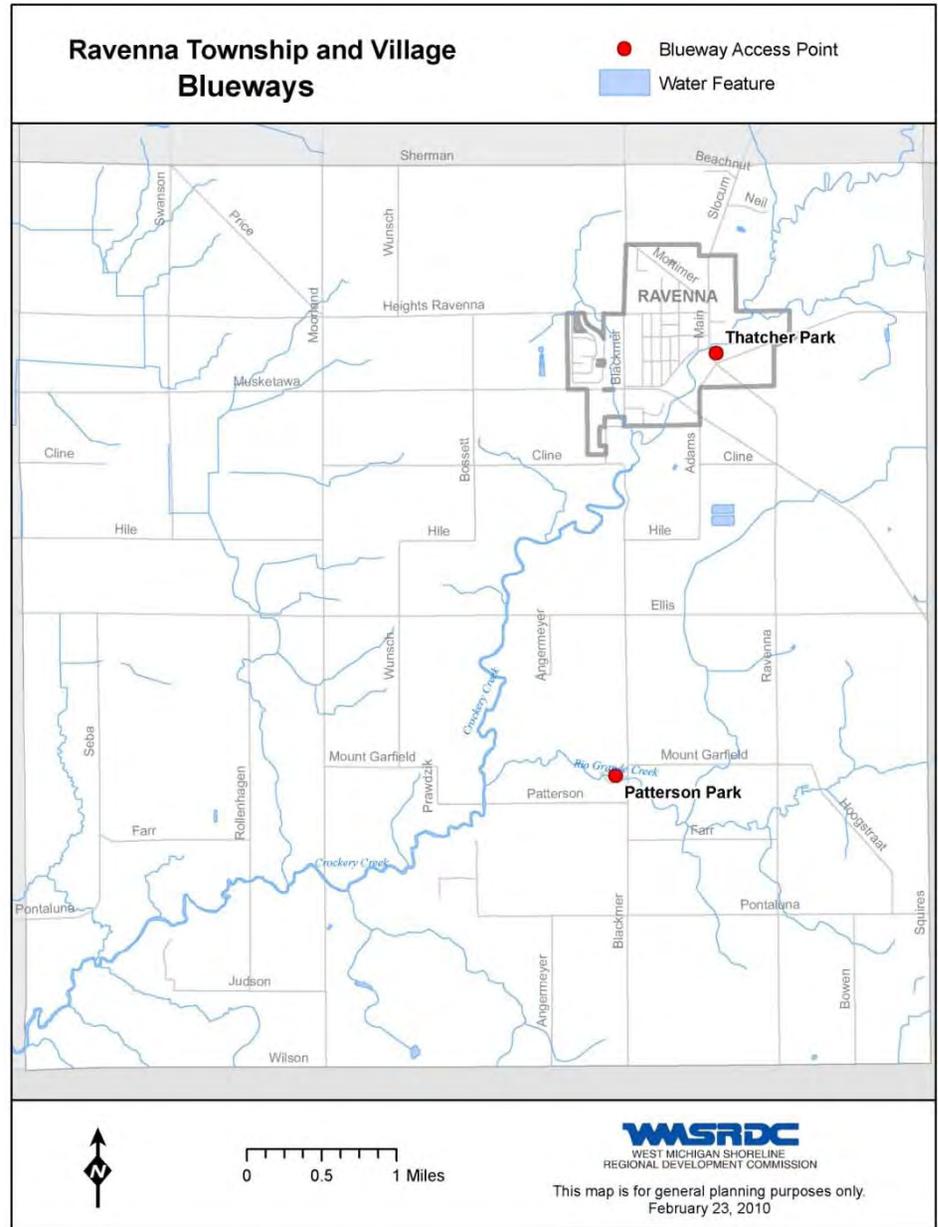
Location: Main Street and Harrisburg Road
Waterway: Crockery Creek
Size: -
Owner/Operator: Village of Ravenna
Water Uses: -

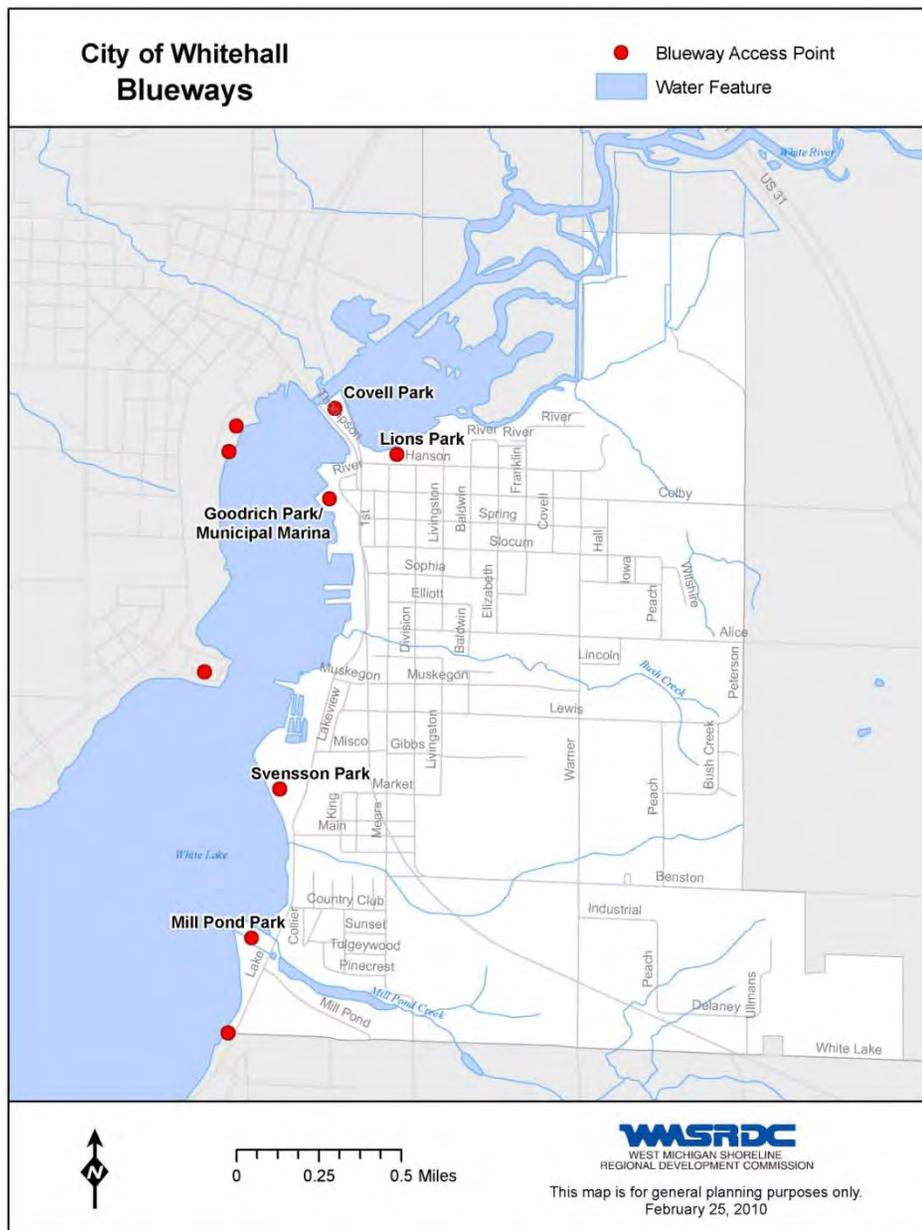
City of Roosevelt Park

*** No points of public access to water identified ***

Sullivan Township

*** No points of public access to water identified ***





City of Whitehall

Goodrich Park/White Lake Municipal Marina

Location: 100 South Lake Street
 Waterway: White Lake
 Size: 8.5 acres
 Owner/Operator: City of Whitehall
 Water Uses: Fishing, marina with 50 slip marina for seasonal and transient use

Covell Park

Location: Thompson St (Business US-31) at the White River
 Waterway: White River
 Size: 3.9
 Owner/Operator: City of Whitehall
 Water Uses: Boat Launch, fishing

Svensson Park

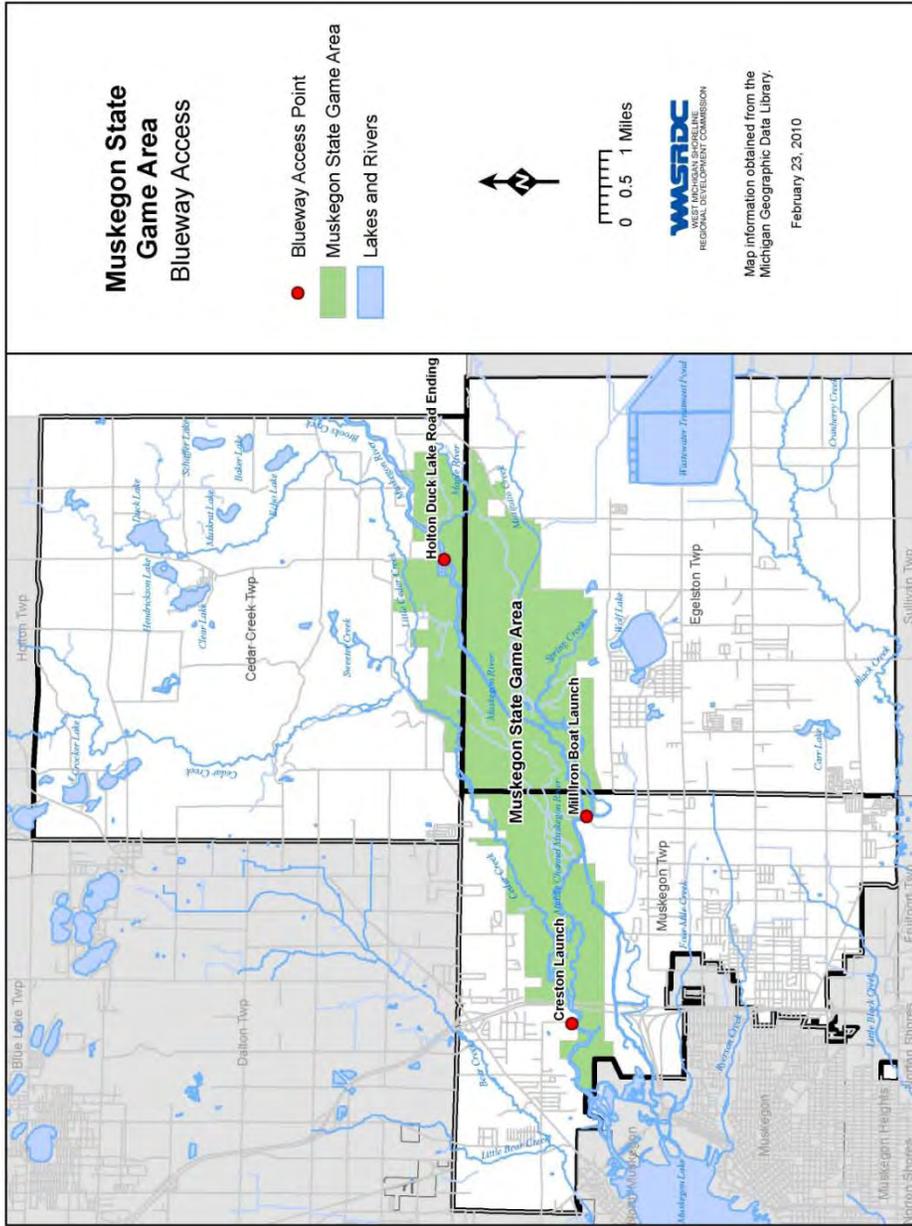
Location: South Lake Street and Market Street
 Waterway: White Lake
 Size: 3.7 acres
 Owner/Operator: City of Whitehall
 Water Uses: Non-motorized watercraft launch, fishing

Lions Park

Location: Hanson Street near Business US-31
 Waterway: White River
 Size: 3.5 acres
 Owner/Operator: City of Whitehall
 Water Uses: Access to White River

Mill Pond Park

Location: Lake Street at Mill Pond Road
 Waterway: White Lake
 Size: 4.6 acres
 Owner/Operator: City of Whitehall
 Water Uses: Waterfront access to White Lake



Multi-Jurisdictional Facilities

Muskegon State Game Area

Location: Cedar Creek Township, Egelston Township, Muskegon Charter Township, and Bridgeton Township (Newaygo County)

Waterway: Muskegon River and tributaries

Size: 10,500 acres

Owner/Operator: Michigan Department of Natural Resources

Water Uses: Fishing

CHAPTER IV: MUSKEGON COUNTY GREENWAYS INVENTORY

Introduction of Greenways in Muskegon County

The term Greenway is defined by the Natural Resources Defense Council as an undeveloped land usually in cities, set aside or used for recreation or conservation. In comparison, the Michigan Department of Natural Resources (MDNR) defines a Greenway as a continuous area of vegetation that may or may not be developed as a trailway for use by people – Greenways often connect open spaces. This chapter presents a detailed inventory of greenways present in Muskegon County. A total of approximately 31,284.15 acres and 66.05 miles of greenways have been identified in the inventory. The greenways have been separated into four categories including Community Parks, Forest Land/Open Space/Natural Areas, Linear Parks/Bike Trails, and Municipal Marinas/Boat Launches. In addition, there are a variety of jurisdictions that operate and maintain the identified greenways. These jurisdictions include Townships, Cities, Villages, County, State and Federal. Table 7 gives a synopsis of the greenways inventory.

Table 7

Muskegon County Greenways Inventory Summary			
Park Type	Jurisdiction	Total Number	Total Acres
Community Parks	State	3	3,228.00
	County	6	337.00
	Township	30	796.57
	City	71	837.08
	Village	6	49.50
	TOTAL	116	5,729.15 Acres
Forest Land/Open Space/Natural Areas	Federal	Various Areas	12,501.00
	State	1	10,500.00
	Conservation	22	1,025.00
	City	9	442.20
	Township	8	747.90
	Other	2	80.00
	TOTAL	42	25,536.10 Acres
Linear Parks/Bike Trails	State	2	47.50 Miles
	Township	1	1.30 Miles
	City	6	17.25 Miles
	TOTAL	9	66.05 Miles
Municipal Marinas/Boat Launches	County	1	5.00
	City	3	13.90
	TOTAL	4	18.9

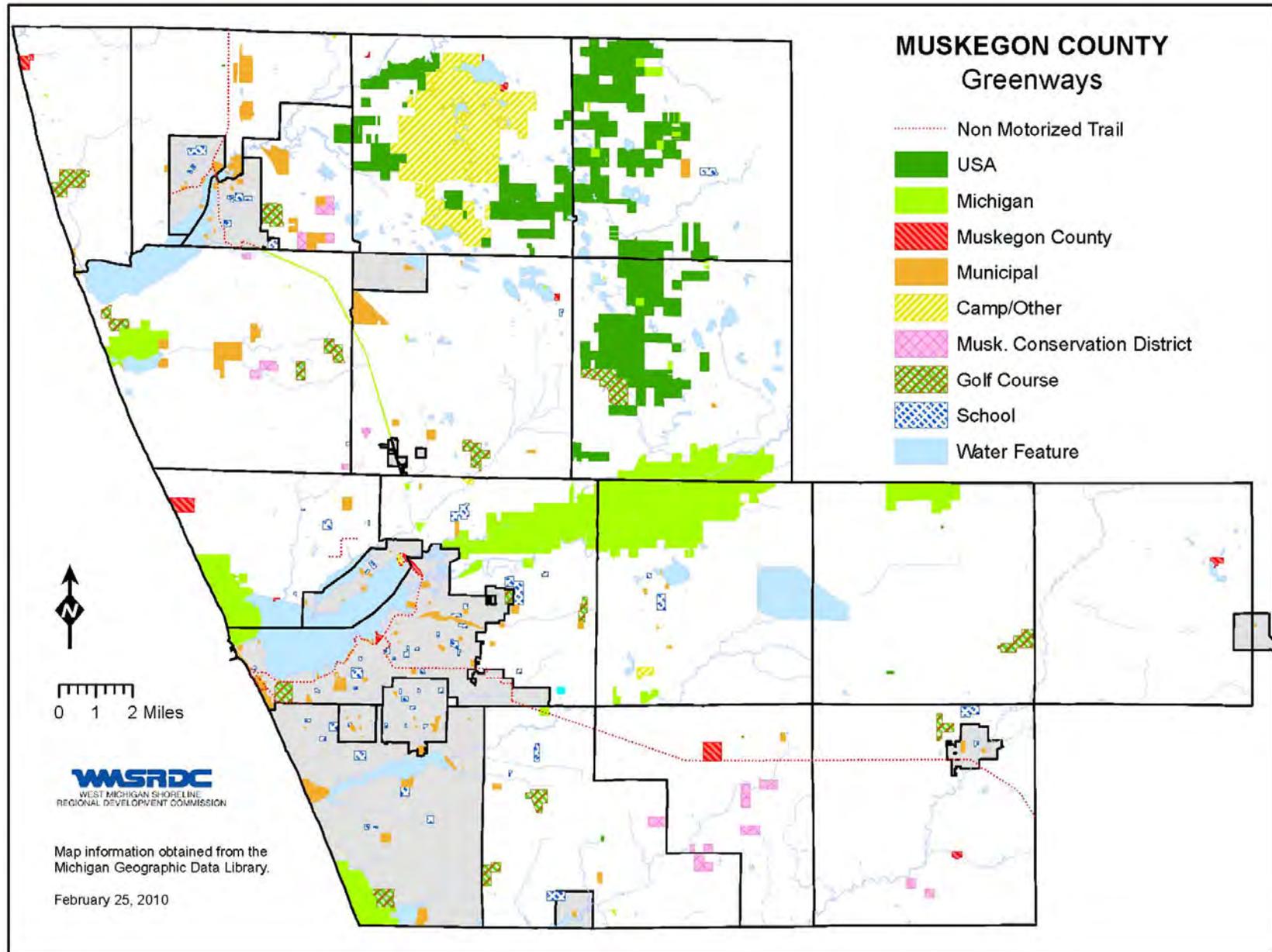
Nearly all 27 local units of government in Muskegon County including the county have an active Community Recreation Plan. The Michigan Department of Natural Resources defines a Recreation Plan as a document that is prepared to assist communities in developing recreation and resource conservation goals and objectives and to establish recreation grant eligibility. Table 8 identifies each of the jurisdictions in Muskegon County and the status of their Community Recreation Plan.

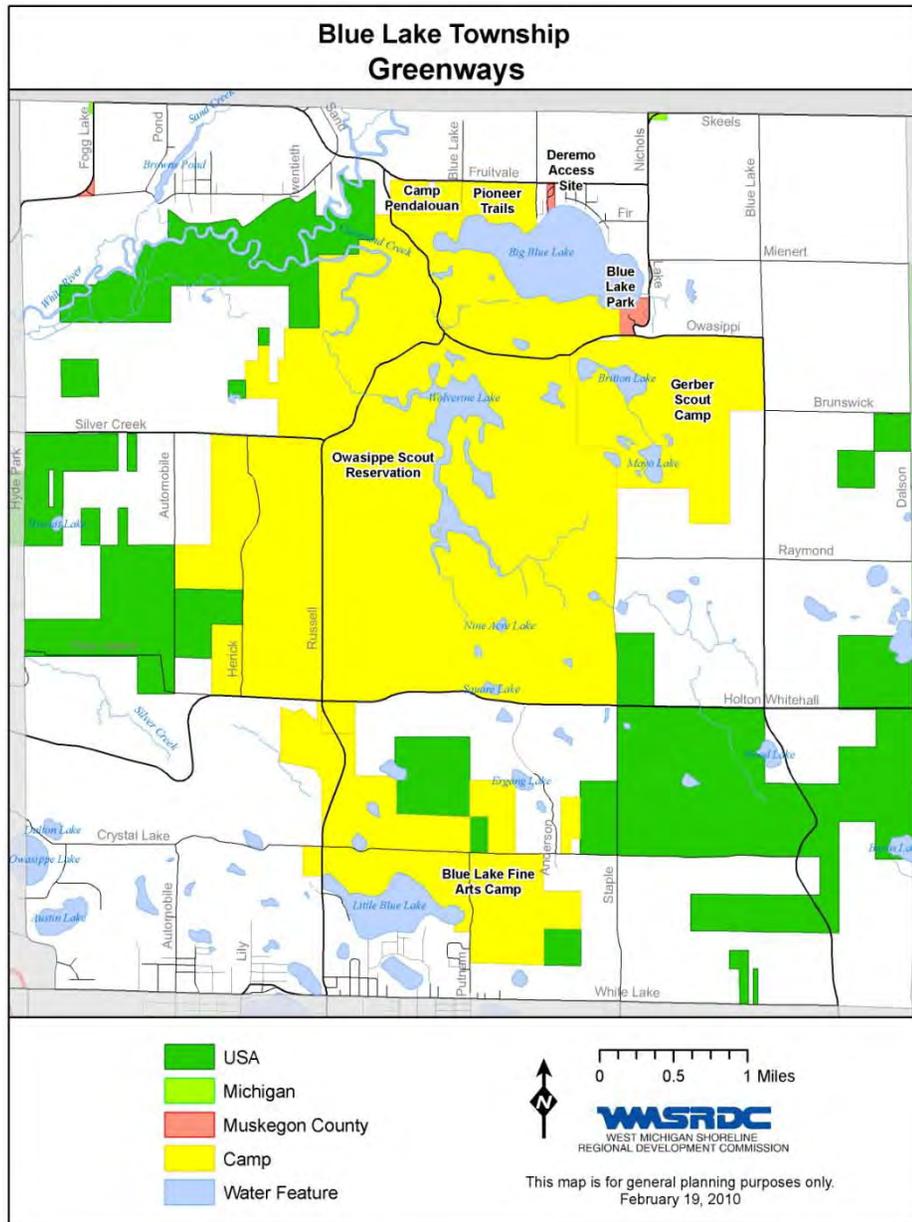
Table 8

Recreation Plan Information				
Jurisdiction	Year Plan Approved	Five Year Planning Period	Plan Under Development	No Plan
Muskegon County	2006	2006 – 2011		
White River Township	2004	2004 – 2009		
Montague Township	2009	2009 - 2014		
City of Montague	2007	2007 – 2012		
City of Whitehall	2009	2009 – 2014		
Whitehall Township	2008	2008 – 2013		
Blue Lake Township	2006	2006 – 2011		
Holton Township	2003	2003 – 2008		
Fruitland Township	2000	2000 – 2005	✓	
Village of Lakewood Club	2007	2007 – 2012		
Dalton Township	2003	2003 – 2008	✓	
Cedar Creek Township	1999	1999 – 2004		
Laketon Township	2006	2006 – 2011		
City of North Muskegon	2007	2007 – 2012		
City of Muskegon	2009	2009 – 2014		
Muskegon Township	2008	2008 – 2013		
Egelston Township	2009	2009 – 2014		
Moorland Township				✓
Casnovia Township	1999	1999 – 2004		
Village of Casnovia				✓
City of Norton Shores	2006	2006 – 2011		
City of Roosevelt Park	2000	2000 – 2005		
City of Muskegon Heights	2008	2008 – 2013		
Fruitport Township	2000 Reviewed in 2005	2005 - 2010		
Village of Fruitport	2006	2006 – 2011		
Sullivan Township	1980	1980 – 1985		
Ravenna Township				✓
Village of Ravenna	2000	2000 - 2005		

The greenways inventory is organized by municipal boundaries including cities, villages, and townships. Each community in Muskegon County is listed in alphabetical order along with a map identifying the location of each greenway, and followed by brief descriptions of each greenway found within that municipality. Each map also includes schools and golf courses, as these properties often provide valuable greenspaces in both urban and rural settings. Below is the inventory of Muskegon County Greenways.

Detailed GREENWAYS Inventory





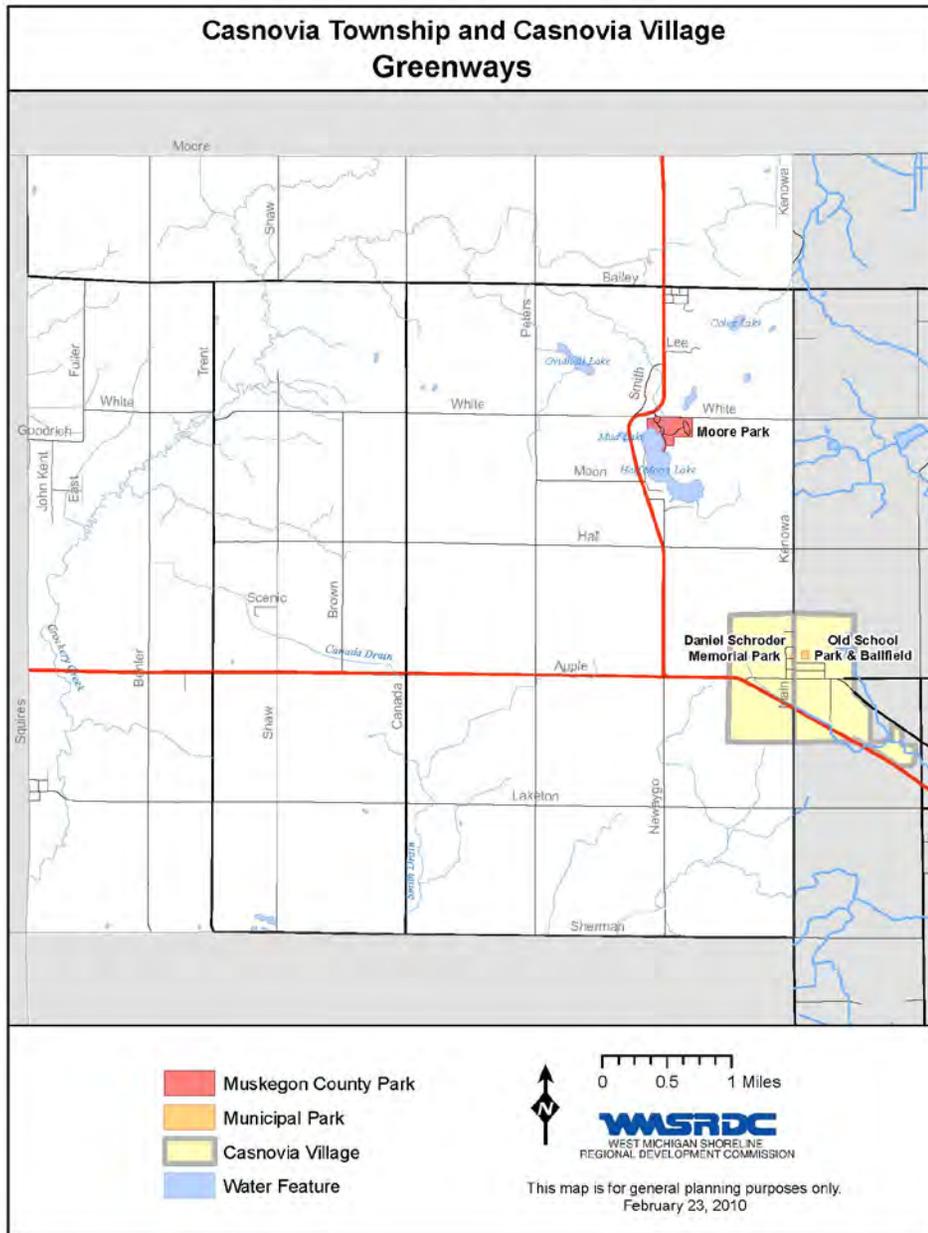
Blue Lake Township

Blue Lake Park

Jurisdiction: County of Muskegon
Location: Nichols Road on Big Blue Lake
Type: County Park
Size: 25 acres
Description: The park offers 600 feet of lake frontage for fishing, boating, water-skiing, picnicking, swimming, sunbathing, 24 modern campsites, flush toilets, showers, sanitary dumping station, ice, firewood, and ranger service/security.

Deremo Access Site

Jurisdiction: County of Muskegon
Location: Fruitvale Road on Big Blue Lake
Type: Boat Launch
Size: 5 acres
Description: A year-round paved launch site for boating, water-skiing and fishing on approximately 550 feet of Big Blue Lake.



Casnovia Township

Moore Park

Jurisdiction: County of Muskegon and Casnovia Township
 Location: On Half Moon Lake one mile north of the M37 and M46 junction (Casnovia Township)
 Type: County Park and Township Park
 Size: 36 acres
 Description: The year-round facility is a popular attraction for fishing, boating, and swimming. Other activities include picnicking, sunbathing and walking on paved roadways or in the woods. The facilities include small picnic shelter, park grills and tables, restrooms and boat launch.

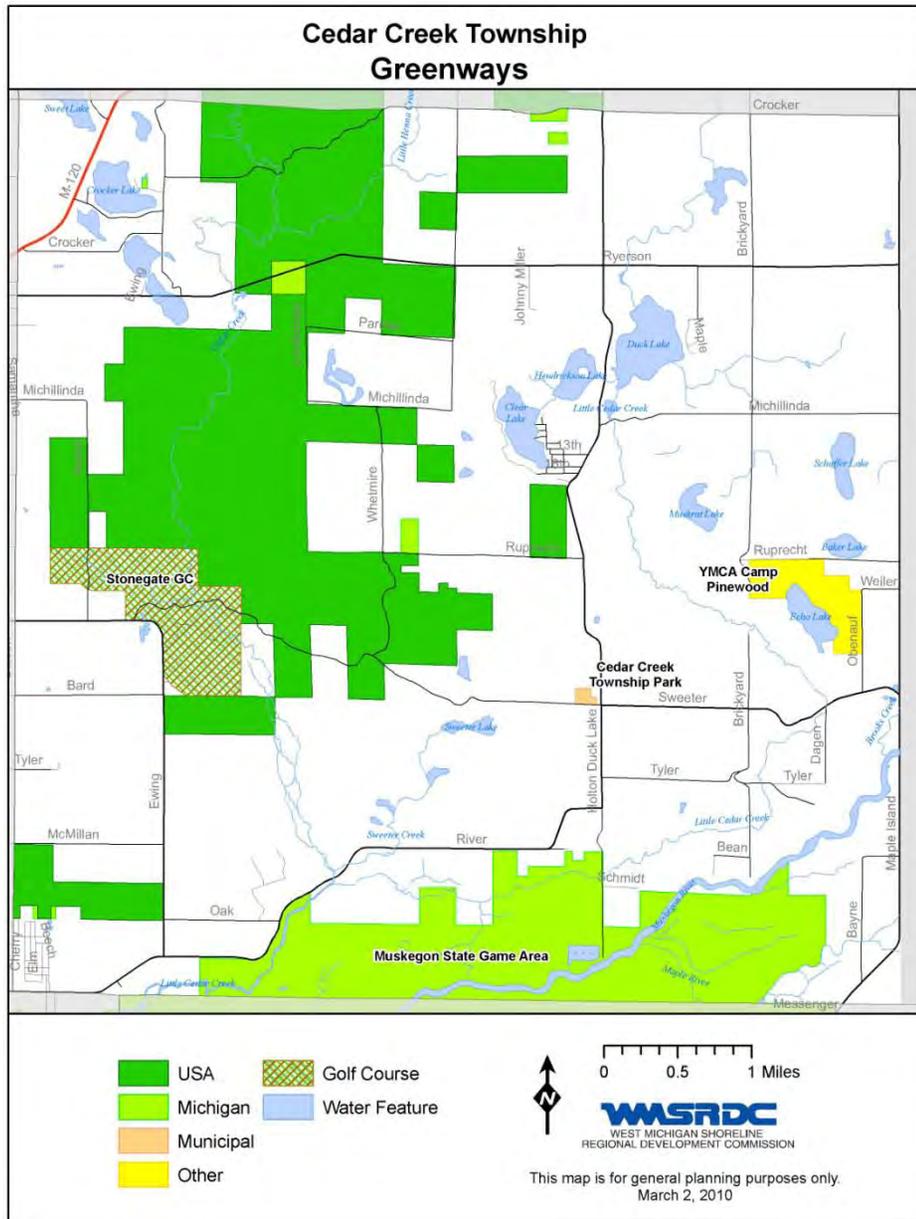
Village of Casnovia

Daniel Schroder Memorial Park

Jurisdiction: Village of Casnovia
 Location: Main Street adjacent to Village Hall
 Type: Community Park
 Size: 0.5 city block
 Description: The park offers a picnic table and memorial monument.

Old School Park & Ballfield

Jurisdiction: Village of Casnovia
 Location: Main Street across from Village Hall
 Type: Community Park
 Size: ~2 acres
 Description: Ballfields and open space.



Cedar Creek Township

Cedar Creek Township Park

Jurisdiction: Cedar Creek Township
 Location: Sweeter Road
 Type: Community Park
 Size: 7 acres
 Description: The facility offers two ball fields, with bleachers, portable restrooms, and a fitness trail with approximately seven exercise stations.

Dalton Township

Beegle Field

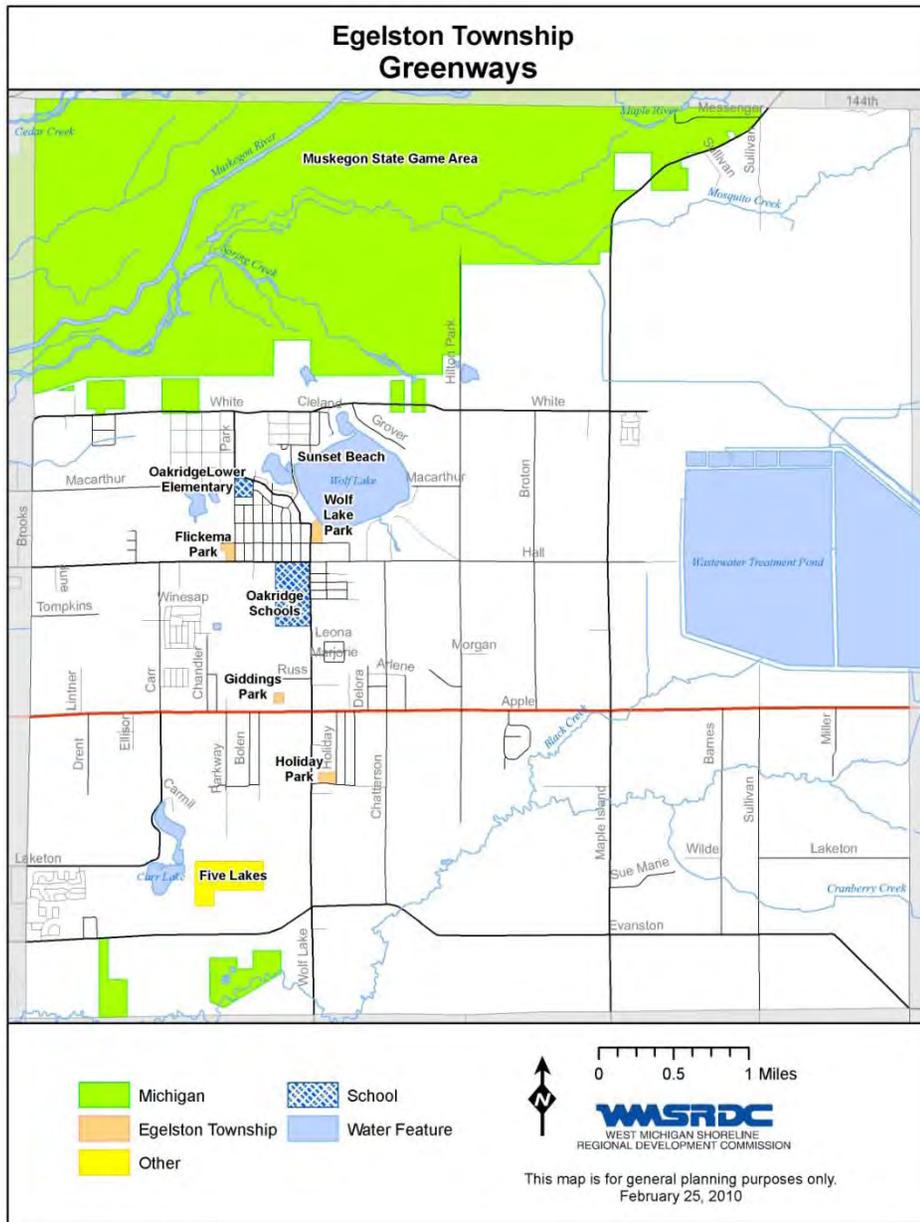
Jurisdiction: Dalton Township
 Location: Tyler Road east of Automobile Road
 Type: Community Park
 Size: 15 acres
 Description: Amenities include two official size soccer fields, one baseball diamond, playground equipment, basketball court, tennis court, small 20/40 enclosed hall, and gravel parking.

Padley Park

Jurisdiction: Dalton Township
 Location: West Lake Road
 Type: Community Park
 Size: 1.7 acres
 Description: The park includes 250 feet of frontage on West Lake, gravel parking area, and two seasonal portable restrooms.

Catalpa Park

Jurisdiction: Dalton Township
 Location: West end of Goose Egg Lake near Putnam Road
 Type: Community Park
 Size: 3 acres
 Description: Park amenities include gravel parking area, gravel boat launch, basketball court and two seasonal portable restrooms.



Egelston Township

Holiday Park

Jurisdiction: Egelston Township
 Location: Wolf Lake Road south of Apple Avenue
 Type: Community Park
 Size: 5 acres
 Description: Amenities include two pavilions, basketball court, two youth softball fields, playground equipment, soccer field, grills, picnic tables, and bleachers.

Flickema Park

Jurisdiction: Egelston Township
 Location: Hall Road and Park Road
 Type: Community Park
 Size: 5 acres
 Description: Facilities include two youth baseball fields, playground equipment, picnic tables, tee-ball field, pavilion, grills, benches, four basketball courts, multi-purpose court, and bleachers.

Sunset Beach

Jurisdiction: Egelston Township
 Location: West end of Wolf Lake
 Type: Community Park
 Size: 1 acre
 Description: Amenities include benches, boat ramp, swimming beach, picnic tables, grills, bleachers, and an all sports field.

Giddings Park

Jurisdiction: Egelston Township
 Location: Apple Avenue west of Wolf Lake Road
 Type: Community Park
 Size: 3 acres
 Description: Amenities include playground equipment, picnic tables, a grill, bench, bleachers and an all sports field.

Gayle Beals/Wolf Lake Park

Jurisdiction: Egelston Township
Location: Wolf Lake Road on south side of Wolf Lake
Type: Community Park
Size: 6 acres
Description: Facilities include playground equipment, picnic tables, youth baseball field, bleachers, swimming beach, three pavilions, benches, grills and two shuffleboard courts.

Five Lakes

Jurisdiction: Michigan Nature Association (MNA)
Location: Egelston Township
Type: Sanctuary
Size: 65 acres
Description: Class C sanctuary including sensitive habitat. Visitors are welcome only with an MNA guide.

Forest Land

Jurisdiction: Muskegon Conservation District
Location: Egelston Township, Section 21
Type: Forest Land
Size: 1.4 acres
Description: Natural forest land.

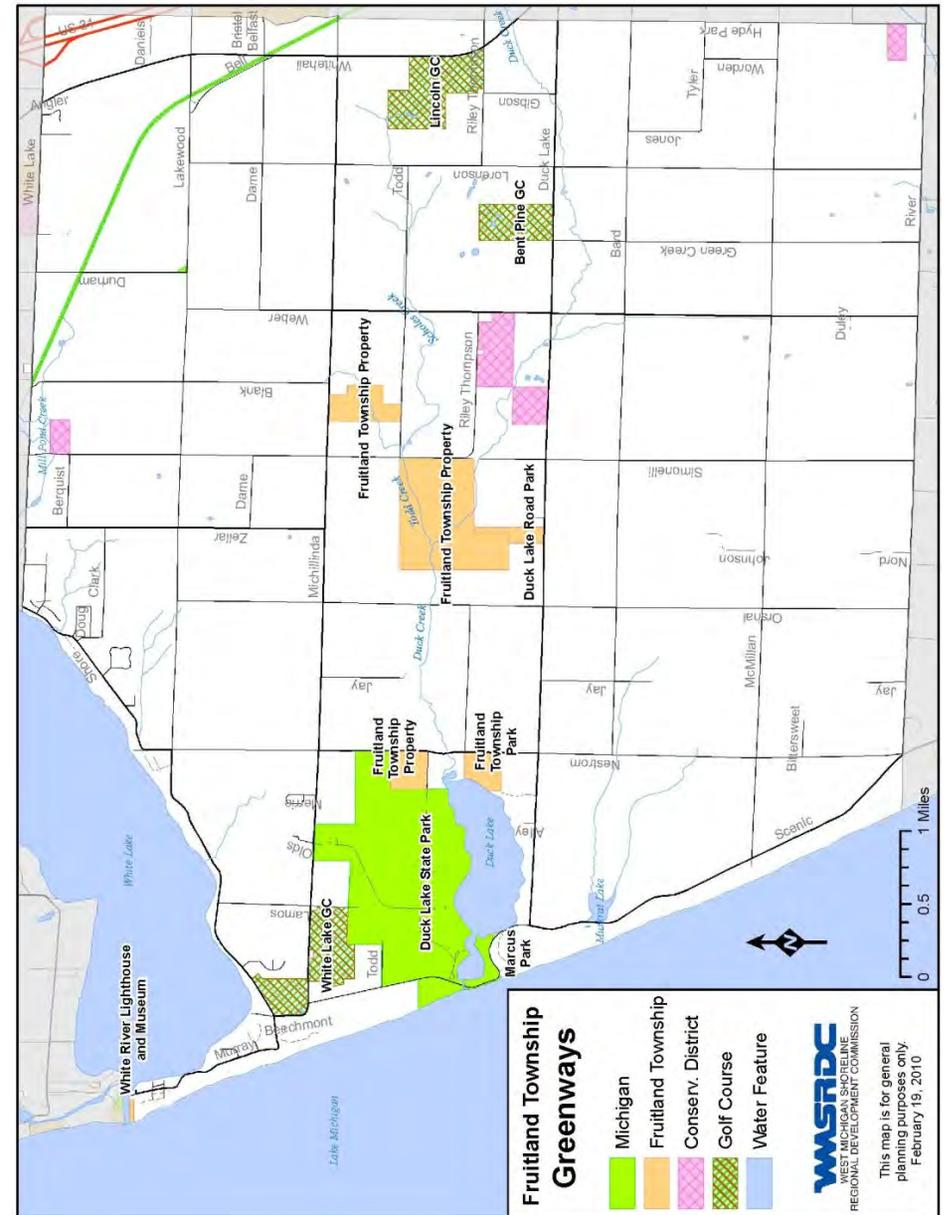
Fruitland Township

White River Lighthouse and Museum

Jurisdiction: Fruitland Township
Location: South side of White Lake Channel
Type: Community Park/Museum
Size: 2.75 acres
Description: The facility offers an historic museum, swimming beach, fishing pier, and parking.

Duck Lake Road Park/Playground

Jurisdiction: Fruitland Township
Location: Duck Lake Road
Type: Community Park
Size: 19.62 acres
Description: Amenities include a tennis court and basketball backstop.



Marcus Park

Jurisdiction: Fruitland Township
 Location: Scenic Drive on Duck Lake
 Type: Community Park
 Size: 1.28 acres
 Description: The park includes a swimming beach, grills, picnic tables, and fishing.

Fruitland Township Park

Jurisdiction: Fruitland Township Park
 Location: Nestrom Road on east end of Duck Lake
 Type: Community Park
 Size: 36.72 acres
 Description: Amenities include swimming beach, ball fields, horseshoe pits, shuffleboard, tennis courts, restroom facilities, picnic shelter, parking, and playground equipment.

Duck Lake State Park

Jurisdiction: State of Michigan
 Location: On Duck Lake between Scenic Drive and Nestrom Road
 Type: State Park
 Size: 728 acres
 Description: The park features a towering sand dune, boat launch, fishing, hunting, snowmobiling, cross country skiing, hiking, metal detecting, swimming, a beach house, picnic shelter, and picnic area.

Forest Land

Jurisdiction: Muskegon Conservation District
 Location: Fruitland Township, Section 3
 Type: Forest Land
 Size: 22 acres
 Description: Natural forest land.

Fruitland Township Property

Jurisdiction: Fruitland Township
 Location: Fruitland Township, Section 15
 Type: Forest Land
 Size: 64 acres
 Description: Township-owned forest land.

Fruitland Township Property

Jurisdiction: Fruitland Township
 Location: Fruitland Township, Section 16
 Type: Forest Land
 Size: ~240 acres
 Description: Township-owned forest land abutting Duck Lake Road Park.

Fruitland Township Property

Jurisdiction: Fruitland Township
 Location: Fruitland Township, Section 18
 Type: Forest Land
 Size: 40 acres
 Description: Township-owned forest land bordered by the Duck Lake State Park on two sides.

Forest Land

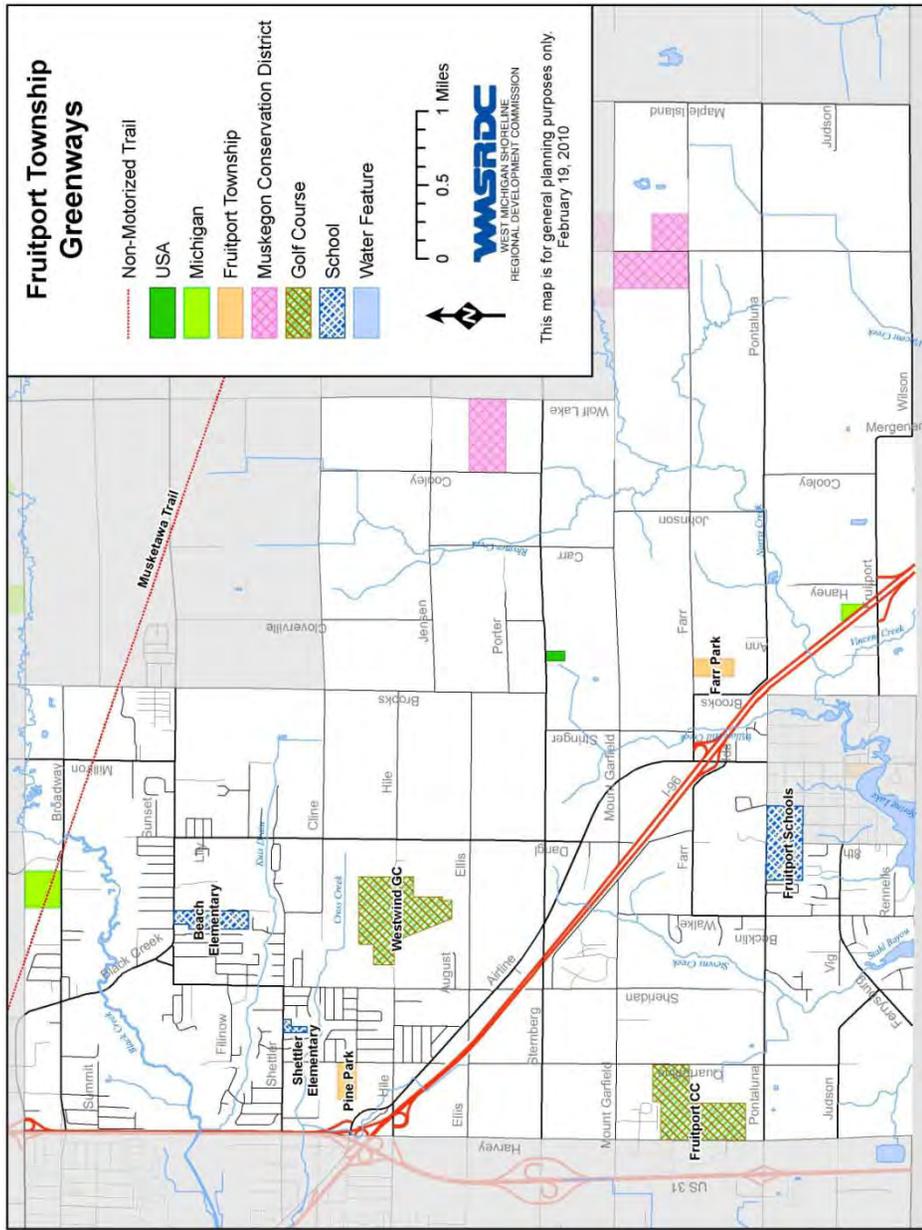
Jurisdiction: Muskegon Conservation District
 Location: Fruitland Township, Section 22
 Type: Forest Land
 Size: 75 acres
 Description: Natural forest land.

Forest Land

Jurisdiction: Muskegon Conservation District
 Location: Fruitland Township, Section 22
 Type: Forest Land
 Size: 40 acres
 Description: Natural forest land.

Forest Land

Jurisdiction: Muskegon Conservation District
 Location: Fruitland Township, Section 36
 Type: Forest Land
 Size: 20 acres
 Description: Natural forest land.



Fruitport Township

South Fruitport Park (Farr Park)

Jurisdiction: Fruitport Township
Location: Farr Road east of Brooks Road
Type: Community Park
Size: 20 acres
Description: The park contains one slow-pitch baseball field, four little league fields, a soccer field, restrooms, concession/maintenance building, gravel parking and playground equipment.

Pine Park

Jurisdiction: Fruitport Township
Location: Quarterline Road between Shettler Road and Hile Road
Type: Community Park
Size: 23 acres
Description: Amenities include a regulation football field, one basketball court, two tennis courts, a pony league field, two little league fields, playground equipment, picnic area, shuffleboard courts, gravel parking, restroom building, and three small soccer fields.

Forest Land

Jurisdiction: Muskegon Conservation District
Location: Fruitport Township, Section 20
Type: Forest Land
Size: 80 acres
Description: Natural forest land.

Forest Land

Jurisdiction: Muskegon Conservation District
Location: Fruitport Township, Section 27
Type: Forest Land
Size: 40 acres
Description: Natural forest land.

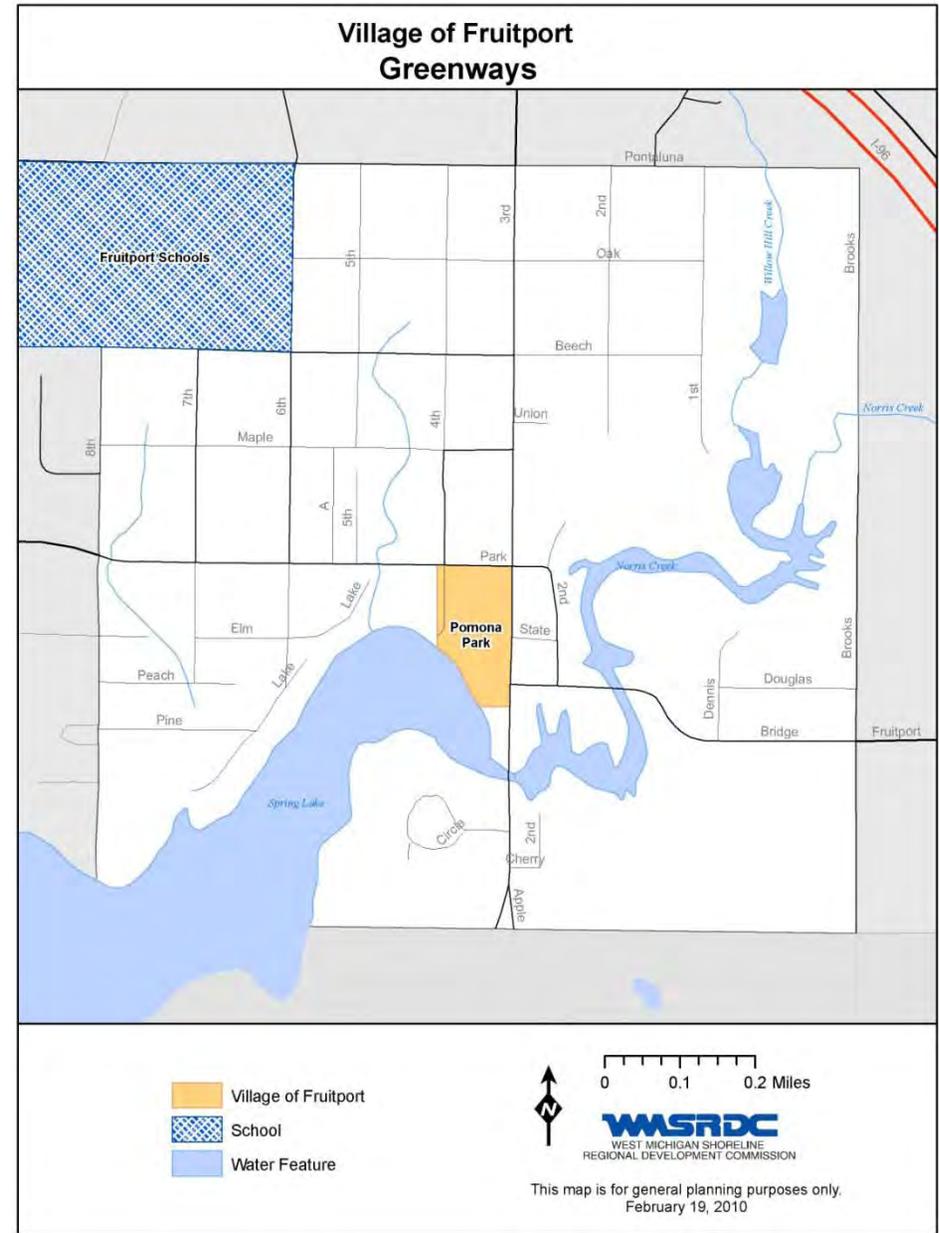
Forest Land

Jurisdiction: Muskegon Conservation District
Location: Fruitport Township, Section 28
Type: Forest Land
Size: 80 acres
Description: Natural forest land.

Village of Fruitport

Pomona Park

Jurisdiction: Village of Fruitport
Location: Park Street and Third Avenue on Spring Lake
Type: Community Park
Size: 5 acres
Description: The park includes a band shell, boat ramp, fishing pier, lake view, peach tree (sitting area), picnic shelter, playground, restrooms, bike path around Spring Lake.



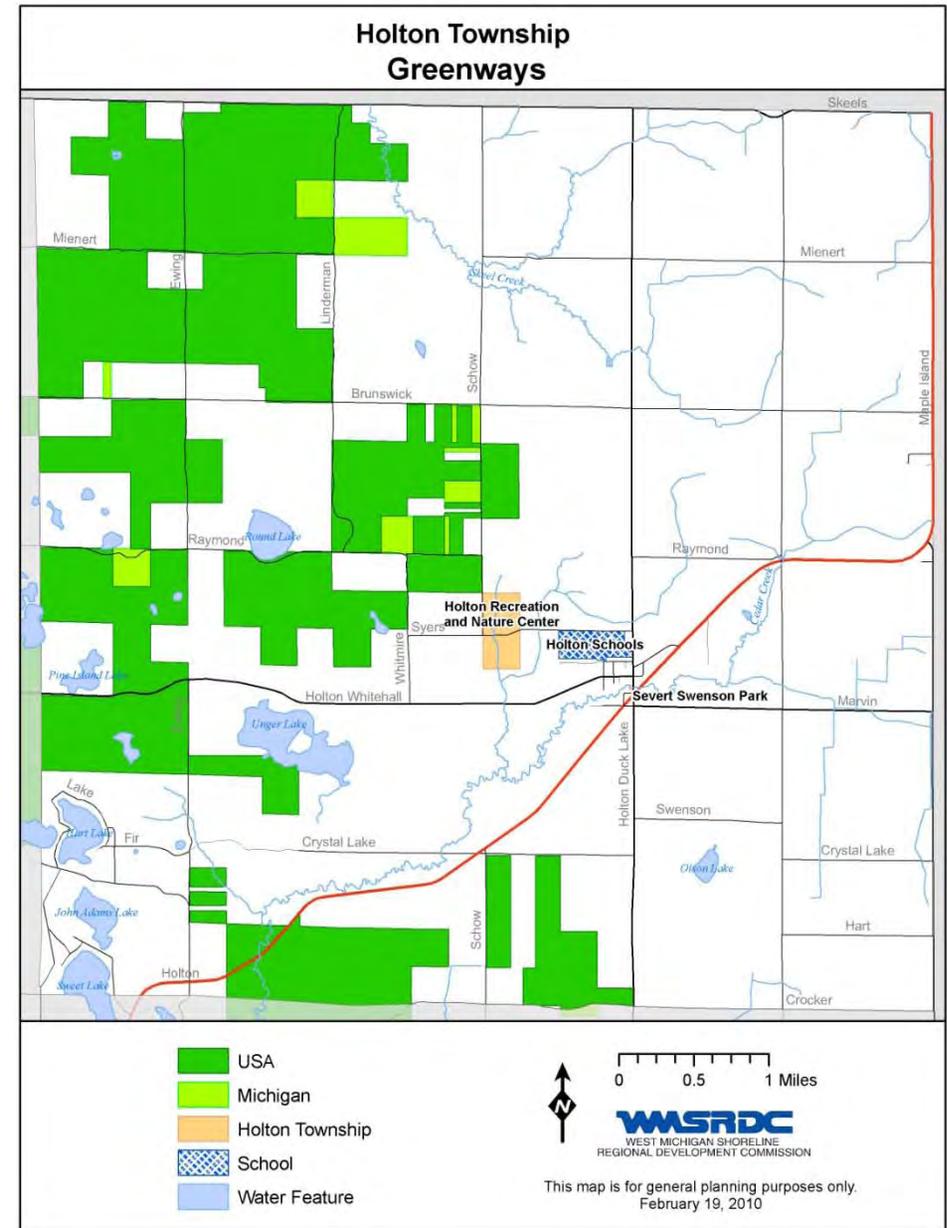
Holton Township

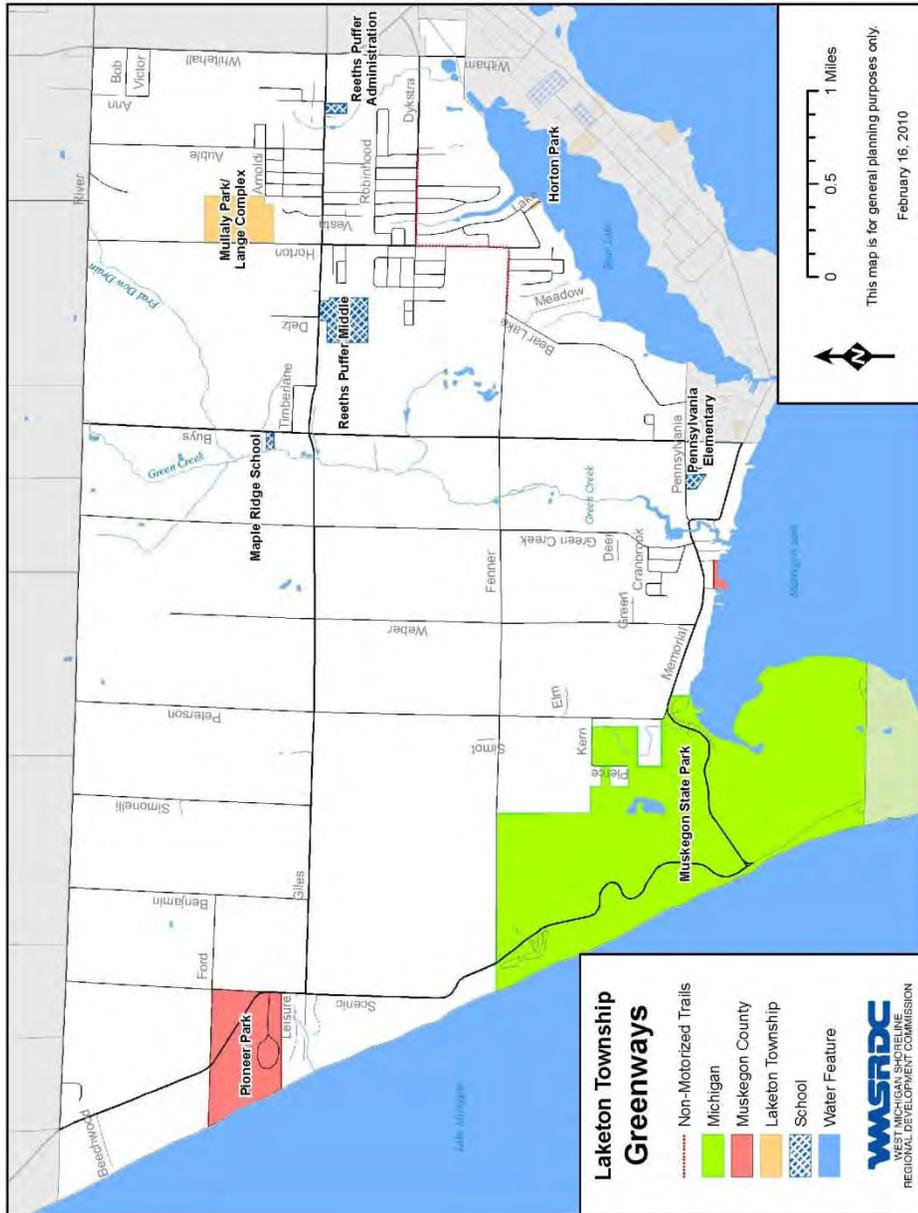
Holton Recreation and Nature Center

Jurisdiction: Holton Township
Location: Syers Road
Type: Community Park
Size: 80 acres
Description: The park provides a picnic area, parking, soccer fields, ball fields, playground, nature trails, and nature center.

Severt Swenson Park

Jurisdiction: Holton Township
Location: Holton Duck Lake Road
Type: Community Park
Size: 0.5 acre
Description: The park contains the community Christmas tree which is decorated each year as a Holton tradition. There is a tree lighting ceremony to kick off the holiday season which includes festive activities such as caroling and refreshments.





Laketon Township

Horton Park

Jurisdiction: Laketon Township
Location: Glenwood and Lake Street on Bear Lake
Type: Community Park
Size: 300 feet long by 100 feet wide
Description: Facilities for picnicking, a swimming beach, playground equipment, and restroom facility. Small watercraft may be launched at the end of the road. Access is available for ice fishing in winter.

Mullally Park/Lange Complex

Jurisdiction: Laketon Township
Location: Horton Road north of Giles Road
Type: Community Park
Size: 58 acres
Description: The facility offers picnic areas/pavilions, baseball, football, volleyball, and soccer fields, tennis courts, walking/jogging path, various playgrounds areas including the Margaret Campbell handicap accessible playground. This facility is often used for organized youth sports.

Muskegon State Park

Jurisdiction: State of Michigan
Location: Lake Michigan Shoreline (Laketon Township)
Type: State Park
Size: 1,300 acres
Description: The park offers a swimming beach with changing facilities, a picnic area, hiking, and boat launching facilities. There are 357 campsites available with modern restrooms and electricity at some sites. During the winter, the Winter Sports Complex features lighted cross-country ski trails, two outdoor ice rinks, a sledding hill and a luge run. There is also an observation point and a replica of a frontier blockhouse.

Pioneer Park

Jurisdiction: County of Muskegon
Location: Scenic Drive on Lake Michigan (Laketon Township)
Type: County Park
Size: 145 acres
Description: The park offers 235 modern campsites, swimming, sunbathing, 2,000 feet of Lake Michigan beach frontage, picnicking (picnic lodge building), tennis, softball, basketball, and volleyball.

Muskegon County Property

Jurisdiction: County of Muskegon
Location: On Muskegon Lake, west of the mouth of Green Creek.
Type: County Property
Size: 8 acres
Description: -

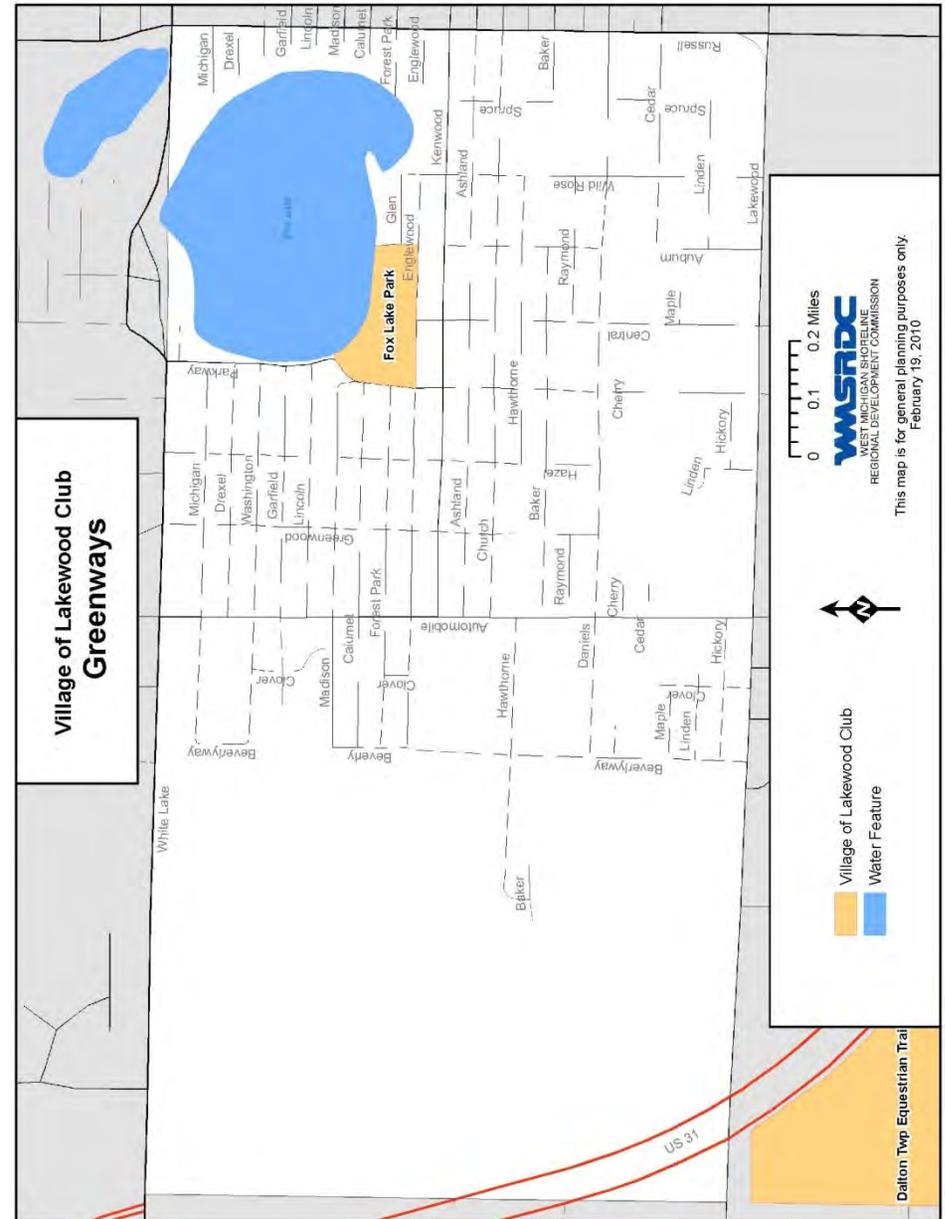
Bike/Walking Trail

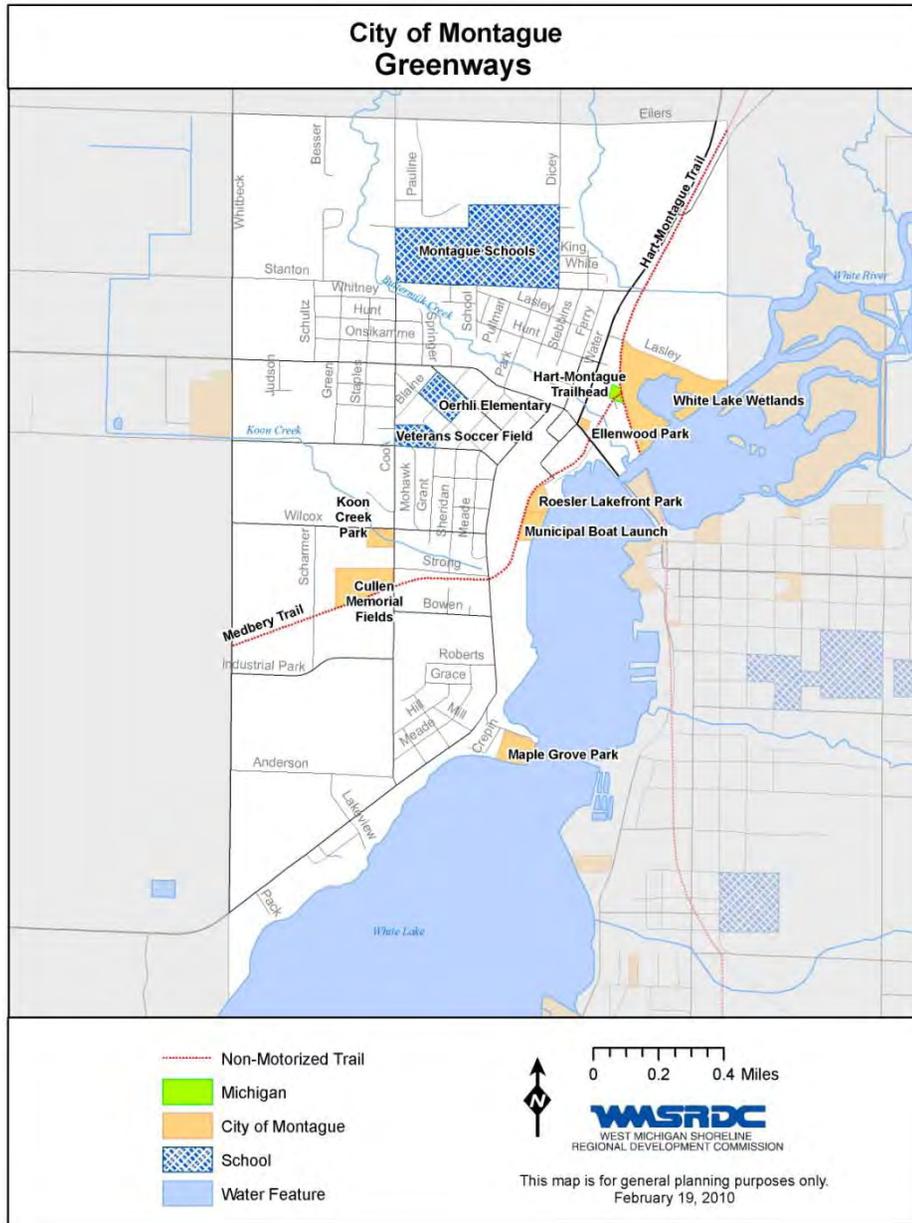
Jurisdiction: Laketon Township
Location: Following Dykstra Road, Horton Road, and Fenner Road
Type: Linear Path
Size: 1.3 miles
Description: 6-foot wide paved path.

Village of Lakewood Club

Fox Lake Park

Jurisdiction: Village of Lakewood Club
Location: Kedzie Boulevard and Englewood Avenue
Type: Community Park
Size: 17 acres
Description: The park offers 1,260 linear feet of shoreline along Fox Lake, ball fields, walking/hiking, picnicking, shelter, nature observations, playground equipment, tennis court, basketball court, beach volleyball, horseshoes, grills, restrooms, swimming beach, and a 750 foot boardwalk.





City of Montague

Roesler Lakefront Park

Jurisdiction: City of Montague
 Location: Water Street
 Type: Community Park
 Size: 3 acres
 Description: Band Shell and open area.

Municipal Boat Launch & Fish Cleaning Station

Jurisdiction: City of Montague
 Location: Water Street
 Type: Boat Launch/Ramp
 Size: 3 acres
 Description: Three docks serving six launch slips, restroom, and fish cleaning station.

Ellenwood Park

Jurisdiction: City of Montague
 Location: Downtown Montague
 Type: Community Park
 Size: 0.25 acres
 Description: Home of the world's largest weathervane.

Maple Grove Park (Maple Beach or Bathing Beach)

Jurisdiction: City of Montague
 Location: Goodrich Street
 Type: Community Park
 Size: 4.5 acres
 Description: Covered picnic area, updated restroom facility, barbeque grills, playground equipment, sand volleyball courts, and a paved circular walking path by the lake.

Medbery Park

Jurisdiction: City of Montague
Location: North of the White Lake Channel in White River Township
Type: Community park
Size: 6.4 acres
Description: The park includes 600 feet of Lake Michigan Shoreline, small picnic area, restrooms, a beach volleyball court, and park benches.

Cullen Memorial Little League Fields

Jurisdiction: City of Montague
Location: Cook Street
Type: Community Park
Size: 10 acres
Description: Ball fields, concession stand, and bathroom facility.

Koon Creek Park

Jurisdiction: City of Montague
Location: Wilcox and Cook
Type: Community Park
Size: 2.75 acres
Description: Undeveloped naturally wooded setting.

White Lake Wetlands

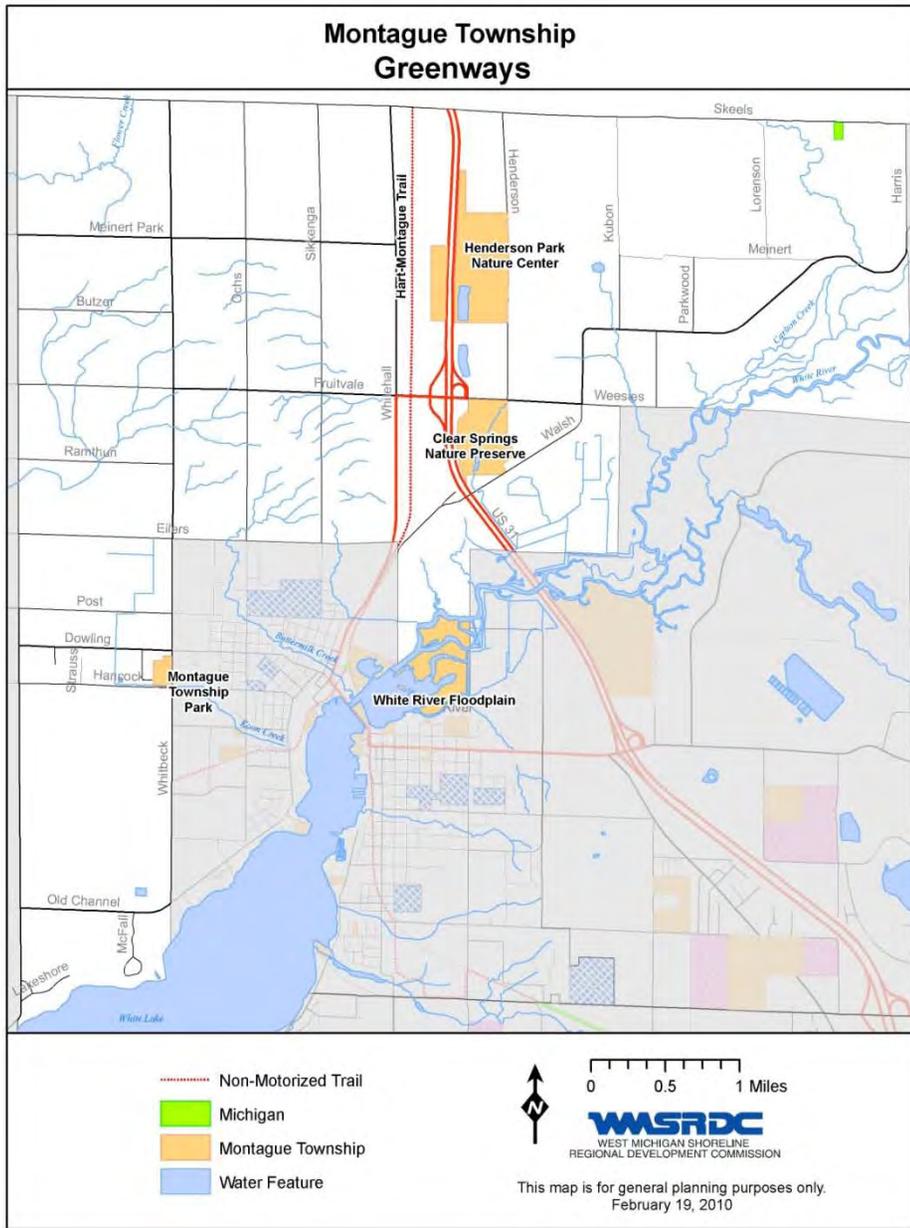
Jurisdiction: City of Montague
Location: North of the White Lake Bridge
Type: Wetlands
Size: 40 acres
Description: Undeveloped wetland area.

Hart-Montague Bike Trail Trailhead

Jurisdiction: City of Montague
Location: East end of Spring Street
Type: Trailhead
Size: ~1 acre
Description: Hart-Montague Trail State Park trailhead.

Medbery Bike Trail

Jurisdiction: City of Montague
Location: From Hart-Montague Bike Trail Trailhead to Whitbeck Road
Type: Trail
Size: 1 linear mile
Description: Bike trail.



Montague Township

Montague Township Park

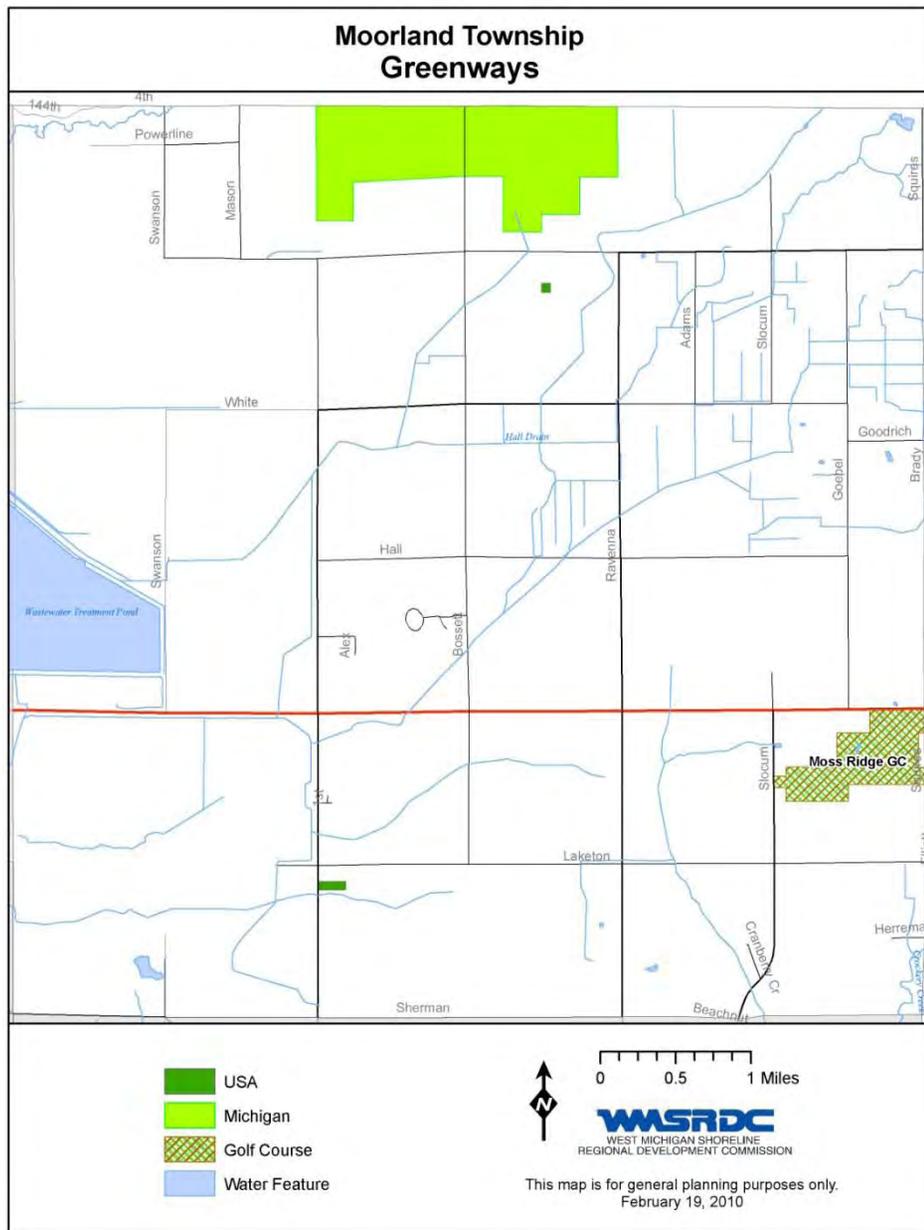
Jurisdiction: Montague Township
 Location: Whitbeck and Hancock
 Type: Community Park
 Size: 14 acres
 Description: Full service family park with a rest area, picnic pavilion, tennis courts, two baseball fields, a basket ball court, volleyball court, and a shuffle board area.

Clear Springs Nature Preserve

Jurisdiction: Montague Township
 Location: Between Fruitvale and Walsh Roads
 Type: Community Park
 Size: 100 acres
 Description: The family park includes a few picnic tables, two large ponds, and plenty of hiking trails.

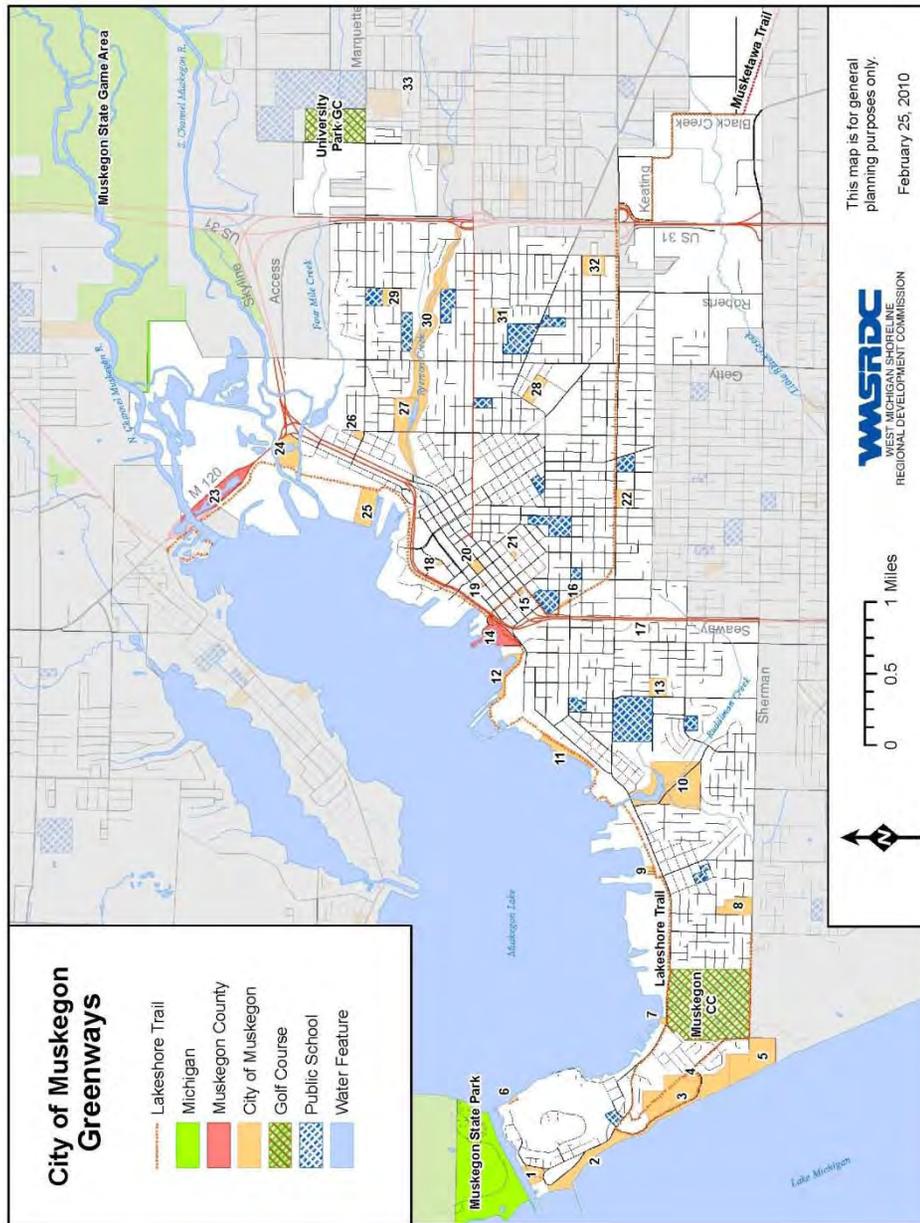
Henderson Park Nature Center

Jurisdiction: Montague Township
 Location: In Oak Woods on Henderson
 Type: Nature Center
 Size: 245 acres
 Description: The nature center has two picnic areas and a 0.7 mile trail around a lake.



Moorland Township

*** No public parks identified ***



City of Muskegon

Margaret Drake Elliott Park (#1)

Jurisdiction: City of Muskegon
 Location: Beach Street and the Muskegon Channel
 Type: Community Park
 Size: 5 acres
 Description: The facility features playground equipment, restrooms, picnic area, picnic shelters, fishing pier, open space for field games, and a walkway along the Muskegon Lake Channel.

Pere Marquette Park (#2)

Jurisdiction: City of Muskegon
 Location: Beach Street and Lakeshore Drive
 Type: Public Beach
 Size: 27.5 acres
 Description: The area includes a restaurant, snack bar, playground equipment, guarded beach, restrooms, picnic area, 40 sand volleyball courts, public beach, and handicapped walkway.

Lake Michigan Park (#3)

Jurisdiction: City of Muskegon
 Location: Lake Michigan Shoreline and Dunes from Sherman Boulevard to Lakeshore Drive.
 Type: Lake Michigan Shoreline
 Size: 54.5 acres
 Description: The area provides a major publicly owned stretch of shoreline dunes between Pere Marquette and Kruse Parks.

Beachwood Park (#4)

Jurisdiction: City of Muskegon
 Location: Beach Street at Resort
 Type: Community Park
 Size: 3.4 acres
 Description: The park offers playground equipment, basketball court, sledding hill, soap box derby hill, picnic area with grill, restroom, and picnic shelter.

Norman F. Kruse Park (#5)

Jurisdiction: City of Muskegon
 Location: Sherman at Beach
 Type: Community Park
 Size: 52.3 acres
 Description: The facility provides two parking lots, nature trails, barrier dunes, accessible dune walkways, playground, dune overlooks, picnic shelters, restrooms, basketball court, and public beach including a dog beach.

Harbor Towne Beach (#6)

Jurisdiction: City of Muskegon
 Location: Fulton Avenue at Muskegon Lake
 Type: Public Beach
 Size: 1 acre
 Description: Beach with a marked swim area, fire pit, and portable toilets.

Jaycee's Launch Ramp (#7)

Jurisdiction: City of Muskegon
 Location: Cottage Grove at Lakeshore Drive
 Type: Community Boat Launch
 Size: 0.6 acre
 Description: Provides a public boat launch with access to the west end of Muskegon Lake.

Seyferth Park (#8)

Jurisdiction: City of Muskegon
 Location: West Sherman between Leon and LeBouf
 Type: Community Park
 Size: 16 acres
 Description: The park provides playground equipment, softball field, football/soccer field, basketball courts, in-line skating rink, skatepark, restrooms, picnic area, grills, and a picnic shelter.

Grand Trunk Launch Ramp (#9)

Jurisdiction: City of Muskegon
 Location: McCracken and Lakeshore Drive
 Type: Community Park
 Size: 4.6 acres
 Description: The facility includes a boat launch, shelter, and picnic tables.

McGraft Park (#10)

Jurisdiction: City of Muskegon
 Location: Wickham and Glen
 Type: Community Park
 Size: 92 acres
 Description: The facility provides playground equipment, softball field, tennis courts, shuffleboard courts, basketball court, horseshoe pits, open air amphitheater, community building, open space for field games, picnic area, Frisbee golf course, and sledding hill.

Muskegon Lake Frontage (#11)

Jurisdiction: City of Muskegon
 Location: Below Lakeshore Drive north of Laketon
 Type: Open Space
 Size: 10 acres
 Description: The area includes open space with large shade trees along the banks of Muskegon Lake.

Hartshorn Marina (#12)

Jurisdiction: City of Muskegon
 Location: Division at Western
 Type: Municipal Marina
 Size: 10.3 acres
 Description: The facility offers 134 major slips, 30 small slips, 102 moorings, two launch ramps, restrooms, and picnic tables.

Campbell Field (#13)

Jurisdiction: City of Muskegon
 Location: Barclay and Young
 Type: Community Park
 Size: 9.5 acres
 Description: The park offers playground equipment, baseball/softball fields, restroom maintenance building, concession buildings, open space for field games. The park is also used for organized youth sports.

Heritage Landing (#14)

Jurisdiction: Muskegon County
 Location: Shoreline Drive

Type: County Outdoor Festival Facility
Size: ~10 acres
Description: An abandoned brownfield, which is now a beautiful park-like setting and home to popular summer festivals.

Day of Caring Park (#15)

Jurisdiction: City of Muskegon
Location: Seventh Street and Muskegon Drive
Type: Community Park
Size: 0.9 acre
Description: The park provides a playground and limited open space.

Clara Shepherd Park (#16)

Jurisdiction: City of Muskegon
Location: Southern Avenue just east of Seaway Drive
Type: Community Park
Size: 1 acre
Description: The park includes basketball courts.

Beidler Street Tot Lot (#17)

Jurisdiction: City of Muskegon
Location: Beidler Street at Young
Type: Community Park
Size: 0.08 acre
Description: The park offers playground equipment, and open space.

Indian Cemetery (#18)

Jurisdiction: City of Muskegon
Location: Morris Street
Type: Memorial Cemetery
Size: 0.42 acre
Description: The facility is the oldest known Indian Cemetery in the area dating back to the early 1800's.

Monet Gardens (#19)

Jurisdiction: City of Muskegon
Location: Fifth and Clay
Type: Community Garden
Size: 0.1 acre
Description: The facility includes a garden and fountain.

Hackley Park (#20)

Jurisdiction: City of Muskegon
Location: City block bounded by Webster, Clay, Third, and Fourth Streets (Downtown)
Type: Community Park
Size: 2.3 acres
Description: Park has walkways, monument structures, and picnic tables.

St. Joseph Park (#21)

Jurisdiction: City of Muskegon
Location: Monroe near Fifth
Type: Community Park
Size: 0.7 acre
Description: The park offers playground equipment and open space.

Marsh Field (#22)

Jurisdiction: City of Muskegon
Location: West Laketon at Peck
Type: Major Baseball Facility
Size: 6.1 acres
Description: The facility provides a lighted baseball diamond, restroom, playground equipment, concession stand, permanent grandstands for spectators, picnic tables, walking trail, and rollerblade area.

Veterans Memorial Park

Jurisdiction: City of Muskegon, North Muskegon, and Muskegon County
Location: Causeway, south side of Muskegon River
Type: Community Park
Size: 50 acres
Description: This memorial greenspace and boulevard offers a pond, river crossings, memorial fountain and flag/sculpture features, memorial walkway, bridges and landscaping. The City of Muskegon maintains park area south of the river.

Richards Park (#24)

Jurisdiction: City of Muskegon
Location: North end of Ottawa Street
Type: Community Park

Size: 7.5 acres
Description: The park provides a launch ramp with access to the Muskegon River.

Fisherman's Landing (#25)

Jurisdiction: City of Muskegon
Location: Giddings Avenue and Ottawa Street
Type: Community Park/Campground
Size: 18.6 acres
Description: The park provides five launch ramps, swimming beach, restrooms, shower facility, playground equipment, picnic shelter, 39 campsites, fish cleaning station, vehicle stored waste disposal site, and open space for picnicking.

Aamodt Park (#26)

Jurisdiction: City of Muskegon
Location: Wood at Marquette
Type: Community Park
Size: 2 acres
Description: The park includes playground equipment, open space, grill, and picnic tables.

Smith-Ryerson Park (#27)

Jurisdiction: City of Muskegon
Location: Wood and Sumner
Type: Community Park
Size: 23 acres
Description: The park includes playground equipment, two softball fields, two tennis courts, two basketball courts, restroom facilities, community center, gymnasium/all purpose room, football field, and open space for field games.

McCrea Playfield (#28)

Jurisdiction: City of Muskegon
Location: Kenneth at Catawba behind Restlawn Cemetery
Type: Community Park
Size: 9.1 acres
Description: The park provides playground equipment, baseball/softball fields, shuffleboard courts, basketball court, horseshoe pits, restrooms, and picnic area.

Beukema Playfield (#29)

Jurisdiction: City of Muskegon
Location: Roberts and Wesley (Marquette)
Type: Community Park
Size: 10 acres
Description: The facility offers playground equipment, three softball fields, four shuffleboard courts, open space for field games, two restroom facilities, and picnic area. The park is also used for school and recreational games.

Ryerson Creek (#30)

Jurisdiction: City of Muskegon
Location: Entire length of Ryerson Creek
Type: Nature Preserve/Open Space
Size: 72 acres
Description: The natural ravine/valley formed by Ryerson Creek provides a ribbon of nature through a heavy residential/commercial portion of the city.

Sheldon Park (#31)

Jurisdiction: City of Muskegon
Location: Madison at Isabella
Type: Community Park
Size: 5.8 acres
Description: The park offers playground equipment, little league baseball and softball fields, shuffleboard courts, basketball court, restroom, and picnic area.

Reese Playfield (#32)

Jurisdiction: City of Muskegon
Location: Creston at East Forest
Type: Community Park
Size: 13 acres
Description: The facility offers playground equipment, softball fields, tennis courts, football/soccer field, basketball court, and restrooms.

Joe Clifford Park (#33)

Jurisdiction: City of Muskegon
Location: Wesley Street

Type: Community Park
 Size: 1.8 acres
 Description: The park provides playground equipment, picnic area with grill, picnic shelter, and spray fountain.

Lakeshore Trail

Jurisdiction: City of Muskegon
 Location: Throughout the City of Muskegon
 Type: Community Park
 Size: 40 acres (12 miles)
 Description: The park includes approximately 12 miles of a non-motorized trail system throughout the City of Muskegon.

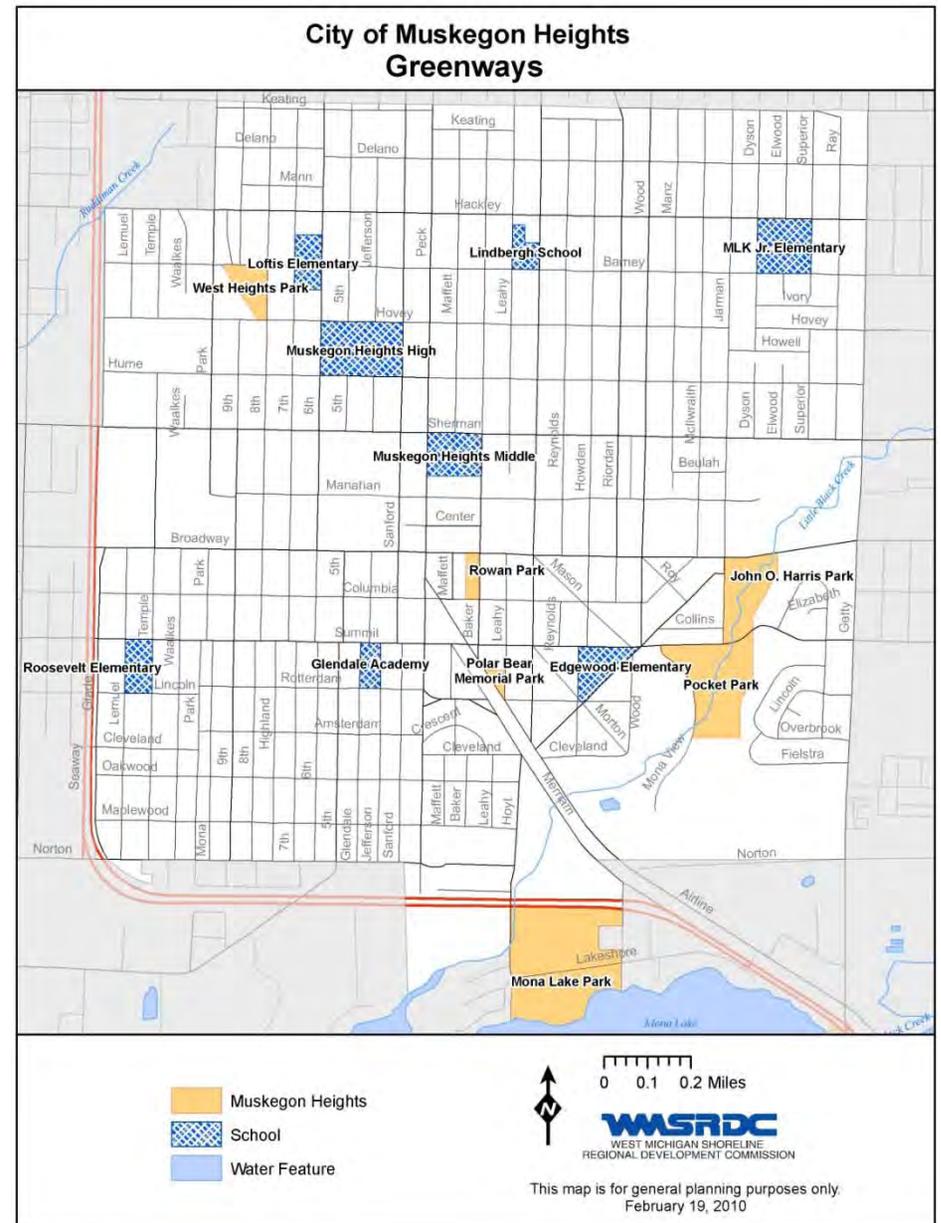
City of Muskegon Heights

Mona Lake Park

Jurisdiction: City of Muskegon Heights
 Location: Seaway Dr. between Hoyt and Green Ave. along Mona Lake
 Type: Community Park
 Size: 34 acres
 Description: The park includes the northern shoreline of Mona Lake and provides the city's only outdoors water recreation area. Facilities include ball fields, boat launch, parking basketball courts, shuffleboard courts, horseshoe pits, benches, bleachers, two story brick pavilion with restrooms and concessions area, paved parking lot, lighted tennis courts, restroom facility, maintenance building, swimming beach, grills, picnic tables and playground equipment.

Rowan Park

Jurisdiction: City of Muskegon Heights
 Location: Entire block between Broadway Avenue, Columbia Avenue, Maffett and Baker streets
 Type: Community Park
 Size: 1.5 acres
 Description: The park provides green space for downtown patrons and includes pay phones, benches, parking lot, small plaza with a clock tower, round performance platforms, and shuffleboard courts.



Johnny O. Harris Park

Jurisdiction: City of Muskegon Heights
Location: East of Jarman Street between Summit Avenue and Broadway Avenue
Type: Community Park
Size: 10.5 acres
Description: The facility offers playground equipment, horseshoe pit, shuffleboard court, grills, lighted softball field, bleachers, picnic tables basketball courts, restroom facility, equipment building, and paved parking lot.

West Heights Park

Jurisdiction: City of Muskegon Heights
Location: South from Barney to Hovey and west on Hackley Avenue to Eight Street and the railroad tracks
Type: Community Park
Size: 4.5 acres
Description: The facility provides playground equipment, basketball courts, shuffleboard courts, grills, softball field, benches, and a maintenance building with restrooms.

Polar Bear Memorial Park

Jurisdiction: City of Muskegon Heights
Location: Airline at Leahy Street
Type: Community Park
Size: 0.75 acre
Description: The area provides limited open space for residents and serves as a Veteran's Memorial Park.

Pocket Park

Jurisdiction: City of Muskegon Heights
Location: East of Wood Street and south of Summit to Mona View Cemetery
Type: Nature Area
Size: 20 acres
Description: The facility service as a nature park with natural areas including footbridges, observations platforms, a specimen tree and flower area. A large portion of the site is in wetlands contiguous to Little Black Creek.

Muskegon Township

Softball World

Jurisdiction: Muskegon Township
Location: Apple Avenue at Mill Iron Road
Type: Community Facility
Size: 19 acres
Description: The facility serves as a regional recreational facility and consists of four lighted softball fields along with a small children's play area, and concession building. The facility is heavily used within the West Michigan Region.

Quarter Oak Park

Jurisdiction: Muskegon Township
Location: Oak Avenue and Quarterline Road
Type: Community Park
Size: 11 acres
Description: This park contains a ball field, picnic areas and playground equipment.

Parslow Park

Jurisdiction: Muskegon Township
Location: Sauter Avenue, Shonat Street, Francis Avenue, and McLaughlin Avenue
Type: Community Park
Size: 10 acres
Description: The facility includes restrooms, skate park, ball fields, basketball courts, playground equipment, parking and picnic area.

Buel Avenue Park

Jurisdiction: Muskegon Township
Location: Buel Avenue south of River Road
Type: Community Park
Size: ~5 acres
Description: The park offers basketballs courts, playground equipment, restroom building, ball fields, and picnic area with benches and grills.

Riverside Park

Jurisdiction: Muskegon Township
Location: Giles Road east of Getty Street
Type: Community Park
Size: 38 acres
Description: The park is located on Cedar Creek and includes playground equipment, open playfields, tennis and basketball courts, ball fields, horseshoe pits, nature trail, and picnic areas.

Evanston Gardens Park

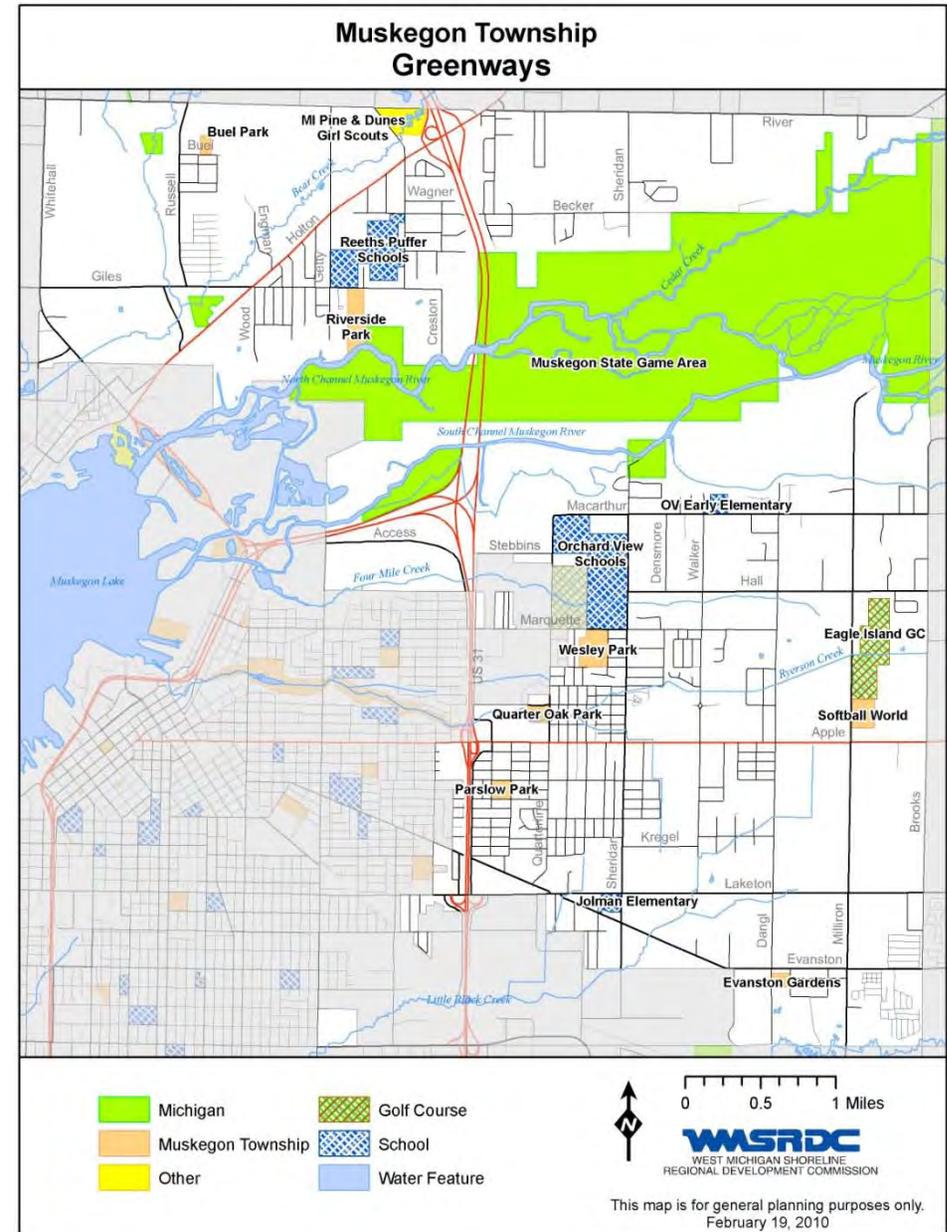
Jurisdiction: Muskegon Township
Location: Evanston Avenue at Shorrocks Street east of Dangle Road
Type: Community Park
Size: ~7 acres
Description: The accommodations include ball fields, basketball courts, tennis courts, shuffleboard, picnic area, playground equipment, and restrooms.

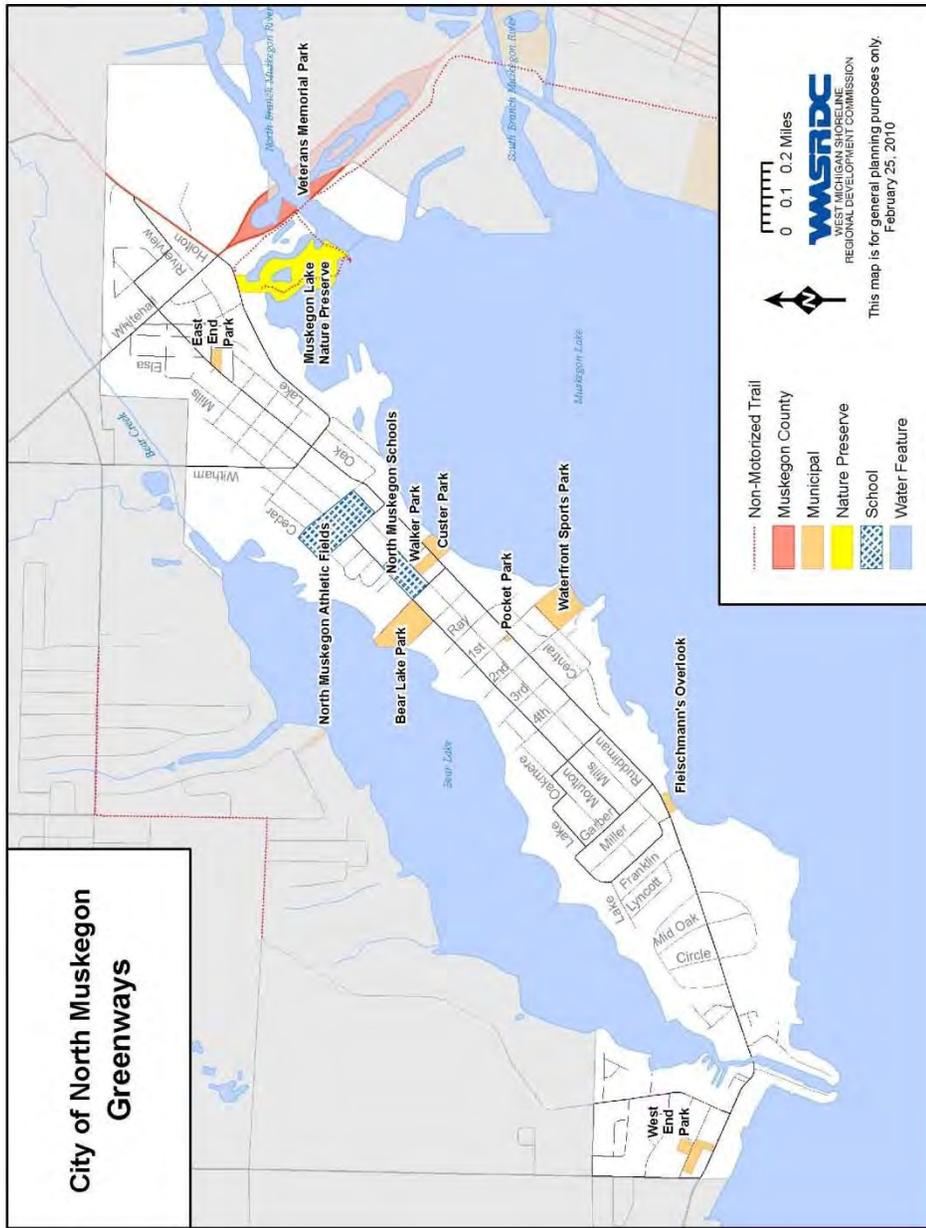
Wesley Park

Jurisdiction: Muskegon Township
Location: East Street between Marquette Avenue and Wesley Avenue
Type: Community Park
Size: 40 acres
Description: The park contains restrooms, tennis courts, ball fields, basketball courts, shuffleboard, picnic shelter, horseshoe pits, playground equipment, and a soccer field.

Forest Land

Jurisdiction: Muskegon Conservation District
Location: Muskegon Township, Section 22
Type: Forest Land
Size: 1.6 acres
Description: Natural forest land.





City of North Muskegon

West End Park

Jurisdiction: City of North Muskegon
Location: Memorial Drive
Type: Community Park
Size: 4 acres
Description: The partially wooded park has unimproved trails, soccer field, playground equipment, benches, shelter, picnic tables, portable restrooms, tennis courts, basketball court, and parking area.

North Muskegon Waterfront Sports Park

Jurisdiction: City of North Muskegon
Location: First Street on Muskegon Lake
Type: Community Park
Size: 7.1 acres
Description: The open park offers fenced soccer and softball fields, paved parking, small boat launch area and approximately 500 feet of lakeshore beach along Muskegon Lake, play equipment, picnic shelter, shoreline boardwalk and pier.

Bear Lake Park

Jurisdiction: City of North Muskegon
Location: Fleming Street on Bear Lake
Type: Community Park
Size: 7 acres
Description: The partially wooded park has steep slopes and approximately 475 feet of frontage on Bear Lake with beach, restrooms/concession building, fenced ball fields, tennis courts, off street parking and picnic area.

Custer Park

Jurisdiction: City of North Muskegon
Location: Ruddiman near City Hall on Muskegon Lake
Type: Community Park
Size: 0.5 acres
Description: The wooded memorial park is on a high lakeshore bluff with walks, benches, gazebo, flag area, monuments stone, and time clock.

Walker Park

Jurisdiction: City of North Muskegon
 Location: Ruddiman at City Hall
 Type: Community Park
 Size: 1 acre
 Description: The park is an integrated area for City Hall, the Public Library, the Walker Community Center and the High School. It offers lighted walks, benches, stone monuments, and maintained turf.

East End Park

Jurisdiction: City of North Muskegon
 Location: Washington Street
 Type: Community Park
 Size: 0.75 acre
 Description: The facility offers playground equipment picnic area, basketball court, benches and portable restrooms.

Veterans Memorial Park

Jurisdiction: City of North Muskegon, City of Muskegon and Muskegon County
 Location: Causeway north side of Muskegon River
 Type: Community Park
 Size: 50 acres
 Description: This memorial greenspace and boulevard offers a pond, river crossings, memorial fountain and flag/sculpture features, memorial walkway, bridges and landscaping. North Muskegon maintains park area north of the river.

Fleischmann's Overlook

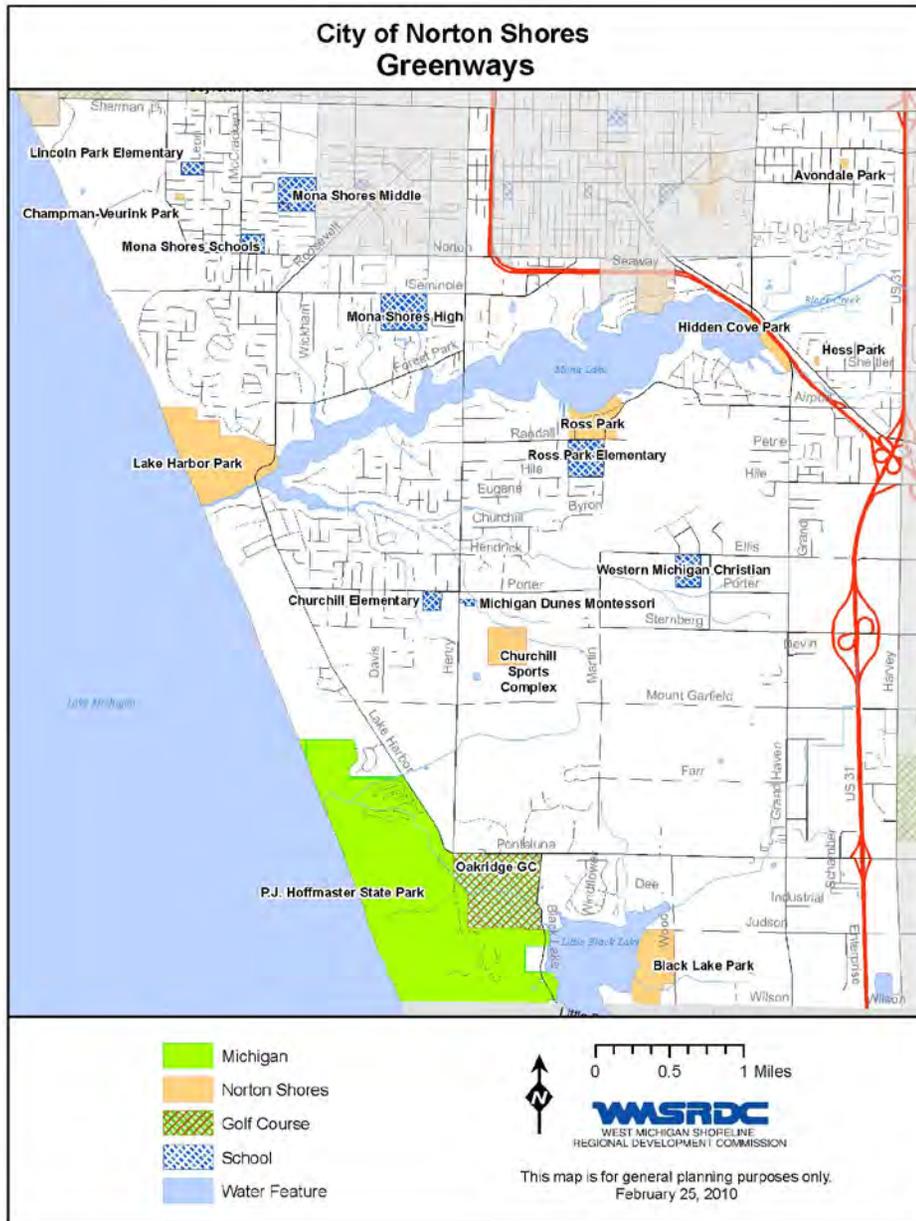
Jurisdiction: City of North Muskegon
 Location: Ruddiman between Garber Road and Plymouth Drive
 Type: Urban Green
 Size: 1 acre
 Description: The space is a wooded, high steep-banked bluff on the Muskegon Lake shoreline with wood deck overlooks, railing planters adjacent to Ruddiman Drive Sidewalk and pedestrian lighting.

Pocket Park

Jurisdiction: City of North Muskegon
 Location: First Street at Ruddiman
 Type: Urban Green
 Size: 4,000 sq. feet
 Description: The area offers seating and greenspace.

Muskegon Lake Nature Preserve

Jurisdiction: Muskegon Environmental Research and Education Society
 Location: Lake Street near M-120/Whitehall Road intersection
 Type: Nature Preserve
 Size: 15 acres
 Description: Outdoor classroom, trails, riverwalk, and observation deck providing viewsheds of Muskegon Lake and the Muskegon River.



City of Norton Shores

Avondale Park

Jurisdiction: City of Norton Shores

Location: North of E. Summit Avenue and South of E. Broadway Avenue on McDermott Street

Type: Community Park

Size: 2 acres

Description: The park offers a basketball court, grills, horseshoe pits, picnic tables, playground equipment, and volleyball area.

Chapman-Veurink Park

Jurisdiction: City of Norton Shores

Location: West of Leon Street on Reneer Avenue

Type: Community Park

Size: 2 acres

Description: The park provides grills, picnic tables, and limited playground equipment.

Churchill Athletic Association Property – Sports Complex

Jurisdiction: City of Norton Shores

Location: Porter Road east of Henry Street

Type: Community Park

Size: 40 acres

Description: The sports complex offers grills, picnic tables, playground equipment, softball fields, and two soccer fields.

Hess Park

Jurisdiction: City of Norton Shores

Location: West side of Hess Street north of Shettler Road

Type: Community Park

Size: 1 acre

Description: The park offers grills, picnic tables, and playground equipment.

Hidden Cove Park

Jurisdiction: City of Norton Shores
Location: Grand Haven Road at Seaway Drive
Type: Community Park
Size: 20 acres
Description: The facility provides two fishing piers, grills, picnic tables, playground equipment, and restrooms.

Lake Harbor Park

Jurisdiction: City of Norton Shores
Location: Lake Harbor Road at Mona Lake Channel
Type: Community Park
Size: 189 acres
Description: The park offers a boating area, fishing area, grills, lookout deck over Mona Lake Channel, picnic shelter, picnic tables, restrooms, swimming area on Lake Michigan, and wooded dune walkway overlooking Lake Michigan.

Ross Park

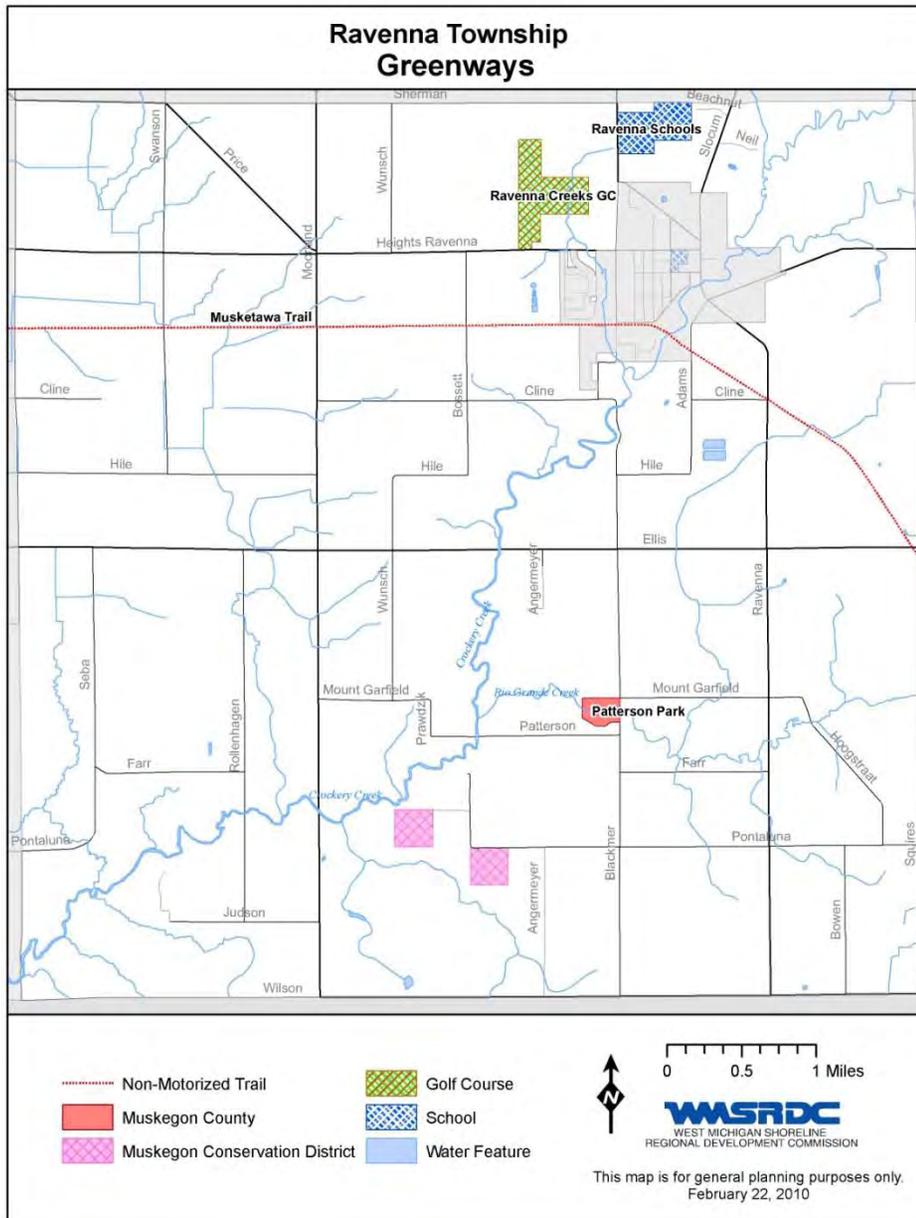
Jurisdiction: City of Norton Shores
Location: Randall Road and Martin Road on Mona Lake
Type: Community Park
Size: 43 acres
Description: The park includes a boating area, frisbee golf course, grills, horseshoe pits, in-line hockey rinks, pavilion with changing and restrooms, picnic shelter, picnic tables, playground equipment on beach, playground tot-lot, shuffle board courts, softball fields, swimming area on Mona Lake, and volleyball area.

Black Lake Park

Jurisdiction: City of Norton Shores
Location: West side of Wood Road south of Pontaluna Road
Type: Community Park
Size: 46 acres
Description: The park encompasses substantial frontage on Black Lake and includes nature walkways and trails.

P.J. Hoffmaster State Park

Jurisdiction: State of Michigan
Location: City of Norton Shores at Lake Harbor and Pontaluna on Lake Michigan
Type: State Park
Size: 1200 acres
Description: The park offers hiking, swimming, year-round interpretive programs, cross country skiing, metal detecting, watchable wildlife, beach house, picnic shelter, picnic area, Gillette Visitor Center, 293 camp sites, Dune Climb Stairway to observation deck, and two group sites.



Ravenna Township

Patterson Park

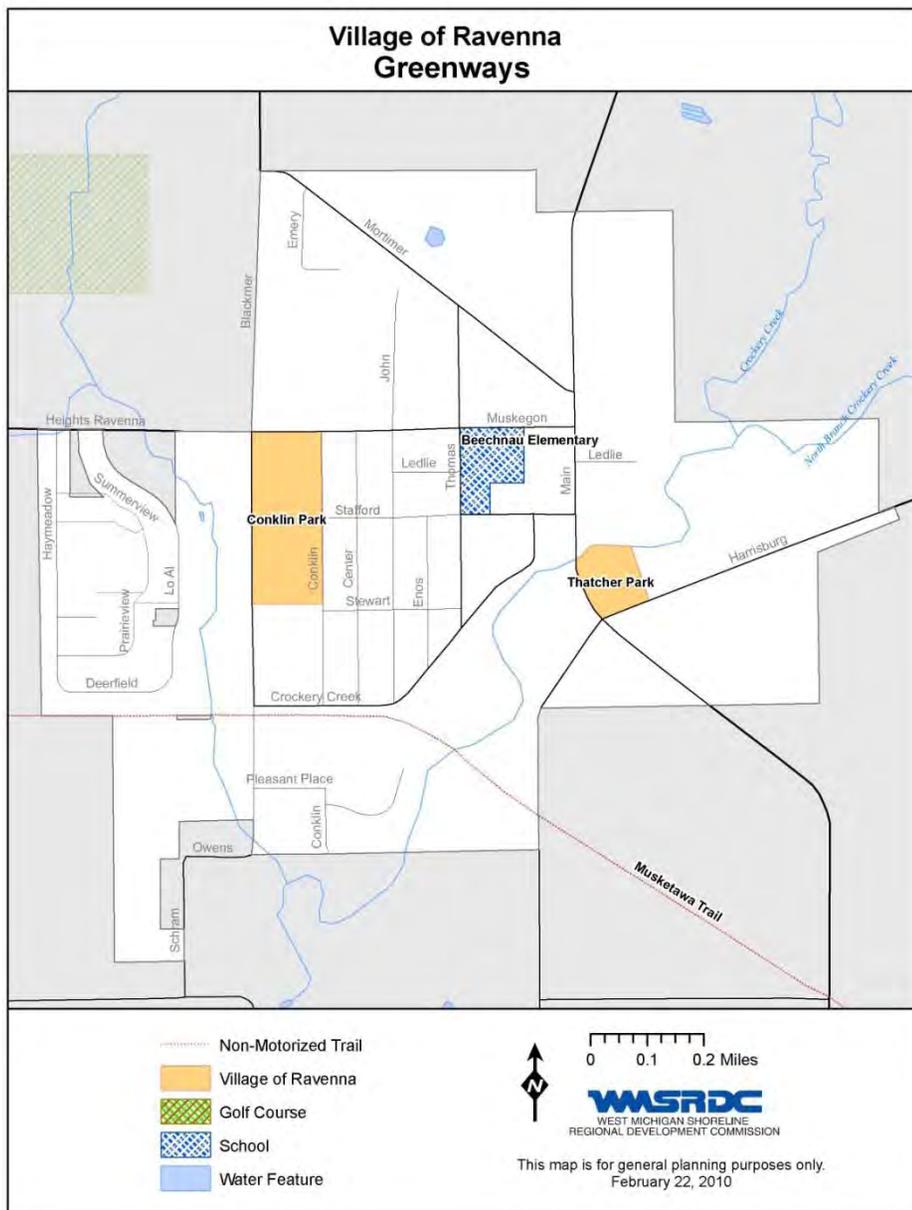
Jurisdiction: County of Muskegon
 Location: Little Rio Grande Creek on Blackmer Road (Ravenna Township)
 Type: County Park
 Size: 28 acres
 Description: The park offers restrooms, a small picnic shelter, grills, tables, and walking trails with benches.

Forest Land

Jurisdiction: Muskegon Conservation District
 Location: Ravenna Township, Section 28
 Type: Forest Land
 Size: 40 acres
 Description: Natural forest land.

Forest Land

Jurisdiction: Muskegon Conservation District
 Location: Ravenna Township, Section 34
 Type: Forest Land
 Size: 40 acres
 Description: Natural forest land.



Village of Ravenna

Conklin Park

Jurisdiction: Village of Ravenna
 Location: Heights Ravenna Road and Blackmer Road
 Type: Community Park
 Size: 20 acres
 Description: The facility includes basketball courts, beach volleyball courts, tennis courts, lighted baseball field, softball fields, lighted paved walking path, pavilion with picnic tables, grills, storage buildings, bathrooms, concession stand, playground equipment, and benches.

Thatcher Park

Jurisdiction: Village of Ravenna
 Location: Main Street and Harrisburg Road
 Type: Community Park
 Size: 5 acres
 Description: The park located along Crockery Creek offers two pavilions with picnic tables, storage building with restrooms, gazebo, playground equipment, benches, grills, and horseshoe pits.

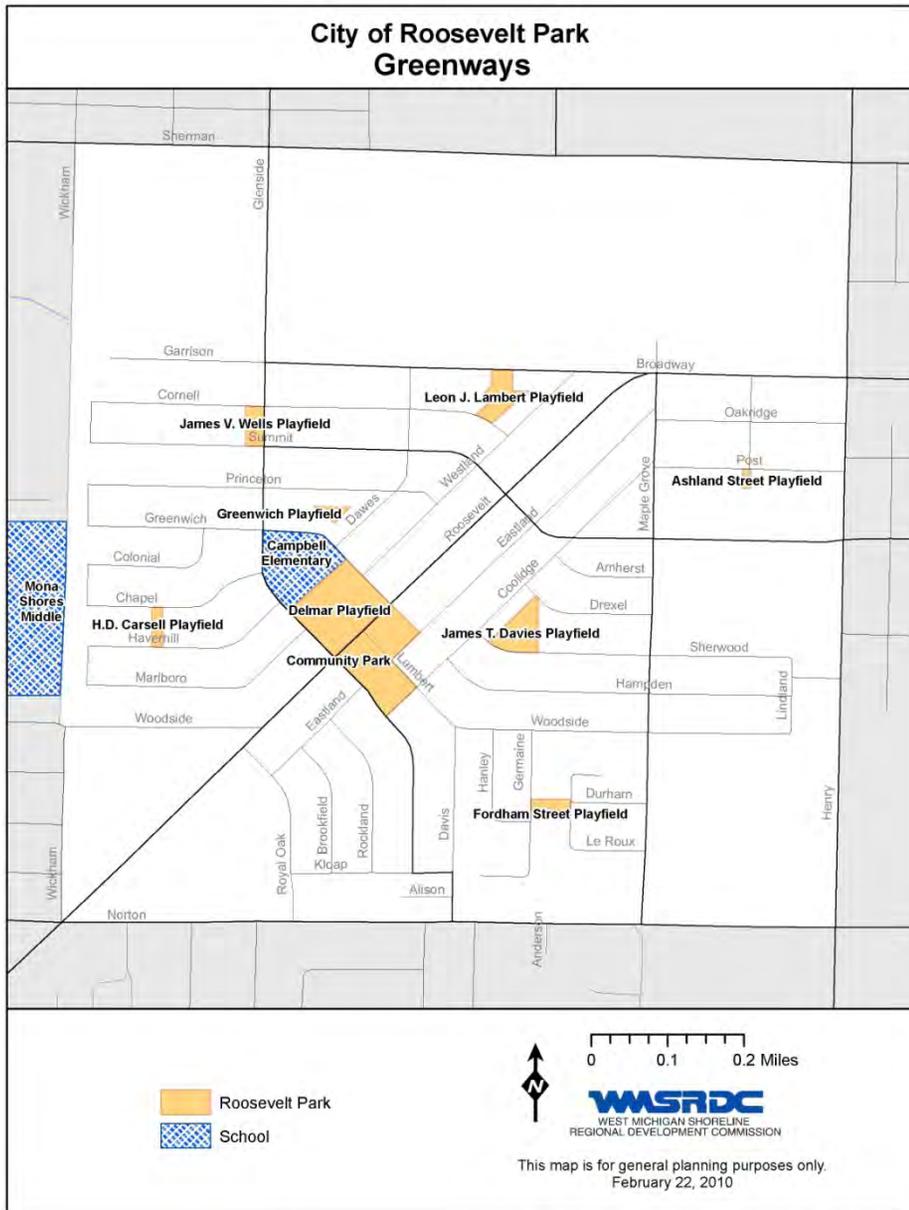
City of Roosevelt Park

James V. Wells Playfield

Jurisdiction: City of Roosevelt Park
 Location: Glenside between Summit and Cornell
 Type: Community Park
 Size: 0.43 acre
 Description: Playground equipment.

H.D. Carsell Playfield

Jurisdiction: City of Roosevelt Park
 Location: Between Haverhill and Chapel
 Type: Community Park
 Size: 0.4 acre
 Description: Playground equipment.



Leon J. Lambert Playfield

Jurisdiction: City of Roosevelt Park
 Location: Between Broadway and Cornell
 Type: Community Park
 Size: 0.84 acre
 Description: Playground equipment and tennis courts.

Ashland Street Playfield

Jurisdiction: City of Roosevelt Park
 Location: Ashland and Post
 Type: Community Park
 Size: 0.17 acre
 Description: Playground equipment.

Community Park

Jurisdiction: City of Roosevelt Park
 Location: Glenside between Roosevelt and Coolidge
 Type: Community Park
 Size: 3.93 acres
 Description: Playground equipment, pavilion, picnic tables, tennis courts, and community building with kitchen and restrooms.

James T. Davies Playfield

Jurisdiction: City of Roosevelt Park
 Location: Between Sherwood and Drexel
 Type: Community Park
 Size: 1.59 acres
 Description: Playground equipment and tennis courts.

Fordham Street Playfield

Jurisdiction: City of Roosevelt Park
 Location: Between Fordham and Germaine
 Type: Community Park
 Size: 0.42 acre
 Description: Playground equipment.

Greenwich Playfield

Jurisdiction: City of Roosevelt Park
 Location: Between Greenwich and Princeton
 Type: Community Park

Size: 0.25 acre
 Description: Playground equipment.

Delmar Playfield

Jurisdiction: City of Roosevelt Park
 Location: Glenside and Roosevelt
 Type: Community Ball Fields
 Size: 4.15 acres
 Description: Three Baseball fields and concession stand, adjacent to Campbell Elementary School playground.

Sullivan Township

Sullivan Township Park

Jurisdiction: Sullivan Township
 Location: Heights Ravenna Road adjacent to township hall
 Type: Community Park
 Size: 17 acres
 Description: The facility offers a softball field, volleyball courts, basketball court, shuffle board, horseshoe pits, playground equipment, two pavilions, picnic tables, and restroom facilities.

Muskegon County Fairgrounds

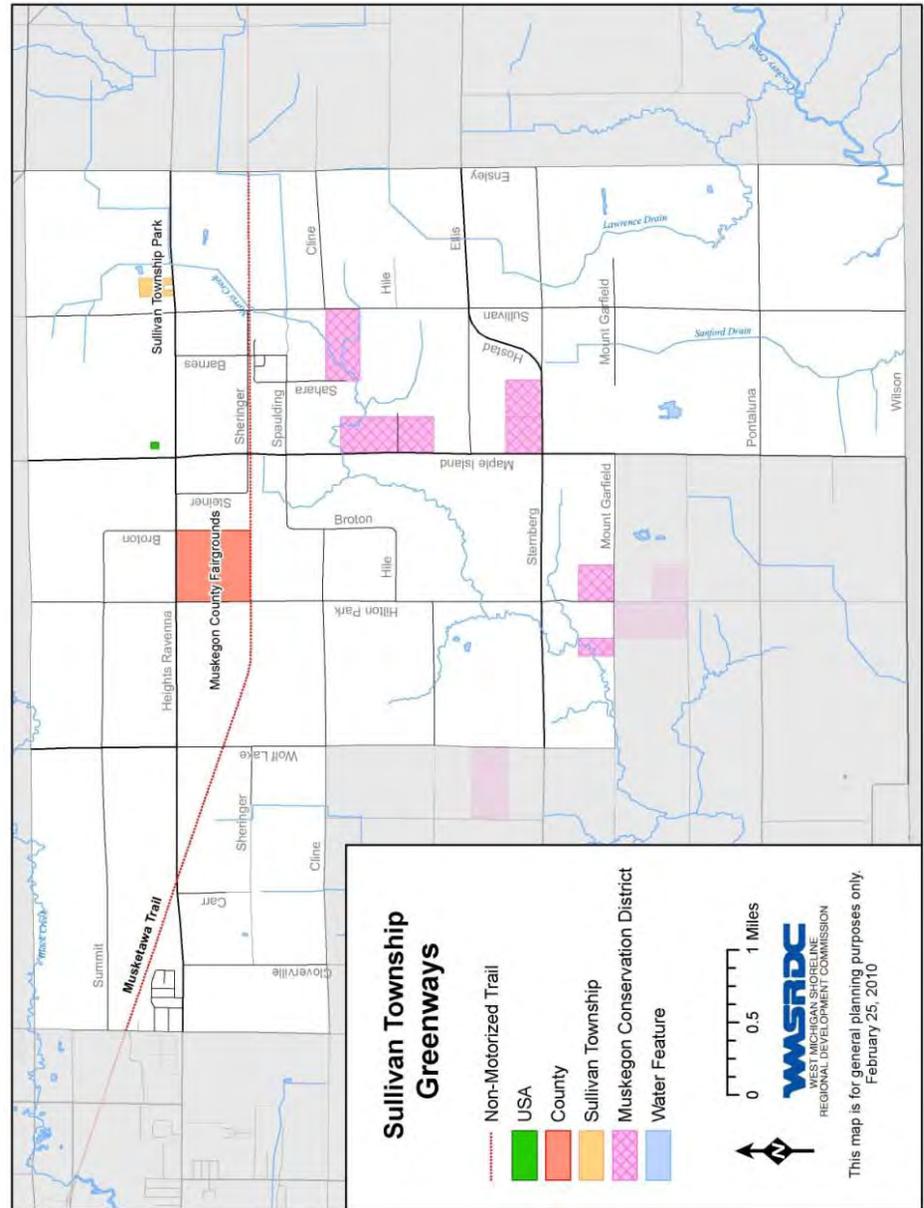
Jurisdiction: Sullivan Township
 Location: 6621 Heights Ravenna Road
 Type: County Fairgrounds
 Size: ~156 acres
 Description: The Muskegon County Fairgrounds is proud to host 4-H events, the Muskegon County Youth Fair, Motocross events, the Renaissance Fair, Tractor shows, and a Haunted House.

Forest Land

Jurisdiction: Muskegon Conservation District
 Location: Sullivan Township, Section 14
 Type: Forest Land
 Size: 60 acres
 Description: Natural forest land.

Forest Land

Jurisdiction: Muskegon Conservation District



Location: Sullivan Township, Section 14
Type: Forest Land
Size: 40 acres
Description: Natural forest land.

Forest Land

Jurisdiction: Muskegon Conservation District
Location: Sullivan Township, Section 14
Type: Forest Land
Size: 80 acres
Description: Natural forest land.

Forest Land

Jurisdiction: Muskegon Conservation District
Location: Sullivan Township, Section 21
Type: Forest Land
Size: 20 acres
Description: Natural forest land.

Forest Land

Jurisdiction: Muskegon Conservation District
Location: Sullivan Township, Section 22
Type: Forest Land
Size: 40 acres
Description: Natural forest land.

Forest Land

Jurisdiction: Muskegon Conservation District
Location: Sullivan Township, Section 23
Type: Forest Land
Size: 40 acres
Description: Natural forest land.

Forest Land

Jurisdiction: Muskegon Conservation District
Location: Sullivan Township, Section 23
Type: Forest Land
Size: 40 acres
Description: Natural forest land.

City of Whitehall

Funnell Field

Jurisdiction: City of Whitehall
Location: Franklin Street and River Street
Type: Community Park
Size: 12.6 acres
Description: The neighborhood park offers two softball fields, two tennis courts, two little league fields, two basketball courts, restrooms, soccer fields and playground equipment.

Goodrich Park/White Lake Municipal Marina

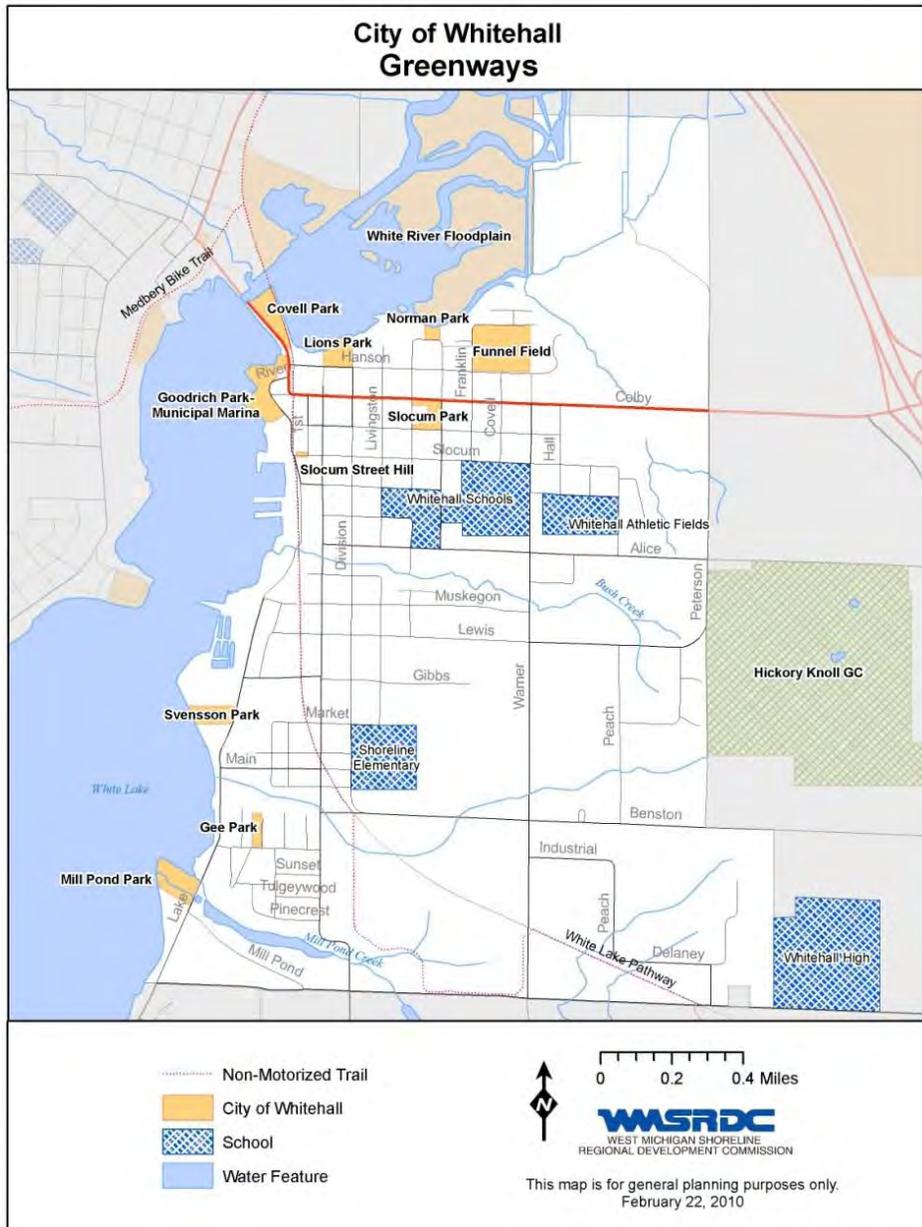
Jurisdiction: City of Whitehall
Location: White Lake near Lake Street and Colby Street
Type: Community Park/Marina
Size: 8.5 acres
Description: The park includes a 50 slip marina for seasonal and transient boat use with toilets and showers for marina users. There are separate restrooms for park users, picnic tables, grills, a picnic shelter, playground equipment, 960 ft bicycle/pedestrian path, benches, and a parking/viewing area.

Slocum Park

Jurisdiction: City of Whitehall
Location: Colby Street at City Hall
Type: Community Park
Size: 2.4 acres
Description: The facility offers two lighted tennis courts, picnic tables, and grills.

Covell Park

Jurisdiction: City of Whitehall
Location: Business Route US-31 at the White River
Type: Community Park
Size: 3.9 acres
Description: The park provides access to the White River and is primarily used for fishing. There are also picnic table and grills on-site, as well as a boat launch and paved parking.



Svensson Park

Jurisdiction: City of Whitehall
 Location: Lake Street and Market Street on White Lake
 Type: Community Park
 Size: 3.7 acres
 Description: The park includes a boat launch for non-motorized boats, sand volleyball, a footbridge, picnic tables, grills, playground equipment, and lake access for fishing.

Gee Park

Jurisdiction: City of Whitehall
 Location: Gee Street near Lake Street
 Type: Community Park
 Size: 1.6 acres
 Description: The park provides picnic tables, grill and playground equipment.

Norman Park

Jurisdiction: City of Whitehall
 Location: River Street
 Type: Community Park
 Size: 1.0 acre
 Description: The facility has picnic tables, grills, swings, and interpretive station and a stairway and deck access to the White River Trail.

Veteran's Memorial

Jurisdiction: City of Whitehall
 Location: Colby Street and First Street
 Type: Community Park
 Size: 0.5 acre
 Description: A community Park and monument

White River Flood Plain

Jurisdiction: City of Whitehall
 Location: Adjacent to the White River
 Type: Park reserve
 Size: 200 acres
 Description: A regional park reserve

Lions Park

Jurisdiction: City of Whitehall
Location: Hanson Street near Business Route US-31
Type: Community Park
Size: 3.5 acres
Description: The park provides access to the White River, and accessible boardwalk, a stairway, floating docks, a picnic shelter and an interpretive station.

White River Trail

Jurisdiction: City of Whitehall
Location: Follows shoreline of the White River Floodplain
Type: Community Park
Size: 0.25 mile
Description: A linear park with a foot bridge at the trail head. The trail follows the shoreline of the White River Flood Plain to an observation deck.

Slocum Street Hill

Jurisdiction: City of Whitehall
Location: Slocum Street on White Lake
Type: Trail Connector
Size: 525 linear feet
Description: The trail offers switchback hard surface path for accessibility, benches, native plantings and Sculpture.

Mill Pond Peninsula

Jurisdiction: City of Whitehall
Location: Mill Pond Road on White Lake
Type: Undeveloped land
Size: 4.6 acres
Description: The area is undeveloped lakefront property with graveled parking area.

Warner St., Lewis St., and Peterson Rd. Bike Route

Jurisdiction: City of Whitehall
Location: Warner Street, Lewis Street, and Peterson Road
Type: On Street Bikeway
Size: 1.7 miles

Description: The path offers a five foot paved street shoulder designated for bicycle traffic.

White Lake Pathway

Jurisdiction: City of Whitehall
Location: White Lake Drive to White River
Type: Linear Park
Size: 2.2 miles
Description: The park offers a 12 foot wide bituminous path with bridges, native landscaping, flower gardens, sculptures and benches. The park also connects to the 22-mile Hart-Montague State Trail System.

Whitehall Township

Township Hall Park

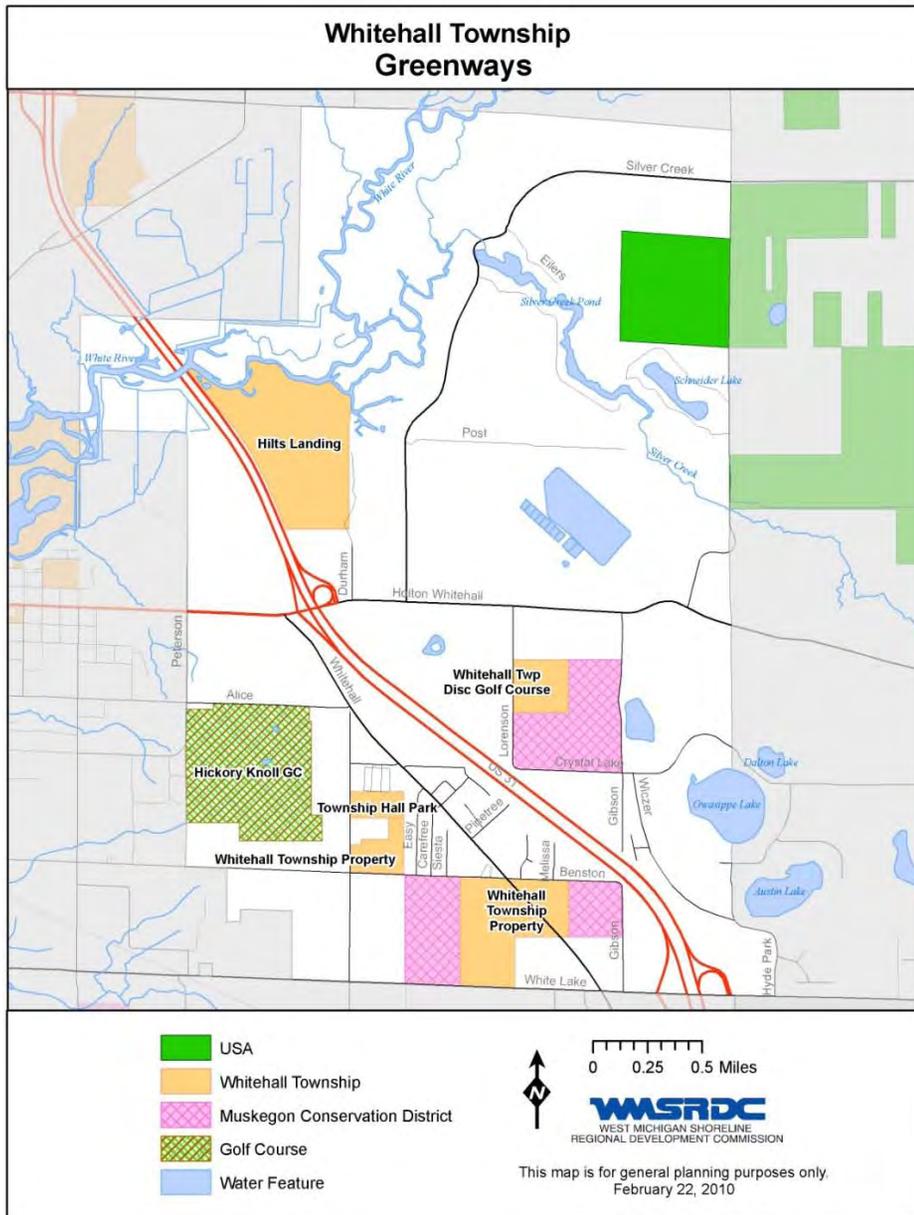
Jurisdiction: Whitehall Township
Location: Durham Road
Type: Community Park
Size: 20 acres
Description: The facility offers playground equipment, tennis courts, skate park, restrooms, horseshoe pits, grill, pavilion, picnic tables, and a one mile walking trail.

Disc Golf Course

Jurisdiction: Whitehall Township
Location: Lorensen Road
Type: Community Park
Size: 39 acres
Description: The 27-hole disc golf course is located in a natural setting and offers benches at each hole, concrete tee pads, restrooms, and Innova DISCatcher baskets.

Hilts Landing

Jurisdiction: Whitehall Township
Location: Durham Road
Type: Community Park
Size: 199 acres
Description: An undeveloped natural setting situated along the White River.



Township owned land

Jurisdiction: Whitehall Township
 Location: Durham and Benston
 Type: Wooded land
 Size: 25 acres
 Description: The wooded property is used for walking/hiking trails.

Township owned land

Jurisdiction: Whitehall Township
 Location: Benston and Whitehall
 Type: Wooded land
 Size: 113 acres
 Description: The wooded property is used for walking/hiking trails.

Forest Land

Jurisdiction: Muskegon Conservation District
 Location: Whitehall Township, Section 25
 Type: Forest
 Size: 120 acres
 Description: Natural forest land.

Forest Land

Jurisdiction: Muskegon Conservation District
 Location: Whitehall Township, Section 35
 Type: Forest Land
 Size: 80 acres
 Description: Natural forest land.

Forest Land

Jurisdiction: Muskegon Conservation District
 Location: Whitehall Township, Section 36
 Type: Forest Land
 Size: 40 acres
 Description: Natural forest land.



White River Township

White River Township Barrier Dune Preserve

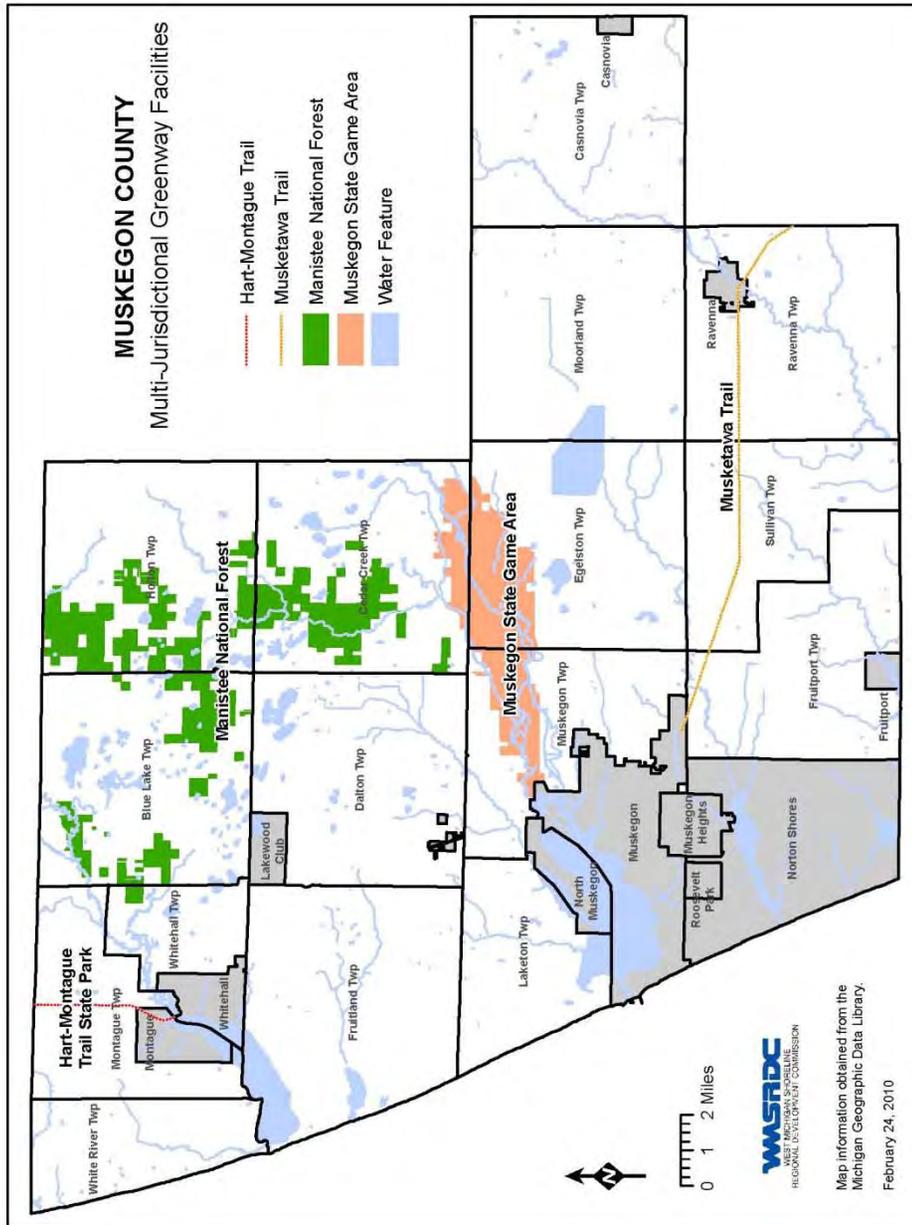
Jurisdiction: White River Township
 Location: North of the White Lake Channel on Ferry Street at Lake Michigan
 Type: Dune Preserve
 Size: 10.9 acres
 Description: The unique and beautiful barrier dune is located on 1,214 feet of Lake Michigan frontage and offers minimal parking.

Meinert Park

Jurisdiction: County of Muskegon
 Location: Meinert Road on Lake Michigan (White River Township)
 Type: County Park
 Size: 88 acres
 Description: Meinert Park offers picnicking with a covered shelter for approximately 40 people, electrical outlets and a large park grill; swimming and sunbathing with over 2,000 feet of sandy Lake Michigan beach frontage; 67 modern campsites and bathroom facilities; three bedroom, one bath, six person rental cottage; and scenic overlooks and climbing trails along the dunes of Lake Michigan.

Medbury Park

Owned and operated by the City of Montague. See “City of Montague” page in this greenways inventory for more detailed information.



Multi-Jurisdictional Facilities

Hart-Montague Trail State Park

Jurisdiction: State of Michigan
Location: City of Whitehall, City of Montague, and Montague Township
Type: Linear Bike Trail
Size: 22.5 miles
Description: The unique asphalt trail meanders through several communities in the counties of Muskegon and Oceana. It can be used for walking, horseback riding, biking, snowmobiles, cross country skiing, in-line skating, and is wheelchair accessible.

Musketawa Trail

Jurisdiction: State of Michigan
Location: Village of Ravenna, Ravenna Township, Sullivan Township and Fruitport Township
Type: Linear Bike Trail
Size: 25 miles
Description: The four-season trail traverses the counties of Muskegon and Ottawa and can be used for biking, snowmobiles, horseback riders, rollerbladers, cross country skiers, wheelchair travelers, hikers, and nature lovers.

Muskegon State Game Area

Jurisdiction: State of Michigan
Location: City of Muskegon, Muskegon Township, Egelston Township, and Cedar Creek Township
Type: State Game Area
Size: 10,500 acres
Description: This natural area is located along the scenic Muskegon River and its tributaries. The site is primarily forested, with river floodplain and wetland areas spread throughout the interior. Most of the area is not accessible by vehicles, so hikers and canoeists can enjoy an excellent wilderness experience. The area can be used for wildlife viewing, fishing, and public hunting during appropriate seasons.

Manistee National Forest

Jurisdiction: United States Forest Service
Location: Blue Lake Township, Cedar Creek Township, Holton
Township, Whitehall Township
Type: National Forest
Size: 12,501 acres
Description: National forest land.

CHAPTER V: MUSKEGON COUNTY GREEN INFRASTRUCTURE

Green Infrastructure Overview

The term “green infrastructure” is used to describe an interconnected network of open spaces and natural areas, such as greenways, wetlands, parks, forest preserves and native plant vegetation, that naturally manages stormwater, reduces flooding, and improves water quality.

In other words, green infrastructure describes the natural environment’s life support system - an organized network of protected land and water that supports native species, maintains natural ecological processes, sustains air and water resources, and contributes to the health and quality of life for communities and people.

As stated previously, the Muskegon Area-wide Plan (MAP) set the stage for future green infrastructure planning within the county. The Smart Growth Principles were a key component in the development of the MAP and were infused into the goals and implementation strategies outlined in the document. The Natural Resources, Open Space, and Environment vision and related implementation activities specifically called for a Muskegon County green infrastructure plan to be developed.

Muskegon County Green Infrastructure Goals

The MAP’s Natural Resource, Open Space, and Environment Visions and Goals identified the need to protect and maintain land and water resources. In addition, these goals provide the framework for the protection, development, and restoration of green infrastructure and the ecological services that help to maintain a healthy quality of life. These goals include the following:

1. Protect the valuable farm and forestlands, wetlands, surface and groundwater resources, wildlife habitat, and opportunities for passive and active recreation.
2. Develop policies and regulations to address the quantity and quality of water resources.
3. Link natural resource protection with development to reduce the loss of important natural resources and open spaces in urban and rural areas.

Green Infrastructure is an interconnected network of open spaces and natural areas, such as greenways, blueways, wetlands, parks and forests that contribute to the health and quality of life for communities and people.



4. Mitigate environmental and human health impacts to important natural resources.
5. Foster increased environmental sensitivity and voluntary stewardship through public-private partnerships, federal-state-local cooperation, and public education and outreach.
6. Protect the watersheds and shorelines of Lake Michigan and the inland lakes of Muskegon County.

Similar to gray infrastructure, green infrastructure should be strategically planned and managed. The foundation of green infrastructure is natural elements such as woodlands, wetlands, rivers, and grasslands. These natural elements work together as a whole to sustain ecological values and functions. Healthy functioning natural or restored ecological systems are essential to ensure the availability of ecological services. The term “ecological services” is used to describe the benefits that natural systems provide in order to help maintain an excellent quality of life for residents; an attractive place for tourism; and economic savings for local governments, businesses, and individuals.

Although green infrastructure planning often begins at a regional scale, it becomes increasingly local as land use decisions are made, critical elements are identified, and when implementation projects are being designed. For example, low-impact development practices, and restoration projects are often planned and designed at the parcel scale.

The Muskegon County Blueways and Greenways Plan and the Green Infrastructure Inventory are localized steps in the process of planning for green infrastructure. The studies are based on an inventory of Muskegon County publicly protected natural areas, parks, existing research, and best professional judgment regarding privately owned lands, water quality, and wildlife needs. The connections, or “linkages,” identified and recommended in this study enables the land to function in a way that provides and preserves space for recreational uses, habitat for wildlife, the preservation of water quality, and even historic features and working lands such as farms and wood lots.

Muskegon County Green Infrastructure Inventory

The Muskegon County Green Infrastructure Inventory is included in its entirety as an appendix to this plan. Listed below are many of the topics addressed in the inventory. Each is described as they relate to the planning and management of green infrastructure and their potential ecological benefits.

Groundwater and Drinking Water

- Groundwater resources can provide safe drinking water supplies. With careful, land use planning and practices, local officials can help to ensure that this ecological service continues to be available as an important drinking water resource for Muskegon County residents. In addition to appropriate land use, planning should include the remediation of brownfields and other sites of soil and groundwater contamination.

Wetlands

- Wetlands can provide flood control, fish and wildlife habitat, healthy surface water and recreational opportunities. As part of a regional water quality research project, Grand

Valley State University Annis Water Resources Institute (AWRI) analyzed Muskegon County wetlands for their importance in providing these benefits. This information is a resource for local planners, conservation agencies and watershed organizations that plan projects which rely on wetland conservation in order to maximize these benefits.

Forests

- Forests provide opportunities for scenic views, hunting, wildlife habitat, tourism, cooler temperatures and improved air quality. To illustrate the benefits of forest cover in urban areas, the Urban Forest Ecological Services Assessment, City of Muskegon, 2008 (GVSU Annis Water Resources Institute) presents benefits for air quality, water quality and the economic benefits to the city and residents. An important resources for both urban and rural forest management planning, is the Muskegon Conservation District (MCD). MCD manages hundreds of acres of forest lands throughout Muskegon County, and partners with local governments to utilize them in a way that benefits communities, ecology and the economy.

Surface Water

- Surface water resources provide drinking water, fish and wildlife habitat, recreation, scenic views, tourism and many quality of life benefits. The quality of lakes, rivers and streams depends on sound land use planning and the proper management of green infrastructure, such as forests, wetlands, and soils.

Farm Land

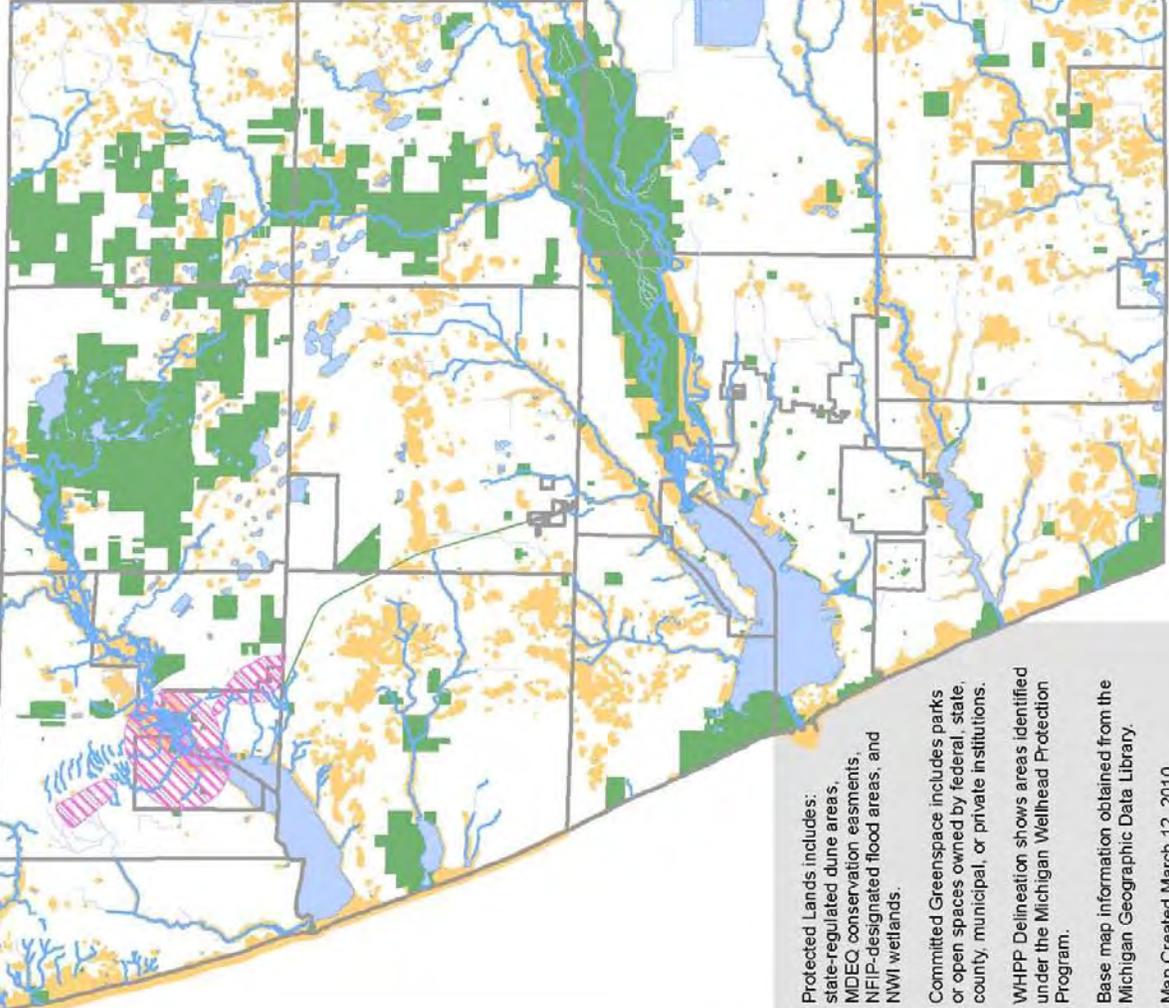
- The Muskegon County Farm Land and Open Space Preservation Program and Ordinance was adopted by the Muskegon County Commissioners in 2006. Since that time, the local foods, community gardens and organic food grower movements have also become a stronger voice for sustainable farming in Muskegon County. Sustainable food production is dependent on the availability of green infrastructure, and sustainable farm practices respect the soil, water, air and the economy of local communities.

Additionally, the Muskegon County Green Infrastructure Inventory contains a wealth of maps to assist communities in identifying existing green infrastructure features, and to facilitate planning for and implementation of linkages. Mapping is an important component of green infrastructure planning, because it can help citizens and decision makers visualize and understand spatial relationships locally, regionally, and worldwide.

The map on the following page provides a snapshot of green infrastructure in Muskegon County. It reveals areas that are currently protected or committed for green space, as well as lakes, rivers, and streams.

Muskegon County Green Infrastructure Overview

- Protected Lands
- Committed Greenspace
- Michigan WHPP Delineation
- Water Feature
- River/Stream
- Drain/Intermittent Stream
- Municipal Boundary



WMSADC
WEST MICHIGAN SHIPLEINE
REGIONAL DEVELOPMENT COMMISSION

Protected Lands includes: state-regulated dune areas, MDEQ conservation easements, NFIP-designated flood areas, and NWI wetlands.

Committed Greenspace includes parks or open spaces owned by federal, state, county, municipal, or private institutions.

WHPP Delineation shows areas identified under the Michigan Wellhead Protection Program.

Base map information obtained from the Michigan Geographic Data Library.

Map Created March 12, 2010

CHAPTER VI: LINKING BLUEWAYS AND GREENWAYS IN MUSKEGON COUNTY

Linkages Overview

This chapter identifies “linkage corridors” which represent existing and potential connections between blueways and greenways. Several elements were considered during the creation of the corridors, and are further discussed below. It is important to note once again that these connections should be planned for through cooperative efforts on a regional scale, and implemented at the local jurisdictional level.

One of the elements used to identify the linkage corridors was the Natural Connections, a Vision of Green Infrastructure in West Michigan. This process, conducted in 2004, provided a multi-county approach to identifying a 25-year vision for the permanent protection of open space in West Michigan. Even though the Natural Connections Vision was primarily focused on Green Infrastructure on a regional level, it provided a valuable starting point in the identification of important greenways in Muskegon County. The Vision identified regionally significant natural areas, which allowed this study to identify and inventory locally important greenspaces at county and municipal levels with greater detail.

The most significant element considered in the determination of the linkage corridors was the inventory of locally significant blueways and greenways compiled at the onset of this study. These inventories are discussed in Chapter III and Chapter IV of this document. The compilation and subsequent mapping of blueways and greenways inventories reveals a comprehensive view of all public access blueways and greenways in Muskegon County. This includes parks or properties owned by federal, state, county, municipal, and private institutions, public blueways access points, as well as golf courses and schools.

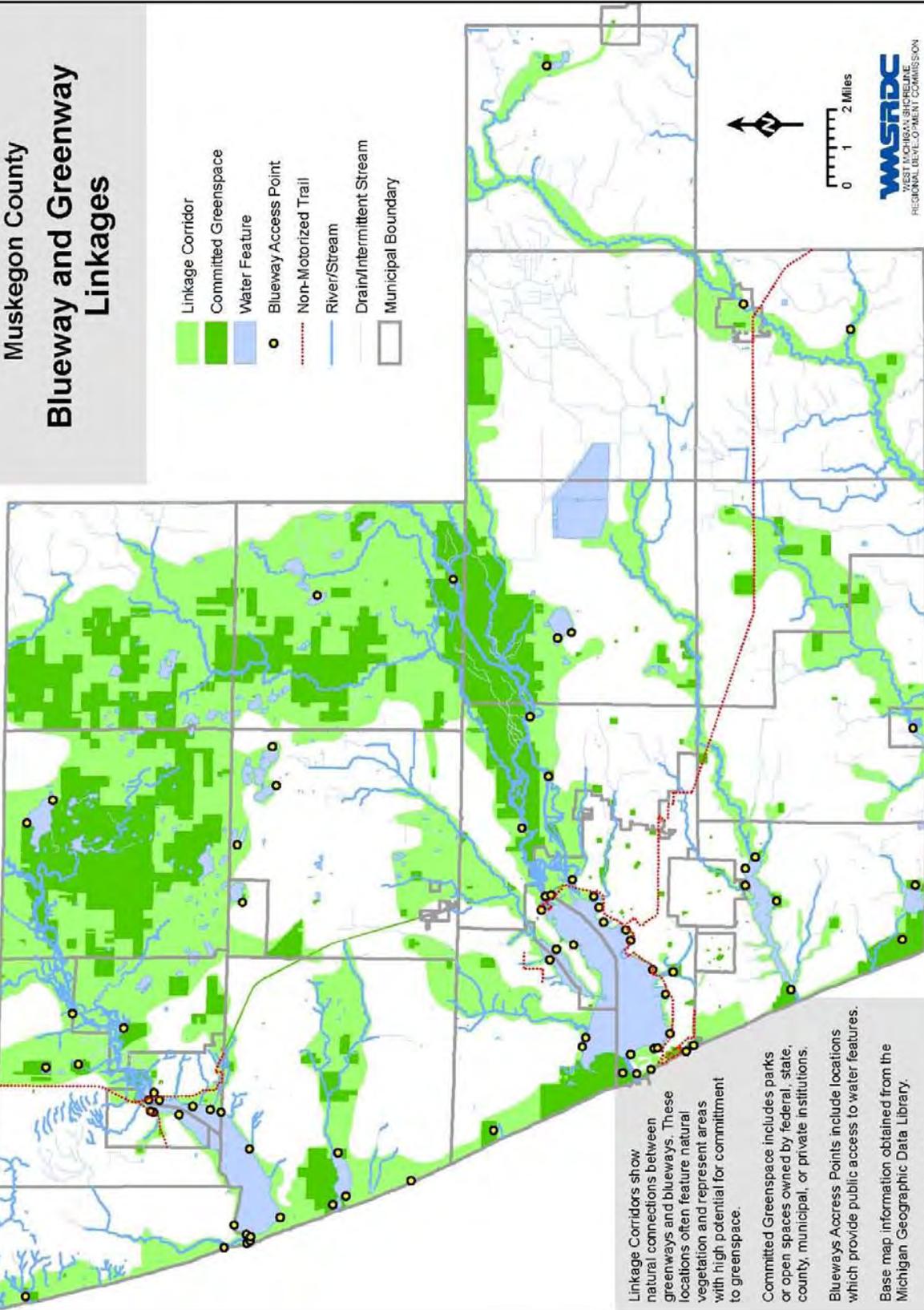


Identification of Potential Linkages

The map below identifies recommended linkage corridors which were based on information obtained through previous works, the Blueways and Greenways inventories, and on analysis of aerial photos taken in 2004. They were carefully drawn to make logical connections between blueways and greenways, water features, and significant areas of natural vegetation. It is important to note that the linkage corridors are recommendations, and that more detailed research should be conducted at the city, village, and township level when moving forward with implementation.

Muskegon County Blueway and Greenway Linkages

- Linkage Corridor
- Committed Greenspace
- Water Feature
- Blueway Access Point
- Non-Motorized Trail
- River/Stream
- Drain/Intermittent Stream
- Municipal Boundary



Linkage Corridors show natural connections between greenways and blueways. These locations often feature natural vegetation and represent areas with high potential for commitment to greenspace.

Committed Greenspace includes parks or open spaces owned by federal, state, county, municipal, or private institutions.

Blueways Access Points include locations which provide public access to water features.

Base map information obtained from the Michigan Geographic Data Library.

Map Created March 8, 2010



CHAPTER VII: RECOMMENTATIONS

Public Input Process

During the development of the Muskegon County Blueways and Greenways Plan, as well as the development of the Muskegon County Green Infrastructure Inventory, the West Michigan Shoreline Regional Development Commission (WMSRDC) took several steps to solicit public input into the planning process. The first step taken was to establish a Technical Advisory Committee to provide valuable input to WMSRDC staff throughout the development of the plans. The Committee was comprised of representatives from the Grand Valley State University Annis Water Resources Institute, the Muskegon County Conservation District, and Muskegon County Public Health. The members of the Committee were invaluable to the development of each plan. They shared existing information, provided technical input and feedback to the Commission, and devoted their time and attention to the process.

One of the implementation activities of the Muskegon Area-wide Plan (MAP) was to establish regularly held County-wide Planning Commission meetings. The purpose of the County-wide Planning Commission meetings is to share information and encourage communication between the planning commissions within Muskegon County. All Planning Commission members are welcome and encouraged to attend. County-wide Planning Commission meetings are held annually during the months that have a fifth Wednesday. The Muskegon County Blueways and Greenways Plan and the Muskegon County Green Infrastructure Inventory were the topic of the April 29, 2009 MAP County-wide Planning Commission Meeting. This was just one avenue used to reach the public and local government officials in order to gain input during the planning process.

Another method the Regional Commission used to provide information and encourage feedback during the development of the plans is the Commission Communications, a bi-monthly newsletter published by the WMSRDC. Nearly every issue of the Commission Communications since the project began contained an article updating the readers and providing contact information to those with additional questions. The Commission Communications has a distribution list of approximately 500 within West Michigan and across the county. The newsletter is also available on the WMSRDC website in order to have a broader outreach.

During the fall of 2009, WMSRDC staff mailed individual packages to all 27 local units of government within Muskegon County, as well as the County. The packages included a cover letter explaining the projects, in addition to the contents of the package; maps of the community identifying both blueways and greenways within the jurisdiction; and a brief survey to be completed. Each community was asked to review the maps and make corrections and/or additions as necessary. They were then asked to return the maps and completed survey to the Regional Commission to be incorporated into the Blueways and Greenways Plan. WMSRDC staff was able to gain valuable input through this process.

On December 15, 2009, WMSRDC staff hosted a Muskegon County Blueways and Greenways Workshop. The workshop was geared toward local government officials and

environmental/watershed groups. The successful workshop focused on the Muskegon County Blueways and Greenways Plan and the Muskegon County Green Infrastructure Inventory. The workshop served as an avenue to provide information to local officials regarding critical green infrastructure in Muskegon County and to allow for public comment and input towards the development of the two projects. This occurred through a series of presentations regarding surface water, groundwater/drinking water, wetlands, forests, and farmlands. During the second half of the workshop, attendees were placed into groups and asked to comment on preliminary blueway and greenway public access maps of Muskegon County. Participants were also asked to identify potential areas and opportunities to create linkages between these public access points. The feedback gathered during the workshop assisted in the completion of both documents.

Recommendations: Blueway and Greenway Goals and Opportunities

Goal: *Preserve and protect existing public access to blueways and greenways in Muskegon County.*

Local government officials have the opportunity and responsibility to provide public access to the community's natural areas. It was clear during the development of the Muskegon Area-wide Plan that residents felt Muskegon County's abundant natural resources and the county's proximity to water were the area's most valuable assets. In addition, the protection of these areas were of equal importance to Muskegon County residents.

Goal: *Strive to expand and enhance the blueways and greenways in Muskegon County.*

Were possible, local governments and community leaders are encourage to seize opportunities for community partnerships and grant funding where existing blueway and greenway public access can be either expanded through the purchase or donation of land, or enhanced through public access and aesthetic improvements.

Goal: *Continuously seek opportunities and utilize available tools to create additional public recreational opportunities.*

There are many tools available to local governments and interested land owners seeking opportunities to add and improved to the region's blueway and greenway public access. A list of available tools is provided in this chapter under the section titled Tools for Implementation. It is recommended that local government officials remain informed regarding new opportunities and tools as they become available, and to build and maintain partnerships with regional planning, private consulting, watershed, trails and conservation organizations for assistance with grant proposals.

Goal: *Identify and work towards the implementation of linking existing and future blueways and greenways in Muskegon County.*

This document is a county-wide perspective regarding public access to blueways and greenways. As stated earlier in the document, each local jurisdiction is responsible for land use decisions within their respective community. Individual communities are encouraged to use this document to guide more detailed local planning (i.e. Community Recreation Plan) and action plans for implementation of activities that provide for more localized linkages.

Goal: *Work cooperatively across jurisdictional boundaries and with appropriate environmental agencies for the betterment of blueways and greenways throughout the county.*

Even though each community is responsible for their own land use decision making, it is important for local governments to work cooperatively amongst themselves to provide for blueway and greenway linkages across jurisdictional boundaries. Therefore, it is encouraged that local officials continually foster existing and seek new opportunities to collaborate regionally, including partnerships with regional planning, watershed, trails and conservation organizations.

Goal: *Continuously educate the citizens in addition to community leaders in Muskegon County about the value and benefit of the blueways and greenways within the county.*

The average citizen, although they may value the local recreational opportunities available within the area, may not understand the valuable benefits provided by the green infrastructure. Local governments, universities, conservation organizations, watershed groups, and community leaders are encouraged to continually provide educational opportunities to the public and area citizens.

Goal: *Develop policies and regulations to address the quantity and quality of water resources.*

The quality of surface waters used for recreation depend on the capabilities of communities to manage the quality and the quantity of stormwater runoff, and to control sources of non-point pollution from a wide variety of land uses. In Muskegon County, the Muskegon Area Municipal Stormwater Committee coordinates an effort to minimize stormwater pollution in the Muskegon Lake and Mona Lake watersheds. The Muskegon County Road Commission and the Drain Commissioner have responsibilities to maintain roads and drainage systems, while protecting water quality. An expanded, county-wide, watershed approach is needed to effectively address stormwater pollution, and communities are encouraged to voluntarily join this effort.

Goal: *Link natural resource protection with development to reduce the loss of important natural resources and open spaces in urban and rural areas.*

It is important that projects for the acquisition and enhancement of public outdoor recreation lands include the preservation of natural areas. Strategic site design can also link any surrounding isolated or fragmented natural habitats to create larger natural

systems. Often, lands located at the headwaters of lakes and streams are not valued for their natural resource benefits. Most of these areas contained wetlands that functioned to control water runoff, before being developed. As part of the built environment, these areas drain the land by way of ditches, storm drains and soil/groundwater infiltration. The development of recreational amenities can incorporate rain gardens and other design techniques that prevent accelerated amounts of stormwater runoff from entering ditches and storm drains. Communities are encouraged to seek expert ecological advice when reviewing site development designs, and to develop natural features inventories that identify these critical areas.

Goal: *Foster increased environmental sensitivity and voluntary stewardship through public-private partnerships, federal-state-local cooperation, and public education and outreach.*

The first step in the process of environmental and natural resources protection is to fully understand nature and the ecosystem concept, including how the interactions of the natural landscape, water features and the built environment result in the quality of communities and the environment. Communities are encouraged to become informed and educated by joining local watershed groups. Watershed groups actively discuss these concepts and provide information about real-world preservation and restoration needs. Active participation at local watershed group planning meetings is also an effective way for communities to build partnerships with local, state and federal agencies. These partnerships are critical when it comes to successful project and proposal development and the acquisition of grant funds to implement them.

Goal: *Protect the watersheds and shorelines of Lake Michigan and the inland lakes of Muskegon County.*

The Lake Michigan Lakewide Management Plan (LaMP) and the LaMP Forum, provide an updated management plan for Lake Michigan, and its surrounding watersheds. Communities are encouraged to review this document, located at <http://www.epa.gov/lakemich/>. In Muskegon County, watershed groups, regional planning organizations, universities, commercial and recreational port landowners and companies actively participate in Lake Michigan Forum projects. Local governments are also encouraged to become involved with the watershed group or groups that best fit the needs of their community. In Muskegon County, watershed groups are: Muskegon Lake Watershed Partnership, Muskegon River Watershed Assembly, Mona Lake Watershed Council, White Lake Public Advisory Council, White River Watershed Partnership and the Duck Lake Watershed Assembly. For information about the watershed efforts and for contact information, check out the Watershed Planning section of the Muskegon County Green Infrastructure Inventory (Appendix A). The West Michigan Watershed Partners Inventory (WMSRDC, 2008) is another resource, located on the WMSRDC web site at <http://www.wmsrdc.org/Download/Watershed%20Partners%20Inventory.pdf>.

Tools and Resources for Implementation

Local governments already have many of the tools and resources they need to preserve and protect the natural resources within their own communities. These tools and resources lie within the land use and zoning authority given to each jurisdiction under state law. Each of the 27 local units of government in Muskegon County currently exercise their right to plan and zone. It is important for these jurisdictions, utilizing their land use and zoning authority, to incorporate green infrastructure planning into other existing planning. These planning activities and opportunities include:

- Master Planning
- Recreation Planning
- Zoning Authority
 - Planned Unit Developments (PUDs)
 - Conservation Easements
 - Utility Service Districts
 - Site Plan Reviews
 - Zoning Overlays
- Transportation Planning
- Sewer and Water Service Area Planning
- Watershed and Habitat Planning
- Purchase of Development Rights
- Economic Development Planning

There are many resources available to assist communities in utilizing this authority. The resources listed below can be used to maximize a community's impact on the preservation, protection, and restoration of natural resources.

Michigan Township Association (MTA)

The Michigan Townships Association promotes the interests of township government by fostering strong, vibrant communities; advocating legislation to meet 21st century challenges; developing knowledgeable township officials and enthusiastic supporters of township government; and encouraging ethical practices of elected officials who uphold the traditions and unique characteristics of township government and the values of the people of Michigan.

Contact:

Michigan Township Association
512 Westshire Drive
Lansing, MI 48917

Phone: (517) 321-6467

Fax: (517) 321-8908

Website: <http://www.michigantownships.org>

Michigan Municipal League (MML)

The Michigan Municipal League is the one clear voice for Michigan communities. Our goals are to aid them in creating desirable and unique places through legislative and judicial advocacy; to provide educational opportunities for elected and appointed officials; and to assist municipal leaders in administering community services. Our mission is that of a non-profit, but we act with the fervor of entrepreneurs to passionately push change for better communities and a better Michigan.

Contact:

Michigan Municipal League
1675 Green Road
Ann Arbor, MI 48105
Phone: (734) 662-3246 or (800) 653-2483
Website: <http://www.mml.org>

Planning and Zoning Center

Since it was first founded in 1982, the Planning & Zoning News has published the only state-specific monthly magazine on planning and zoning issues. Each month, **Planning & Zoning News (PZC)** offers its estimated 6,000 readers:

- A summary of recent case law
- Attorney general opinions
- Pending legislation
- A feature story on an issue of contemporary interest
- Practical guidance on typical planning and zoning issues
- Information on a variety of new publications
- Training opportunities and conferences and other notices

Contact:

Planning and Zoning Center
715 North Cedar Street, Suite 2
Lansing, MI 48906-5275
Phone: (517) 886-0555
Fax: (517) 886-0564
Website: <http://www.pzcenter.com>

Michigan Department of Natural Resources and Environment

State Revolving Loan Funds Water & Sewer

- **Clean Water State Revolving Fund:** This fund backs a low interest rate loan financing program that assists qualified local municipalities with the construction of needed water pollution control facilities.
- **Drinking Water Revolving Fund:** Designed to assist water suppliers in satisfying the requirements of the Safe Drinking Water Act by offering low interest rate loans to eligible water suppliers.

Contact:

Water Bureau
P.O. Box 30273
Lansing, MI 48909-7773
Phone: (517) 373-2161
Fax: (517) 335-0743
Website: <http://www.michigan.gov/deq>

Brownfields

The Michigan Department of Environmental Quality offers grants and loans for environmental assessments and cleanups at properties with known or suspected contamination. Funds are targeted to projects that promote economic development and reuse of Brownfield properties. Some of the Brownfield funding sources include: Michigan Brownfield Redevelopment Loans (BRL) and Grants (BRG), Site Reclamation Grants (SRG), Revitalizing Revolving Loan (RRL), Site Assessment Funds (SAF), Waterfront Redevelopment Grants (WRG).

Contact:

Remediation & Redevelopment Division
P.O. Box 30426
Lansing, MI 48909
Phone: (517) 335-1104 or (517) 373-9540
Fax: (517) 373-2637
Website: <http://www.michigan.gov/deq>

U.S. Environmental Protection Agency - Brownfields

EPA's Brownfields Program provides direct funding for brownfields assessment, cleanup, revolving loans, and environmental job training. To facilitate the leveraging of public resources, EPA's Brownfields Program collaborates with other EPA programs, other federal partners, and state agencies to identify and make available resources that can be used for brownfields activities. In addition to direct brownfields funding, EPA also provides technical information on brownfields financing matters.

- **Assessment Grants:** Assessment grants provide funding for a grant recipient to inventory, characterize, assess, and conduct planning and community involvement related to brownfield sites.
- **Revolving Loan Fund Grants:** The purpose of Revolving Loan Fund Grants is to enable States, political subdivisions, and Indian tribes to make low interest loans to carryout cleanup activities at brownfields properties.
- **Cleanup Grants:** Cleanup grants provide funding for a grant recipient to carry out cleanup activities at brownfield sites.
- **Job Training Grants:** Job Training Grants are designed to provide funding to eligible entities, including nonprofit organizations, to recruit, train, and place, predominantly low-income and minority, unemployed and under-employed residents of brownfields-impacted communities with the skills needed to secure full-time, sustainable, employment in the environmental field and in the assessment and cleanup work taking place in their communities.

- **Training, Research, and Technical Assistance Grants:** Training, Research, and Technical Assistance Grants provide funding to eligible organizations to provide training, research, and technical assistance to facilitate brownfields revitalization.
- **Targeted Brownfields Assessments:** The Targeted Brownfields Assessment (TBA) program is designed to help states, tribes, and municipalities—especially those without EPA Brownfields Assessment Pilots/Grants—minimize the uncertainties of contamination often associated with brownfields.

Contact:

U.S. EPA
 Office of Brownfield and Land Revitalization
 Mail Code 5105 T
 1200 Pennsylvania Avenue NW
 Washington, DC 20460
Phone: (202) 566-2777
Fax: (202) 566-2757
Website: <http://www.epa.gov/brownfields>

Other Resources

Listed below are other tools and resources to consider and utilize when planning for blueways and greenways within your community and regionally. Each tool and resource consists a brief description, as well as contact information and, where possible, a website.

INtegrated Valuation of Ecosystem Services Tool (INVEST)

GVSU's Annis Water Resources Institute has created a web-based tool, the INtegrated Valuation of Ecosystem Services Tool (INVEST). INVEST creates a framework that allows West Michigan to measure the costs and benefits of green infrastructure preservation. It estimates the economic value of green infrastructure and its associated ecosystem services to the region, and "monetizes" those preliminary value estimates so that they can be introduced into public and private market decision-making. By valuing ecosystem services, this tool provides a basis for better balancing development and conservation, which will inform the policy discussion and lead to better decision making.

Contact:

Grand Valley State University – Annis Water Resources Institute
 Lake Michigan Center
 740 W. Shoreline Drive
 Muskegon, MI 49441
Phone: (616) 331-3749 or (231) 728-3601
Website: <http://gvsu.edu/wri/>

West Michigan Trails and Greenways Coalition

The West Michigan Trails and Greenways Coalition is a non-profit group of like-minded donors, organizations and volunteers who are dedicated to developing non-motorized trails and greenways into a linked system that connects wilderness areas, parks, historic landmarks

and cultural sites throughout West Michigan. The West Michigan Trails and Greenways Coalition addresses over 585 miles of regional connections, provides a forum for local trail groups, networking opportunities with partners, assists "friends" groups with funding assistance for local projects, and maintains a regional perspective.

Contact:

West Michigan Trails & Greenways Coalition
P.O. Box 325
Comstock Park, MI 49321

Website: <http://www.wmtrails.org>

E-mail: info@wmtrails.org

Rails-to-Trails Conservancy

The Rails-to-Trails Conservancy is a nonprofit organization based in Washington, D.C., whose mission it is to create a nationwide network of trails from former rail lines and connecting corridors to build healthier places for healthier people.

Contact:

Rails-to-Trails Conservancy
The Duke Ellington Building
2121 Ward Ct. NW, 5th Floor
Washington, DC 20037

Phone: (202) 331-9696

Website: <http://www.railstotrails.org/index.html>

Contact (Midwest Office):

Rails-to-Trails Conservancy
Midwest Regional Office
10 South High Street, Suite A
Central Winchester, OH 43110

Phone: (614) 837-6782

Transportation Enhancement Program

Michigan's Transportation Enhancement program is funded through a 10 percent set-aside of Surface Transportation Program (STP) funds. This amounts to \$20-\$25 million annually. The Transportation Enhancement program is administered by the Office of Economic Development (OED) of the Michigan Department of Transportation (MDOT). There are 12 activities eligible for Transportation Enhancement funding, including:

- facilities for pedestrians and bicycles,
- preservation of abandoned railway corridors (Including the conversion for pedestrian or bicycle trails),
- provision of safety and educational activities for pedestrians and bicyclists,
- landscaping and other scenic beautification,
- acquisition of scenic easements and scenic or historic sites,
- control and removal of outdoor advertising,
- scenic or historic highway programs,

- historic preservation,
- archaeological planning and research,
- establishment of transportation museums,
- rehabilitation and operation of historic transportation buildings,
- environmental mitigation to address water pollution due to highway runoff or reduce vehicle caused wildlife mortality while maintaining habitat continuity

Contacts:

Michigan Department of Transportation (MDOT)

Office of Economic Development (OED)

Phone: (517) 335-1069.

Webpage: www.michigan.gov/tea

Recreational Trails Program

The Recreational Trails Program (RTP) is a program of the Federal Highway Administration that provides funds to States to maintain and develop recreational trails and related facilities. Each state administers its own program. Michigan’s allotment amounts to just over \$1,000,000 annually.

Michigan’s Recreational Trail Program is administered through the Michigan Department of Natural Resources and Environment (DNRE). The DNRE must always be the applicant but local projects can be considered if they contribute to DNRE goals, link to a trail on DNRE land, or are located on DNRE land. Projects are selected on the following criteria:

- Project need and benefit
- Site/Project quality
- Balance among project types
- Balance among trail uses
- Geographic distribution of projects
- Balance among programs/divisions

Contact:

Michigan Department of Natural Resources and Environment

Forest, Mineral and Fire Management

Phone: (517) 335-3037

Safe Routes to School (SR2S)

Michigan’s Safe Routes to School program is managed by the Michigan Department of Transportation (MDOT), with training, logistical, administrative, and technical support from the Michigan Fitness Foundation.

The purposes of Safe Routes to School programs are:

- To enable and encourage children, including those with disabilities, to walk and bicycle to school
- To make bicycling and walking to school a safer and more appealing transportation alternative, thereby encouraging a healthy and active lifestyle from an early age

- To facilitate the planning, development, and implementation of projects and activities that will improve safety and reduce traffic, fuel consumption and air pollution in the vicinity of elementary schools

A federal Safe Routes to School program was authorized as part of the surface transportation bill signed into law in August 2005. As a result, every state now has dedicated dollars to help with infrastructure improvements (e.g. new sidewalks and traffic calming projects) and non-infrastructure activities to encourage and enable students to walk and bicycle to school.

Contacts:

Safe Routes to School

Website: <http://www.saferoutesmichigan.org>

Michigan Fitness Foundation

P.O. Box 27187

Lansing, MI 48909

Phone: (517) 347-7891

Toll-Free: (800) 434-8642

Fax: (517) 347-8145

Website: <http://www.mighiganfitness.org>

The Great Lakes Fishery Trust

The mission of the Great Lakes Fishery Trust (GLFT) is to provide funding to nonprofit organizations, education institutions, and government agencies to enhance, protect, and rehabilitate the Great Lakes fishery. Since 1998, the GLFT has awarded over \$44 million in grants to enhance the Great Lakes fishery. Each year the GLFT provides funding for creating, enhancing, or improving shore-based fishing access. GLFT funds are used for:

- Increased fishing access, including land acquisition and site enhancement, to the Great Lakes fishery for shore-based angling and tribal fishing
- Public education relating to the Great Lakes fishery
- Research on the Great Lakes fishery, with special emphasis on rehabilitation of lake sturgeon and lake trout
- Fishery habitat protection and restoration, with special emphasis on the Muskegon River Watershed

Nonprofit organizations and government agencies may submit applications at any time. Applications and supporting materials are available on the GLFT website or by calling the GLFT offices at (517) 371-7468.

Contact:

Great Lakes Fisheries Trust

600 W. St. Joseph, Suite 10

Lansing, MI 48933-2265

Phone: (517) 371-7468

Fax: (517) 484-6549

E-mail: glft@glft.org

Website: <http://glft.org>

Michigan Natural Resources Trust Fund

With this source of funding, state and local units of government are able to acquire land for public recreation and for protection of land for its environmental importance or scenic beauty. A limited amount of the funds may be used for the development of public outdoor recreation facilities. Over its 32-year history, the Michigan Natural Resources Trust Fund has had a tremendous impact on Michigan's landscape. Approximately \$781 million has been awarded to state and local units of government and has been used to acquire and develop recreation land in all 83 counties of the state.

Contact:

Michigan Natural Resources Trust Fund

Grants Management Office

P.O. Box 30425

Lansing, MI 48909-7925

Phone: (517) 373-9125

Website: <http://www.michigan.gov/dnr-grants>

Land and Water Conservation Fund

The National Park Service, U.S. Department of the Interior provides Land and Water Conservation Fund grants for up to fifty percent (50%) of costs for the acquisition of land and the development of public outdoor recreation sites and facilities. The President's budget for FY 2010 proposed a \$30 million appropriation for LWCF State grants. The LWCF State Assistance program provides matching grants to States, and through the States to local governments, for the acquisition and development of public outdoor recreation areas and facilities. Planning grants are also available to the States to assist in the development of Statewide Comprehensive Outdoor Recreation Plans (SCORP). The goals of the LWCF State Assistance Program are to:

- Meet state and locally identified public outdoor recreation resource needs to strengthen the health and vitality of the American People.
- Increase the number of protected state and local outdoor recreation resources and to ensure their availability for public use in perpetuity.
- Encourage sound planning and long-term partnerships to expand the quantity and to ensure the quality of needed state and local outdoor recreation resources.

Contact:

Grants Management

Michigan Department of Natural Resources and Environment

P.O. Box 30425

Lansing, MI 48909-7925

Phone: (517) 241-4717

Email: mctiernanl@michigan.gov

Land Conservancy of West Michigan

The Land Conservancy of West Michigan (LCWM) permanently preserves West Michigan's natural landscape by:

- **Establishing Nature Preserves:** LCWM acquires natural land through donation or purchase of high priority land for the purpose of creating nature preserves. LCWM nature preserves are open to the public.
- **Creating Conservation Easements:** Conservation easements are voluntary legal agreements between a landowner and a land conservancy or government agency that permanently limit development of the property in order to protect the conservation values of the land. The land remains in private ownership and can continue to be used by the landowner. The Land Conservancy also works with developers to create easements preserving important natural land in open space developments.
- **Assisting Local Communities:** LCWM assists local governments with identifying important natural areas, preserving lands and creating community parks.

Contact:

Land Conservancy of West Michigan
1345 Monroe Ave. NW, Ste. 324
Grand Rapids, MI 49505
Phone: (616) 451-9476
E-mail: lcwm@naturenearby.org

Rain Gardens of West Michigan

Rain Gardens of West Michigan is located in the West Michigan Environmental Action Council (WMEAC) offices in Grand Rapids, Michigan. Project strategies include local and regional partnerships, and collaborative projects. Rain Gardens of West Michigan develops partnerships with local and national businesses and volunteers participate by donating their time and skills.

Contacts:

Rain Gardens of West Michigan
Website: raingardens.org

West Michigan Environmental Action Council
1007 Lake Drive SE
Grand Rapids, Michigan 49506
Phone: (616) 451-3051
E-mail: info@wmeac.org
Website: <http://www.wmeac.org>

Low Impact Development Urban Design Tools

This resource website, developed through a Cooperative Assistance Agreement under the U.S. EPA Office of Water, provides watershed managers with a new set of tools and techniques that can be used to meet regulatory and receiving water program goals for urban retrofits, redevelopment projects, and new development sites. It features an interactive design page for a range of LID techniques and land uses.

Contacts:

Website: <http://www.lid-stormwater.net/>

Smart Growth and Water: Resources and Tools

This set of Web pages includes residential and non-residential low impact development tools.

Website: <http://www.epa.gov/watertrain/smartgrowth/resources/plan.htm>

- **Streaming video program on LID, *Reining in the Storm - One Building at a Time*:** This engaging 30 minute film explains low impact development to the uninitiated. It is ideally suited for educating local government officials and key decision-makers on the merits of low impact development in a way that breaks down barriers for adoption of these practices and directly addresses real concerns.
- **LID for Big Box Retailers:** Developed with input from a major big box retail corporation, this EPA-funded manual is designed to provide large building and site footprint high volume retailers with strategies that integrate innovative and highly effective LID stormwater management techniques into their site designs for regulatory compliance and natural resource protection.
- **Low Impact Development Center:** The Low Impact Development Center was established to develop and provide information to individuals and organizations dedicated to protecting the environment and water resources through proper site design techniques that replicate pre-existing hydrologic site conditions.

Michigan Department of Natural Resources and Environment Grants & Loans Catalog:

http://www.michigan.gov/documents/deq/deq-essd-grantsloans-catalog_210643_7.pdf

Michigan Department of Natural Resources and Environment Guidelines for the Development of Community Park, Recreation, Open Space, and Greenways Plans:

<http://michigan.gov/dnr-grants>

In addition to the numerous resources and tools provided in the document, there are several private consulting firms that provide valuable resources and assistance in preserving and protection natural resources at the local level.

CHAPTER VIII: CONCLUSION

The Muskegon County Blueways and Greenways Plan: Public Access Inventory and Linkages created the first extensive inventory of public access to water bodies, parks and natural areas at the county-wide level in Muskegon County. While the inventory portion includes public access to local, county, state, federal, and privately-owned properties, the linkages portion identifies areas with high potential for connecting blueways and greenways. Finally, the plan includes a detailed list of tools and resources to assist local officials' future blueways and greenways planning efforts.

This Blueways and Greenways Plan fits in with goals and objectives laid out in the Muskegon Area-wide Plan, and is intended to be utilized by local governments, environmental groups, and property owners when making land use decisions. It is also hoped that this plan will enhance awareness of existing blueways and greenways, and lead to increased protection and expansion of these areas.

The development of the document was made possible through the support of the Michigan Department of Natural Resources and Environment Coastal Zone Management, as well as local project partners including the Muskegon Conservation District, GVSU Annis Water Resources Institute, and Public Health-Muskegon County.

APPENDIX

Muskegon County Green Infrastructure Inventory

The Muskegon County Green Infrastructure Inventory provides an overview of green infrastructure and ecological services, and associated benefits to communities. Information about existing and planned “grey” infrastructure is included along with maps of natural features upon which a county-wide green infrastructure plan would focus. Natural features include groundwater soils, groundwater, wetlands, forests, surface water, and farm land. The inventory pulls together information about existing green infrastructure plans and studies that have been completed by project partners, and builds on the Muskegon Area-wide Plan and the West Michigan Natural Connections Vision. It provides the basis for communities to engage in green infrastructure planning.

The Muskegon County Green Infrastructure Inventory was primarily developed to implement the Lake Michigan Lakewide Management Plan, with financial support from the Chicago Metropolitan Agency for Planning made possible through a grant from the U.S. Environmental Protection Agency Great Lakes National Program Office. The inventory was developed alongside the Blueways and Greenways Plan, which was funded, in part, by the Michigan Coastal Management Program, Michigan Department of Natural Resources and Environment, through a grant from the National Oceanic and Atmospheric Administration.

The Green Infrastructure Inventory is intended to complement the Blueways and Greenways Plan content, as well as be able to exist as a stand alone document.



Muskegon County Green Infrastructure Inventory

March 2010



**WEST MICHIGAN SHORELINE
REGIONAL DEVELOPMENT COMMISSION
(WMSRDC)**

The WMSRDC is a regional council of governments representing 120 local governments in the West Michigan counties of Lake, Mason, Muskegon, Newaygo, and Oceana.

The mission of WMSRDC is to promote and foster regional development in West Michigan... through cooperation amongst local governments.



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Muskegon County **Green Infrastructure** Inventory

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Chapter 1: Green Infrastructure and Muskegon County

The term **Green Infrastructure** is used to describe an interconnected network of open spaces and natural areas, such as greenways, wetlands, parks, forest preserves and native plant vegetation, that naturally manages stormwater, reduces flooding and improves water quality.

In other words, Green Infrastructure describes the natural environment's life support system - an organized network of protected land and water that supports native species, maintains natural ecological processes, sustains air and water resources, and contributes to the health and quality of life for communities and people.

In 2005, Muskegon County along with several local units of government adopted a comprehensive land use plan titled the Muskegon Area-wide Plan (MAP). The mission of the Muskegon Area-wide Plan was to involve citizens in the shared vision for the future of Muskegon County. The MAP embraced the Smart Growth Principles and contained five main vision areas including Land Use and Growth; Natural Resources, Open Space, and Environment; Economy and Jobs; Infrastructure; and Quality of Life. The goals and outlined implementation activities of the Natural Resources, Open Space, and Environment vision called for a green infrastructure plan for Muskegon County.

Muskegon County Green Infrastructure Goals:

The MAP set the stage for green infrastructure planning within Muskegon County. The MAP's Natural Resource, Open Space, and Environment Visions and Goals identified the need to protect and maintain land and water resources. These goals provide the framework for the protection and development of green infrastructure and the ecological services that help to maintain a healthy quality of life. These goals include the following:

1. Protect the valuable farm and forestlands, wetlands, surface and groundwater resources, wildlife habitat, and opportunities for passive and active recreation.
2. Develop policies and regulations to address the quantity and quality of water resources.

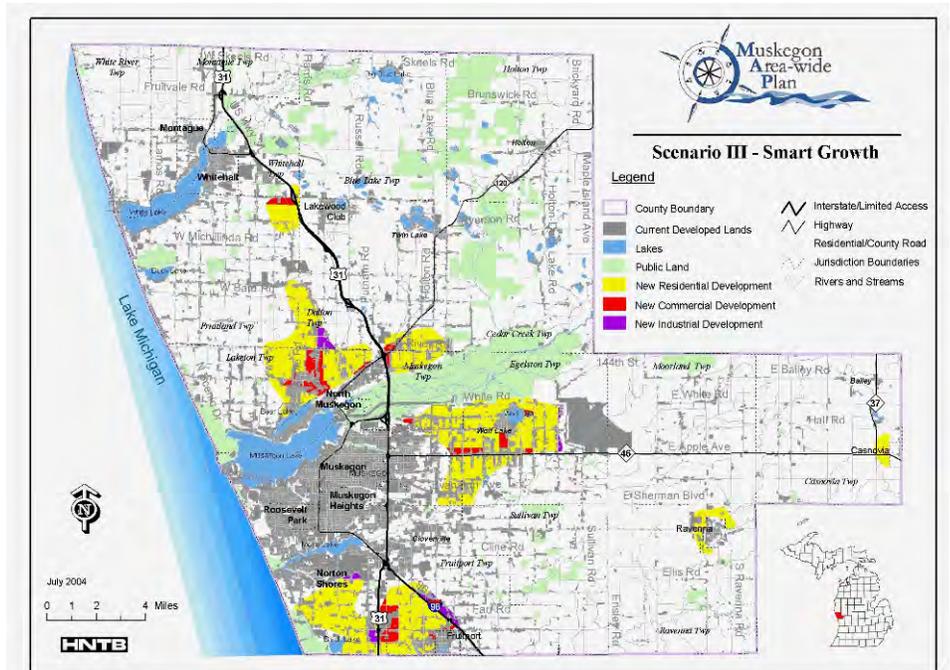
Green Infrastructure is an interconnected network of open spaces and natural areas, such as greenways, blueways, wetlands, parks and forests that contribute to the health and quality of life for communities and people.



3. Link natural resource protection with development to reduce the loss of important natural resources and open spaces in urban and rural areas.
4. Mitigate environmental and human health impacts to important natural resources.
5. Foster increased environmental sensitivity and voluntary stewardship through public-private partnerships, federal-state-local cooperation, and public education and outreach.
6. Protect the watersheds and shorelines of Lake Michigan and the inland lakes of Muskegon County.

Growth with Green Infrastructure in Mind:

As part of the MAP planning process, local communities identified three possible growth scenarios, including Business As Usual, County Build-out, and Smart Growth. The Smart Growth development option was overwhelmingly the preferred scenario amongst community leaders and participants in the MAP process. The Smart Growth development option is illustrated in the adjacent map. The development scenario took into consideration the Smart Growth Principles and encourages future development to take place near and within currently developed areas, as well as available and planned public infrastructure including water, roads, and sewer. This in turn, will protect and preserve the vast natural areas found within Muskegon County. Twenty-four of the 28 local units of government in Muskegon County passed a resolution endorsing the Muskegon Area-wide Plan, the Smart Growth Development Scenario, and the Smart Growth Principles. In addition, each community through the passage of the resolution made a commitment to refer to the MAP document and its findings when making local land use decisions. This is most important since the State of Michigan is a home rule state and all land use decisions and authority are made by the individual local units of government including townships, cities, and villages.



During the development of the Muskegon Area-wide Plan, the MAP Steering Committee conducted a Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis exercise to assess the existing and future conditions of Muskegon County. A SWOT Analysis is a highly effective way to identify a community's existing conditions/attitudes and possible future direction, as well as, assist a community to focus on the areas where it is strong and where it's

greatest opportunities lie. It is important to note that the four (4) top rated issues under the Strengths category all pertained to Muskegon County’s natural resources. They include the following: Abundant Natural Resources, Recreational Opportunities, Waterfront/Recreation, and Lakefronts (inland also).

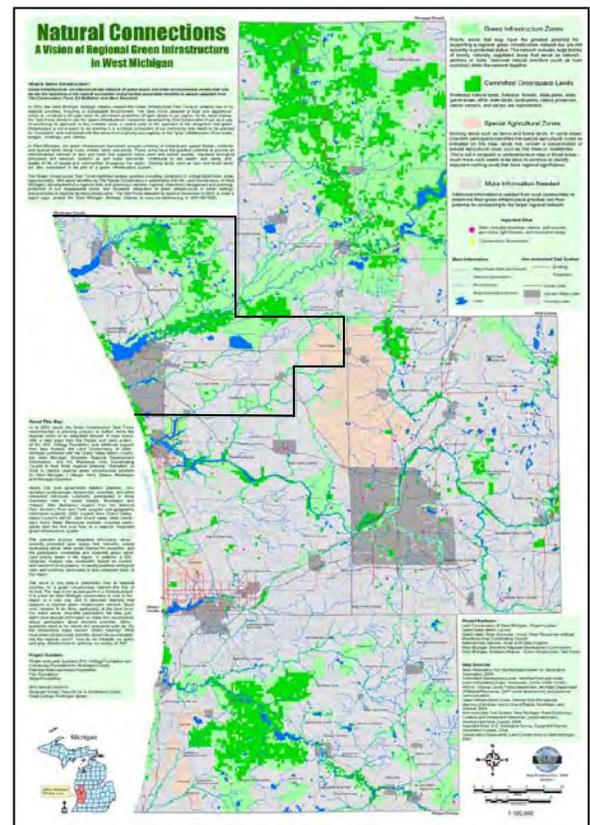
A Regional Vision of Green Infrastructure:

Community leaders in Muskegon County have also participated in the development of the “Natural Connections, a Vision of Green Infrastructure in West Michigan” spearheaded by the West Michigan Strategic Alliance in 2004.

These county-wide and regional planning efforts have inspired local communities throughout West Michigan to invest in the acquisition and development of parks and trails, development of farmland preservation programs, restoration of natural resources, and the protection of forest and open space along the Lake Michigan shoreline. Communities have also approved bond referendums and invested in roads, sewers and other public works or "gray infrastructure” projects that preserve and protect the area’s natural resources.

Green Infrastructure Planning:

Similar to gray infrastructure, green infrastructure should be strategically planned and managed. The foundation of green infrastructure is natural elements such as woodlands, wetlands, rivers, and grasslands. These natural elements work together as a whole to sustain ecological values and functions. Healthy functioning natural or restored ecological systems are essential to ensure the availability of ecological services. Ecological services are further explained later in this chapter.



In addition to the core natural elements that provide ecological services, trails; greenways; other recreational features; cultural and historic sites; and working lands can be developed to create a green infrastructure network for improved community health and quality of life.

Although green infrastructure planning often begins at a regional scale, it becomes increasingly local as land use decisions are made, critical elements are identified, and when implementation projects are being designed. For example, low-impact development practices, and restoration projects are often planned and designed at the parcel scale.

The Muskegon County Green Infrastructure Inventory is another more localized step in the process of planning for green infrastructure. The document is centered around an inventory of

publicly protected natural areas, parks, existing research, and best professional judgment regarding privately owned lands, water quality, and wildlife needs. The purpose of this inventory is to inform and enable communities to develop connections, or “linkages,” that will maximize ecological services of the land such as recreation, wildlife habitat, water quality, and preservation of historic features and working lands such as farms and wood lots.

Muskegon County Green Infrastructure Chapter Topics:

Listed below are many of the topics addressed in this report. Each is described as it relates to the planning and management of green infrastructure and their potential ecological benefits.

Groundwater and Drinking Water:

- Groundwater resources can provide safe drinking water supplies. With careful, land use planning and practices, local officials can help to ensure that this ecological service continues to be available as an important drinking water resource for Muskegon County residents. In addition to appropriate land use, planning should include the remediation of brownfields and other sites of soil and groundwater contamination.

Wetlands:

- Wetlands can provide flood control, fish and wildlife habitat, healthy surface water and recreational opportunities. As part of a regional water quality research project, Grand Valley State University Annis Water Resources Institute (AWRI) analyzed Muskegon County wetlands for their importance in providing these benefits. This information is a resource for local planners, conservation agencies and watershed organizations that plan projects which rely on wetland conservation in order to maximize these benefits.

Forests:

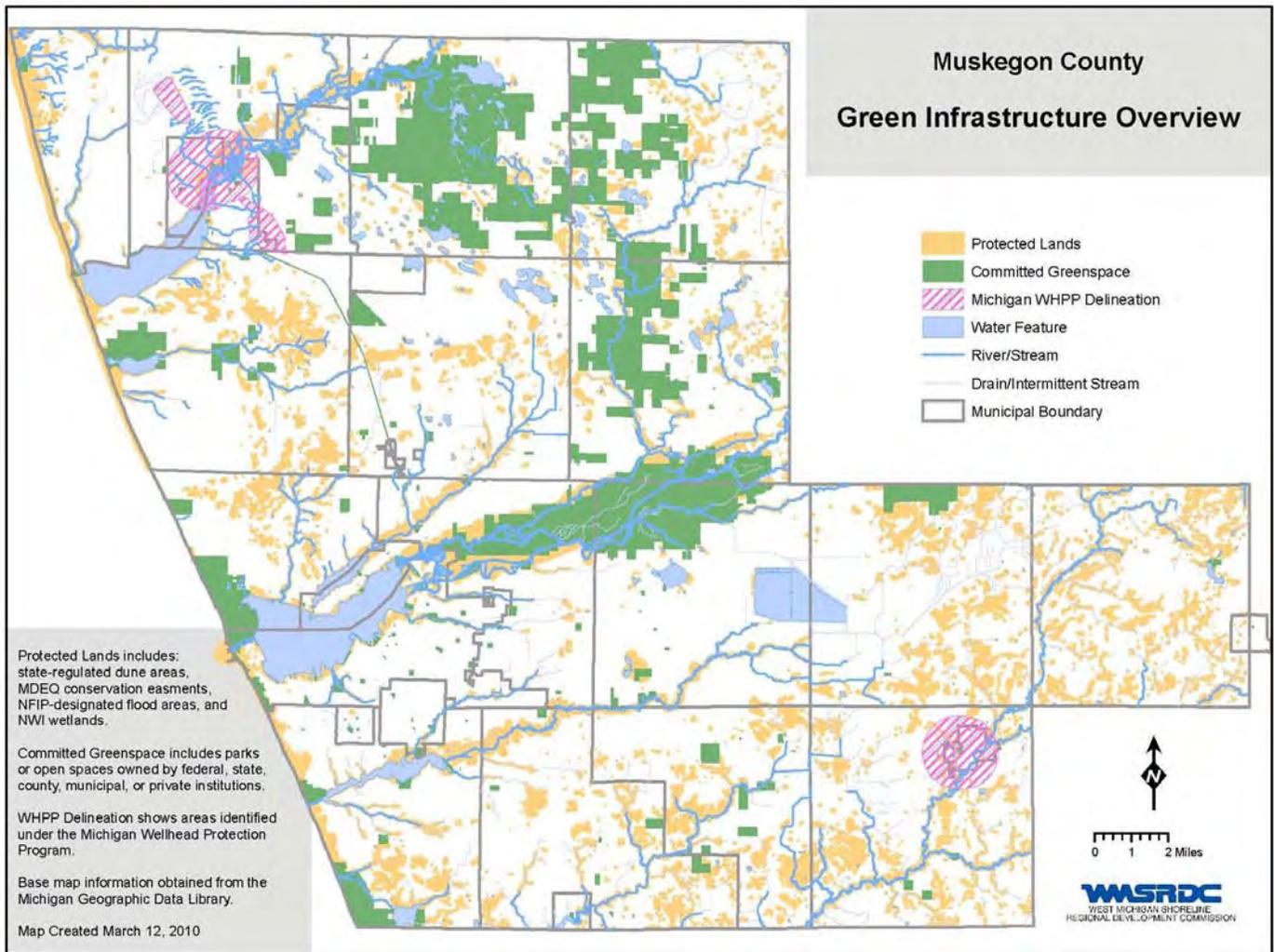
- Forests provide opportunities for scenic views, hunting, wildlife habitat, tourism, cooler temperatures and improved air quality. To illustrate the benefits of forest cover in urban areas, the Urban Forest Ecological Services Assessment, City of Muskegon, 2008 (GVSU Annis Water Resources Institute) presents benefits for air quality, water quality and the economic benefits to the city and residents. An important resources for both urban and rural forest management planning, is the Muskegon Conservation District (MCD). MCD manages hundreds of acres of forest lands throughout Muskegon County, and partners with local governments to utilize them in a way that benefits communities, ecology and the economy. MCD also coordinates a sand dune restoration initiative, based on a survey of the county’s critical dunes. Hundreds of acres are in need of restoration, ranging from erosion control and exotic species eradication to endangered species plant protection and habitat diversity enhancement.

Surface Water:

- Surface water resources provide drinking water, fish and wildlife habitat, recreation, scenic views, tourism and many quality of life benefits. The quality of lakes, rivers and streams depends on sound land use planning and the proper management of green infrastructure, such as forests, wetlands, and soils.

Farm Land:

- The Muskegon County Farm Land and Open Space Preservation Program and Ordinance was adopted by the Muskegon County Commissioners in 2006. Since that time, the local foods, community gardens and organic food grower movements have also become a stronger voice for sustainable farming in Muskegon County. Sustainable food production is dependent on the availability of green infrastructure, and sustainable farm practices respect the soil, water, air and the economy of local communities.



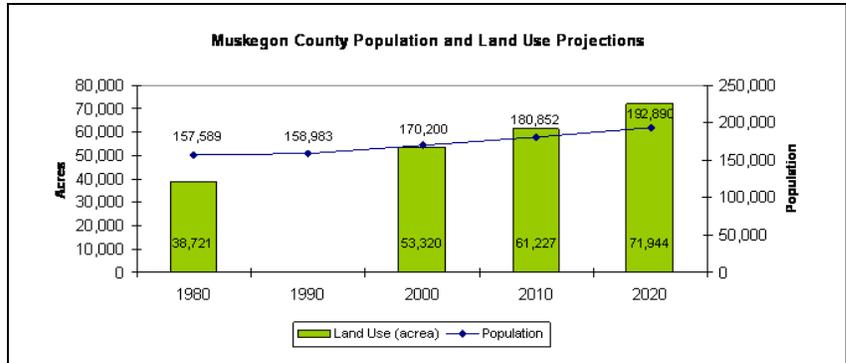
Mapping Green Infrastructure:

Mapping is an important part of green infrastructure planning, and a critical component of this inventory. It helps decision makers to visualize geographic features across a landscape, and enhances communication of the existence or lack of features within a spatial context. For example, maps from different time periods can be compared, allowing decision makers to identify temporal trends and assist them in planning for the future. Maps are also important tools for decision makers to communicate the importance of an issue, and to build consensus and support for an initiative.

Maps included within this inventory are intended to help communities and decision makers identify existing green infrastructure features and begin planning for and implementing linkages. An index of maps can be found in the Table of Contents.

Ecological Services:

The term **Ecological Services** is used to describe the benefits that natural systems provide in order to help maintain an excellent quality of life for residents; an attractive place for tourism; and economic savings for local governments, businesses, and individuals. However, the landscape of Muskegon County has changed significantly over the past several years, and based on findings of the Muskegon Area-wide Plan (MAP), the landscape will continue to change with a strong potential to cause negative effects on these valuable functioning ecosystems. Land that was once available for ecological services in Muskegon County is predicted to transform into new uses as the county grows and develops. Therefore, it is important to identify significant service areas and develop ways to protect, maintain, or restore them.



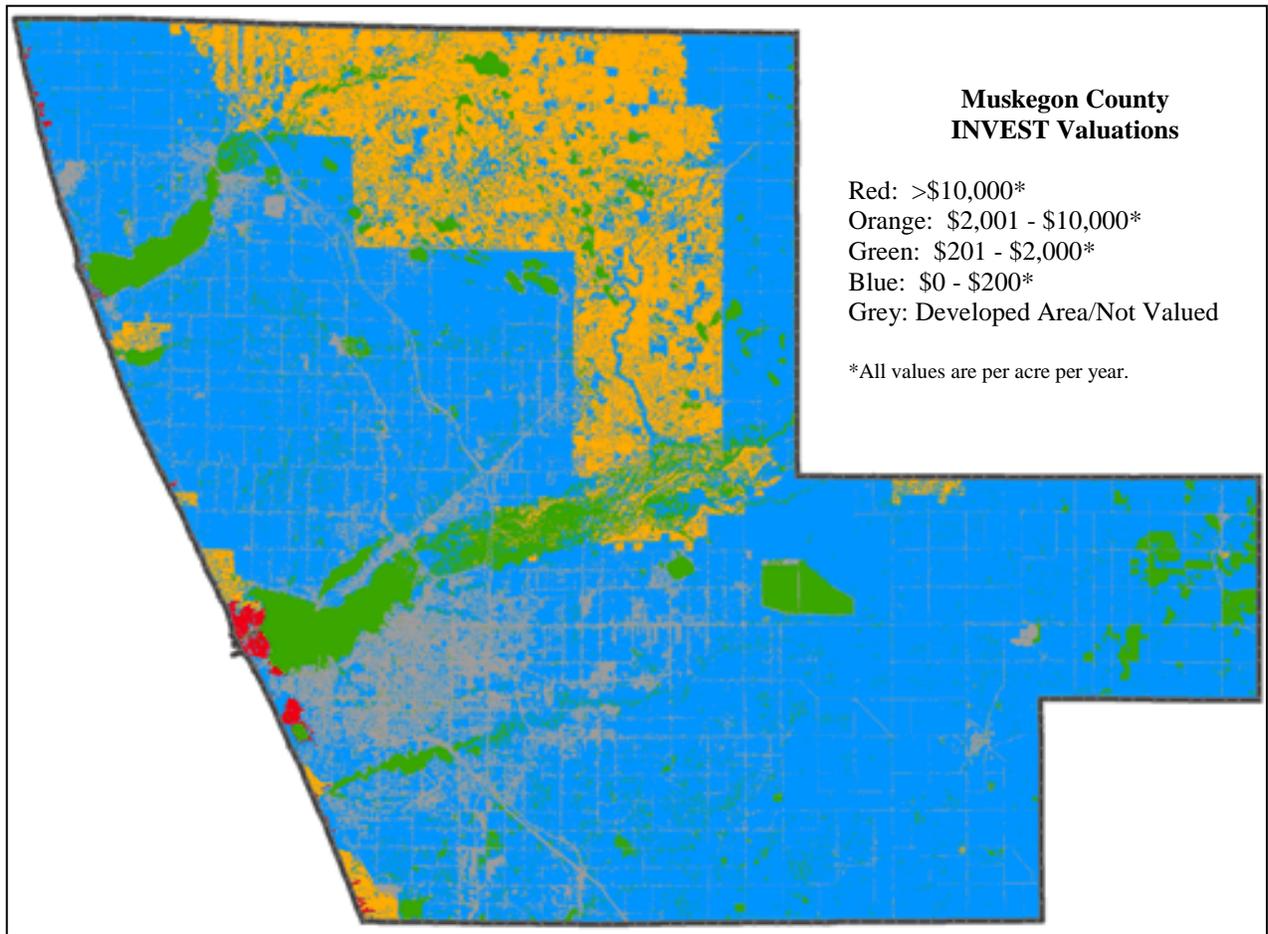
Benefits of Green Infrastructure and Ecological Services:

In Muskegon County, opportunities exist to offer ecological services in urban, suburban, and rural areas. Communities are planning for the protection of critical biodiverse areas; redevelopment and cleanup of brownfields; development of trails and greenways; and projects that incorporate low-impact development practices. This localized planning for green infrastructure and ecological services in Muskegon County can result in numerous benefits.

Communities benefit from, and often take for granted, the free services provided by vegetation, soils, and diverse landscapes. This inventory presents information that must be considered when planning for green infrastructure on rural and urban lands. It will help us to understand how the Muskegon County landscape can function to provide communities with services that, otherwise, would be more costly to provide.

Integrated Valuation of Ecosystem Services Tool (INVEST):

INVEST is a tool developed by Grand Valley State University to quantify the value of ecological services in a community. According to the tool, preliminary value estimates for ecosystem services in Muskegon County (per acre per year) are approximately \$253.2 million per year. The map on the following page reveals the annual values of land in Muskegon County per acre. More information about INVEST is available at the website: <http://invest.wri.gvsu.edu/index.html>.



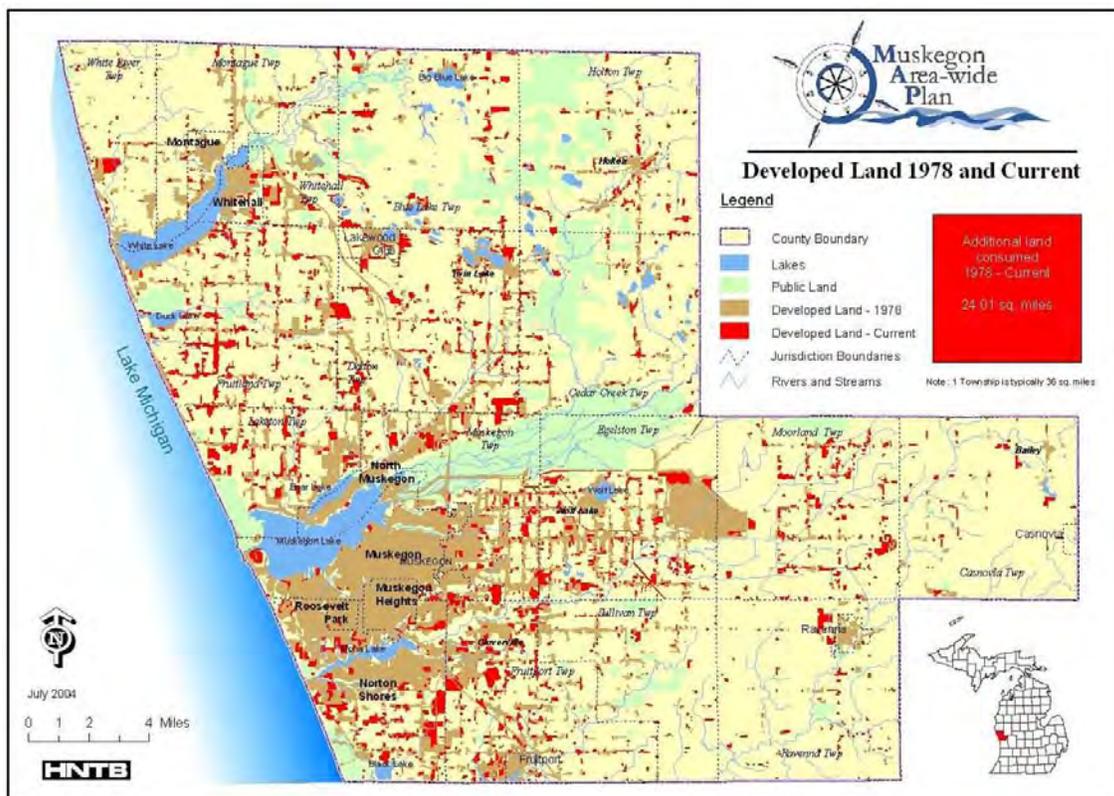
Chapter 2: Land Cover and Soils

Muskegon County is home to a variety of soil types, topographical features, and land covers. The availability and integrity of these features dictate the fundamental ability of the landscape to provide communities with ecological services. Understanding the functions of vegetation, land cover, and soil types helps decision makers to make informed decisions that can sustain the landscape's ability to function in ways that provide cost-saving benefits.

The protection or degradation of natural resources can be tied directly to the way a region grows. The amount and type of open space that is developed by a growing population can ultimately determine the quality of lakes, wetlands, forests and other sensitive natural resources. In turn, the quality of natural resources affects how the interrelated landscape functions, and ultimately what level of ecological services it is able to provide to communities.

Land Cover:

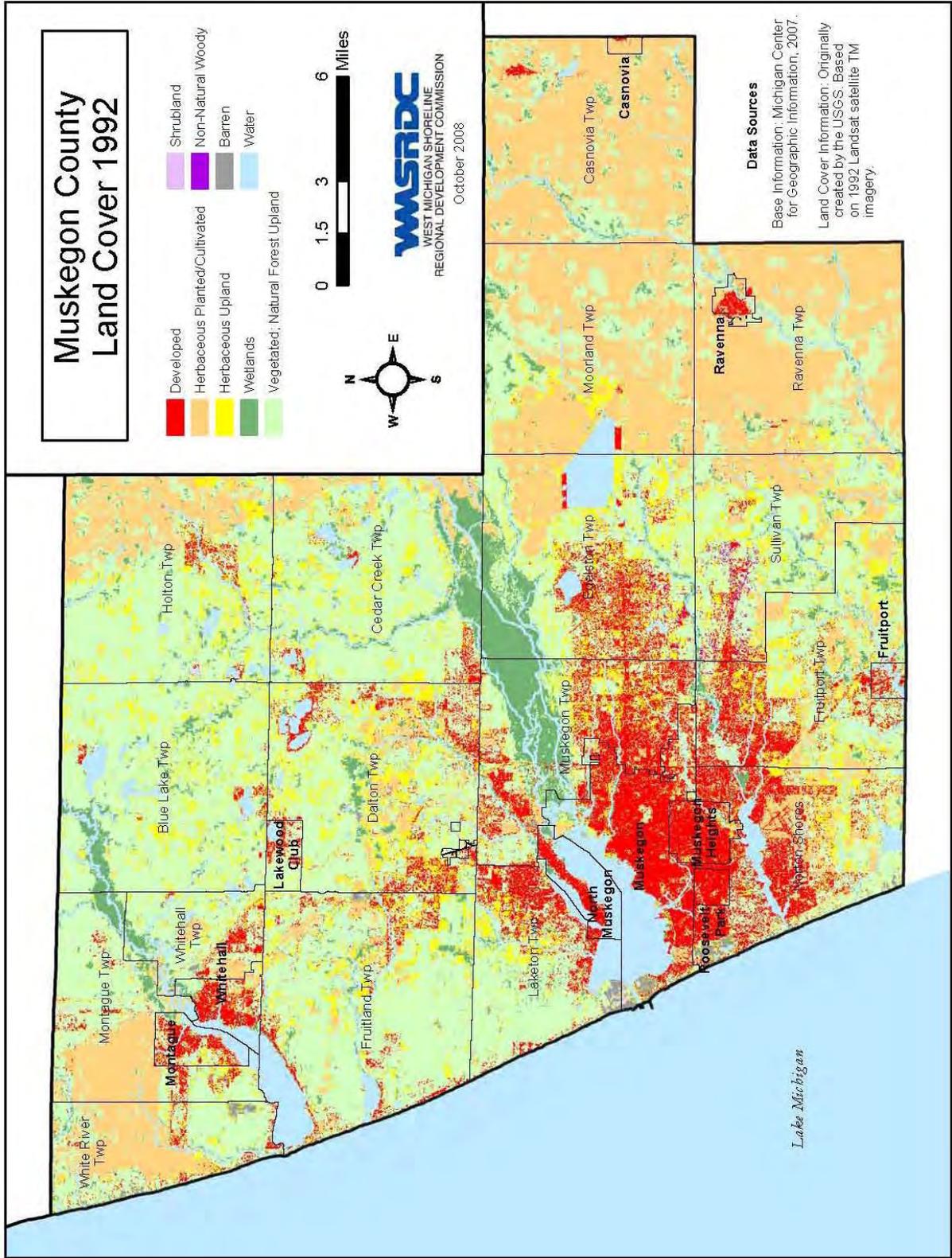
The Muskegon County landscape varies greatly depending on the location. It ranges from highly urbanized, to rural, to natural areas such as shorelines, wetlands, and forests. There are twenty-seven jurisdictions in the county, all of which have planning and zoning authority. The county has a land area of 509 square miles, or 325,760 acres. As of the 2000 US Census, the population density was 334 people per square mile. According to the Muskegon Area-wide Plan, the developed area of the county increased by 24 square miles, or 4.7 percent, between 1978 and 1998. While much of the new development occurred in the areas adjacent to existing urban areas, there was also significant new development that was decentralized in nature.



Land cover of Muskegon County is illustrated in Table #1 as well as the following map. This information, which was compiled by the USGS, is a part of the National Land Cover Dataset and was based on satellite imagery taken in 1992. Although this information is nearly 20 years old, it paints an accurate picture of the distribution of development, natural vegetation, and agriculture found within Muskegon County.

Muskegon County Land Cover in Acres				
<i>land cover categories</i>	<i>%</i>	<i>land cover subcategories</i>	<i>countywide acreage</i>	<i>%</i>
Water	3.90%	open water	13,147.54	3.90%
Developed	9.51%	low intensity residential	22,981.84	6.81%
		high intensity residential	4,570.66	1.36%
		commerce/industry/transport	4,531.52	1.34%
Barren	0.53%	bare rock/sand/clay	1,357.28	0.40%
		quarries/strip mines/gravel pits	415.43	0.12%
Vegetated; Natural Forest Upland	46.12%	deciduous forest	84,597.22	25.08%
		evergreen forest	37,907.87	11.24%
		mixed forest	33,067.22	9.80%
Shrubland	0.06%	Shrubland	186.37	0.06%
Non-natural Woody	0.13%	orchards/vineyards/other	433.67	0.13%
Herbaceous Upland	7.99%	grasslands/herbaceous	26940.47	7.99%
Herbaceous Planted/ Cultivated	24.70%	pasture/hay	35,479.54	10.52%
		row crops	42,494.32	12.60%
		small grains	1,428.22	0.42%
		urban/recreational grasses	3,929.05	1.16%
Wetland	7.07%	woody wetlands	18,427.19	5.46%
		emergent herbaceous wetlands	5,420.21	1.61%

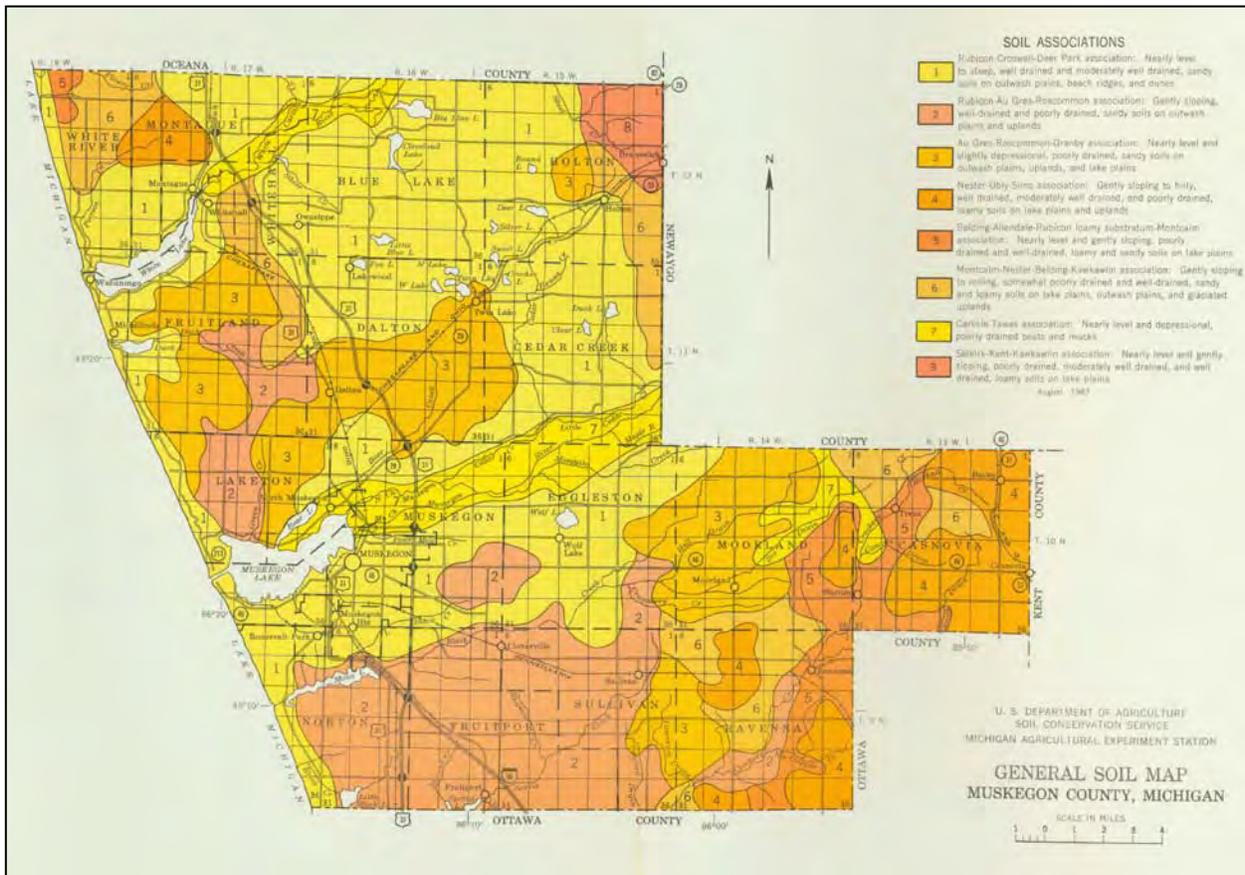
Estimates based on USGS National Land Cover Dataset, 1992.



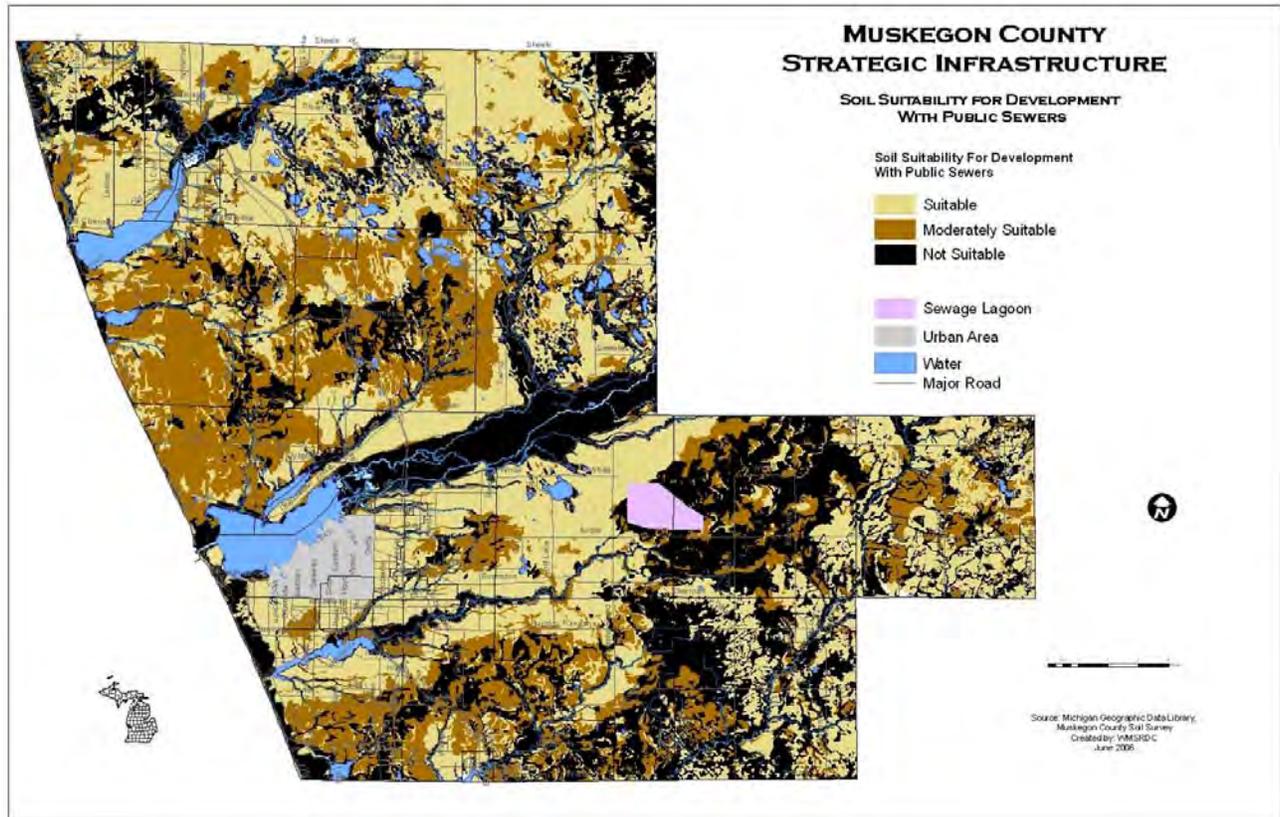
Soils:

Soil information is a valuable resource for decision makers in a community. It is helpful in and locating soils that are suitable for various kinds of development, agriculture, or vegetation. With respect to green infrastructure planning, soils play an important role in promoting rainwater percolation, evapotranspiration, and filtration. Soils also help determine the suitability of various types of vegetation at a given site. This is important to consider when efforts are made to preserve or restore natural landscape features.

Soil information for Muskegon County is readily available in the Soil Survey of Muskegon County, which was published by the US Department of Agriculture, Soil Conservation Service in 1968. The general soils map, shown below, reveals the soil associations in Muskegon County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern or proportion.

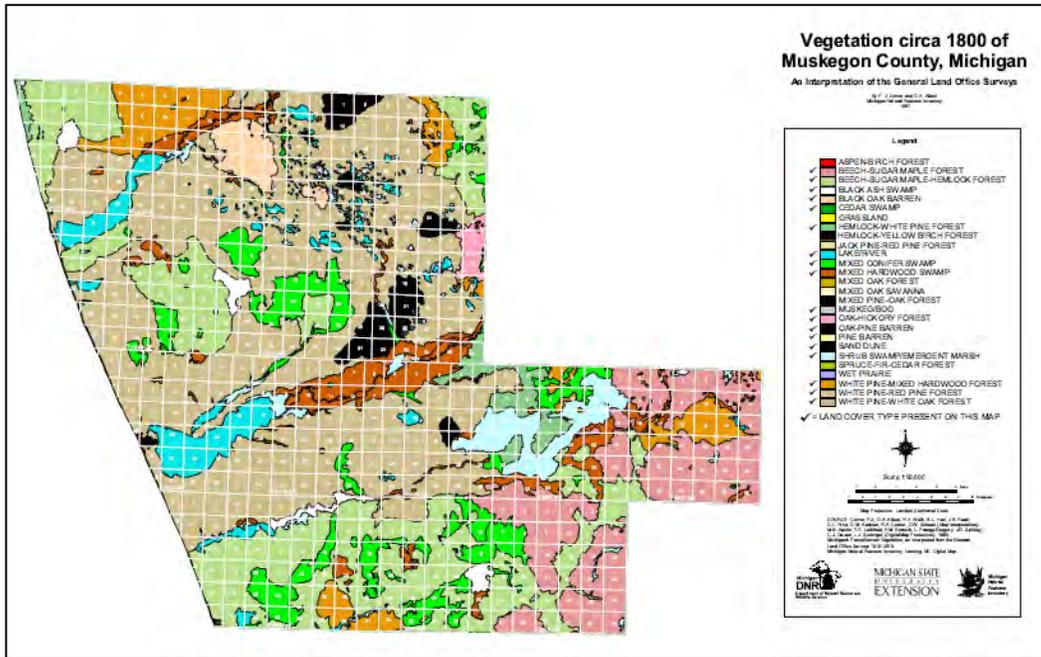


A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect management.



In addition to soil associations, the Muskegon County Soil Survey also illustrates the soil types within the associations as well as their characteristics. The Muskegon County soil suitability map is an example of the soil information available within the Soil Survey. The map identifies suitability for development based on various soil types. The soils on the map are categorized into three groups including suitable, moderately suitable, and not suitable. This map should be considered when expanding infrastructure and new developments. Areas with soils moderately suitable or not suitable for wells or septic systems should be served with public water and/or sewer. This will assist in protecting the county's groundwater and public health.

Native plant communities and unique natural features, such as sand dunes and barrens are also important factors to consider when developing green infrastructure restoration and preservation projects. The pre-settlement vegetation map provides the types of plant communities that have evolved with native soils and other conditions. Choosing the appropriate plant types for green infrastructure restoration projects will reduce the need for long-term maintenance, and the dependence upon chemical fertilizers and pesticides.



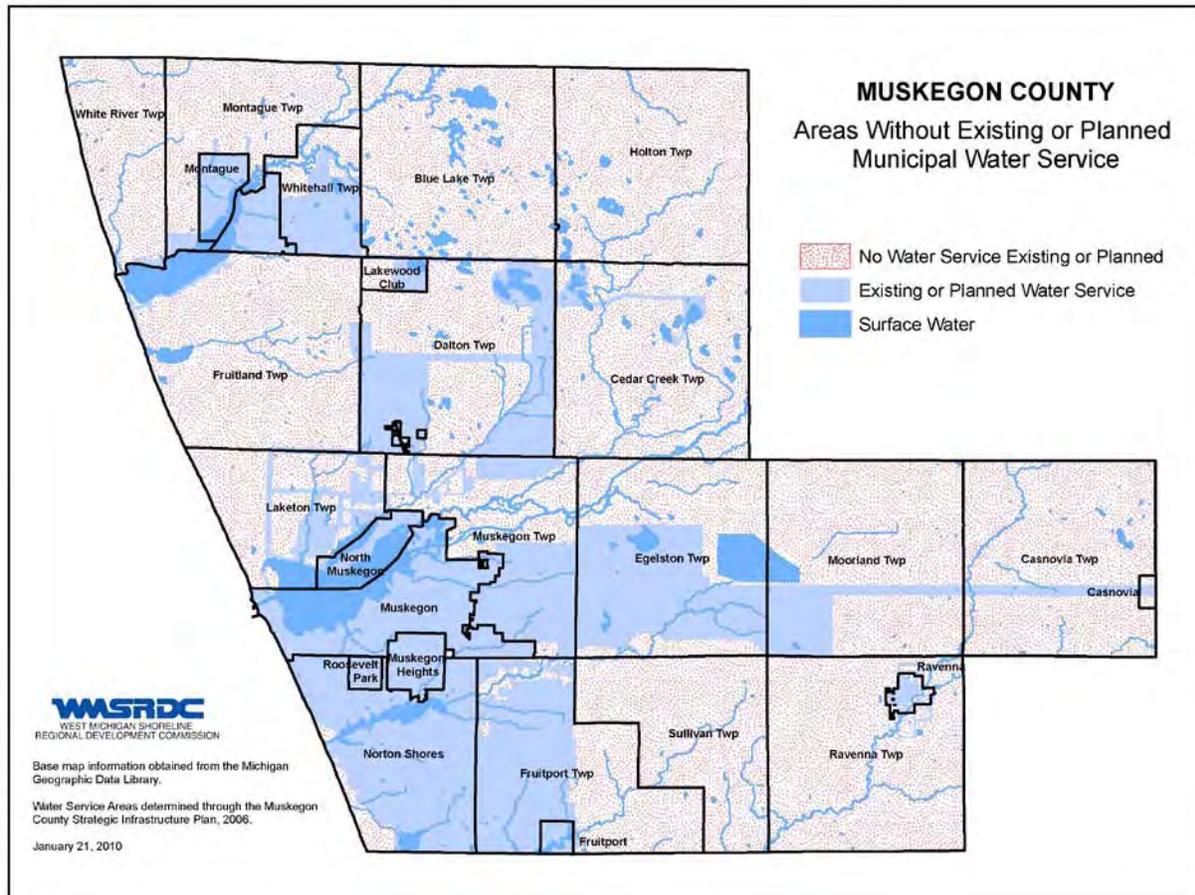
Chapter 3: Drinking Water

It is important to acknowledge that the quality and quantity of drinking water resources in a community are directly linked to land use decisions, and that the incorporation of green infrastructure planning with traditional land use planning can have a significant impact on water quality in a community.

This chapter reviews groundwater and municipal water sources of drinking water in Muskegon County, as well as some of the existing threats to the public water supply such as brownfields, wastewater, and existing or abandoned oil and gas wells.

Muskegon County enjoys access to significant surface water sources and an abundant supply of groundwater. Its communities utilize either groundwater or surface water resources for drinking water, depending on the location. Groundwater aquifers are situated in unconsolidated glacial till consisting predominantly of loose sand, which makes them highly susceptible to contamination.

The following map provides a view of existing and planned municipal water service areas in Muskegon County. It highlights the fact that a majority of land in the county is not, or will not be, serviced by municipal water service, and therefore must rely on well water drawn directly from groundwater aquifers.



Municipal Surface Water Supply Systems:

The two municipal water systems in Muskegon County that utilize surface water are owned and operated by the City of Muskegon and the City of Muskegon Heights. Coincidentally, these are the two largest municipal water supply systems in the county. Both draw and filter water from Lake Michigan, and include distribution systems which pump, transmit, and store water. Although there is some variation in the size and number of individual treatment plant process units, the water source (Lake Michigan) and the treatment process (alum flocculation, settling, and rapid sand filtration) is identical in each plant.

Each treatment plant contains the following process units:

- Lake Michigan intake
- Shore well with low lift pumps
- Pretreatment comprised of chemical addition, rapid mixing, and flocculators in sedimentation basins and clarifiers
- Rapid sand filters
- Chemical storage and feeding facilities for chlorine, alum, fluoride, and activated carbon
- Treated water storage
- High service pumping
- Sludge lagoons

Each plant has multiple units to provide for reliability of operation. Neither plant has experienced a substantial failure that would result in a prolonged plant shut down. Additionally, both plants have undertaken extensive upgrades within the past ten years. They serve a combined total of 41,407 households in Muskegon County.

The Muskegon Heights Water Filtration Plant provides a municipal water supply to:

- 19,832 households in the cities of Muskegon Heights, Norton Shores, Village of Fruitport and Fruitport Township.

The City of Muskegon Water Filtration Plant provides a municipal water supply to:

- 21,575 households in the cities of Muskegon, Roosevelt Park, North Muskegon, Muskegon Township, and a portion of Muskegon County. It serves a population of 57,446 persons.

Groundwater Supply Systems:

About one-third of water users in Muskegon County depend on either private well or municipal well drinking water systems that utilize groundwater. The vast majority of these users are households. Three municipal systems in the county treat groundwater for public water supplies in the communities of Ravenna, Whitehall, and Montague. The Ravenna system serves households in the Village of Ravenna, and Ravenna Township. The Whitehall and Montague systems, under the White Lake Water Authority, serve households in the City of Whitehall, City of Montague, Whitehall Township, and Montague Township.

- Ravenna System: Serves 550 households, including commercial and industrial users.
- Whitehall System: Serves 1,078 households, with 341 commercial and industrial users, including 33 in the township.
- Montague System: Serves 1,076 households, including commercial and industrial users.

The Public Health Muskegon County oversees water well installation for both drinking water and irrigation purposes, and should be the primary contact for information regarding water wells in Muskegon County. Its Onsite Drinking Water Program is administered with the goals of protecting the groundwater from contamination by improperly constructed or poorly maintained drinking water wells; and protecting the public from contaminated drinking water.

Subdivision Well and Septic Requirements for Groundwater Protection:

In Muskegon County, there are 179 subdivision developments that maintain agreements that outline septic and well restrictions for residents, so they can protect their groundwater wells for safe drinking water supplies.

The Public Health Muskegon County maintains records of the deed restrictions and guidelines for each development site. Homeowners are responsible for meeting these requirements to ensure the safety of their drinking water.

Private well owners must take responsibility to ensure the safety of groundwater. Public Health Muskegon County has water testing available for individuals who would like to know the quality of their groundwater/drinking water supply. For more information, contact Public Health Muskegon County. Ask for the Environmental Health Division.

Protection of Drinking Water Resources:

The Michigan Department of Natural Resources and Environment is a valuable resource for information regarding the protection of drinking water resources. The DNRE has primary enforcement authority in Michigan for the Federal Safe Drinking Water Act under the legislative authority of the Michigan Safe Drinking Water Act. As such, the division has regulatory oversight for all public water supplies, including approximately 1,500 community water supplies and 11,000 non-community water supplies. In addition the program regulates drinking water well drilling. The DNRE also investigates drinking water well contamination, and oversees remedial activities at sites of groundwater contamination affecting drinking water wells.

Michigan Wellhead Protection Program:

This program equips municipalities with groundwater-supplied drinking water systems with activities and management practices for protecting public groundwater supply systems from contamination. Involvement in the WHPP minimizes the potential for contamination by identifying and protecting the area that contributes water to municipal water supply wells and

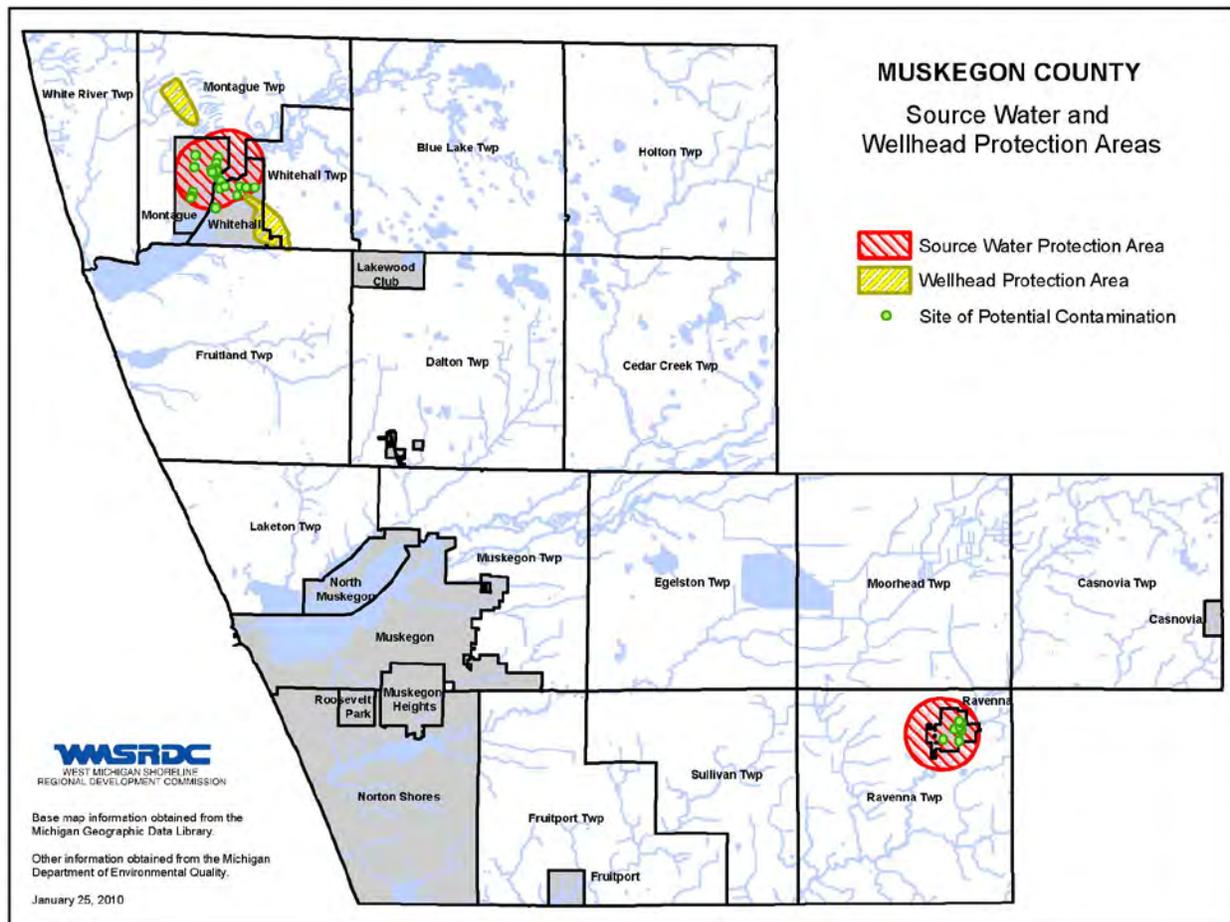
avoids costly groundwater clean-ups. The program has been approved by the US Environmental Protection Agency.

Communities with a WHPP receive a higher level of environmental review in the state permitting process. In addition, permitting for underground and aboveground storage tanks, spillage of polluting materials, and discharging to groundwater include more stringent requirements within Wellhead Protection Areas (WHPAs). A WHPA is the surface area that overlies the aquifer that is directly contributing water to a well. As a result, communities that have designated WHPAs are able to better safeguard their groundwater from contamination.

A WHPA is the surface area that overlies the aquifer that is directly contributing to a water well.

In addition to the WHPP, the State of Michigan is developing guidance for communities for development of a Surface Water Intake Protection Program (SWIPP). This will be a program based on the same logic, only applies to surface water sources of municipal drinking water.

Funding for WHPP activities is available through a state grant program and is designed to assist communities in the development and implementation of WHPP's. For more information regarding Michigan's Wellhead Protection Program, visit the website at http://www.michigan.gov/deq/0,1607,7-135-3313_3675_3695---,00.html.



The map above illustrates the areas in Muskegon County that have participated in Michigan's WHPP. These communities include the cities of Montague and Whitehall, the Village of Ravenna, and the townships of Montague, Ravenna, and Whitehall. The map also identifies potential sites of contamination located within the delineated protection areas. The sites are based on Michigan DEQ databases of Part 201, environmental remediation; Part 211, underground storage tanks; and Part 213, leaking underground storage tanks.

Community Water Supply Program:

The State of Michigan also administers the Community Water Supply Program, which oversees the primary EPA program that sets forth minimum standards for safe drinking water, as well as administering the requirements of Michigan's Safe Drinking Water Act. The program's primary function is regulatory oversight of approximately 1,450 community public water supplies in Michigan.

A Non-community Water Supply (otherwise known as a "Type II") is a water system that provides water for drinking or household purposes to 25 or more persons at least 60 days per year or has 15 or more service connections. A few examples are schools, restaurants, churches, campgrounds, industries and highway rest stops with their own water supply. In contrast, a Community Water Supply (or Type I) is a water system that provides year-round service to at least 15 living units or 25 residents. Examples include cities, villages, apartment complexes and mobile home parks.

Public Water Supply Classifications		
<i>Classification</i>	<i>Description</i>	<i>Examples</i>
Type I Community Public Water Supply	Provides year-round service to not less than 25 residents OR not less than 15 living units	Municipalities, Apartments, Nursing Homes, Mobile Home Parks
Type II Nontransient Noncommunity Public Water Supply	Serves not less than 25 of the SAME people for at least six months per year	Schools, Industries, Places of Employment
Type II Transient Noncommunity Public Water Supply	Serves not less than 25 people OR not less than 15 connections for at least 60 days per year	Hotels and Restaurants (with less than 25 employees), Campgrounds
Type III Public Water Supply	Anything not considered a Type I or Type II water supply; serves less than 25 people AND 15 connections, OR operates for less than 60 days per year	Small Apartment Complexes and Condominiums, Duplexes, all Others
Private Water Supply	Serves a single living unit	Single Family Home

Threats to Groundwater / Private Drinking Water Supplies:

The number one threat to groundwater drinking water supplies is nitrates originating from fertilizer and on-site sewage systems. As previously mentioned, groundwater aquifers in Muskegon County are situated in unconsolidated glacial till consisting predominantly of loose sand, and are therefore highly susceptible to contamination.

Many of the historic sites of soil and groundwater contamination within Muskegon County have undergone extensive investigation and cleanup. However, many sites remain a threat to the quality of groundwater. This condition requires that communities be aware of potential threats,

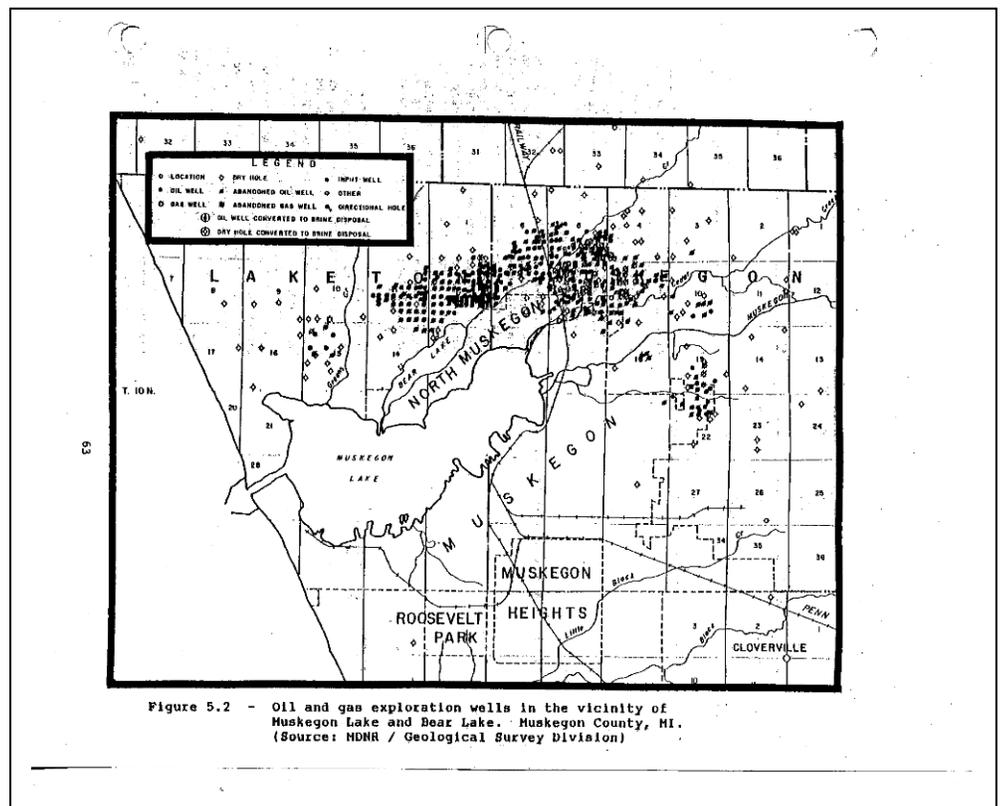
and that green infrastructure planning take into account the need for remedial actions and site designs that eliminate the risk of exacerbating exposure to pollution. Planning for green infrastructure requires a proactive approach rather than a reactive one. Steps taken to prevent damage to groundwater supplies can greatly outweigh costs needed to compensate for poor planning.

The concerns that environmental contamination present for green infrastructure planning are not insurmountable. Communities are encouraged to be aware of threatening conditions, and to keep informed about administrative and regulatory changes that may affect the progress of existing cleanup projects. The following paragraphs provide a general overview of the scope of this concern stemming from the presence of abandoned oil and gas wells, Part 201 sites, Superfund sites, and other identified brownfield sites in Muskegon County.

Abandoned Oil & Gas Exploration Wells:

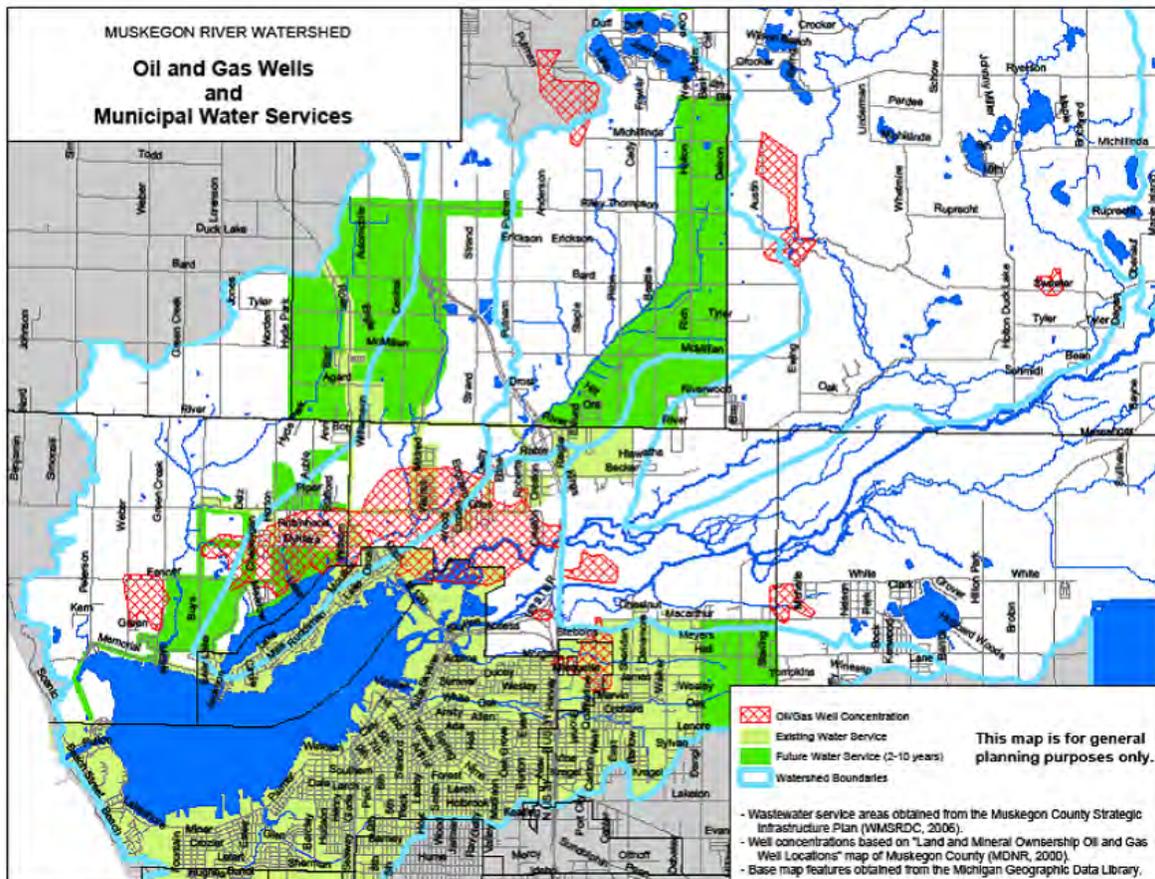
Approximately 300 oil and gas exploration wells were drilled within the watershed of the Muskegon Lake Area of Concern (AOC) between 1928 and 1970. Exploration and extraction continues, with the most recent gas well permits issued in 2009. In general, wells plugged prior to the 1970's were done so improperly. This accounts for the majority of the wells in the watershed. As the rural area underwent residential development and commercial development, wells were plugged on a case-by-case basis. According to the 1987 Muskegon Lake Remedial Action Plan (RAP), the Michigan Department of Natural Resources recommended fourteen priority oil wells for plugging (M. Cote, 1983, District 12 Geologist). In 1987, Muskegon Lake was designated an AOC, and the abandoned oil wells were listed as a major source of pollution (Muskegon Lake Remedial Action Plan (RAP), Michigan Department of Natural Resources, 1987).

Public Health
Muskegon County
completes permit
reviews for the drilling
of drinking water wells
at the time of
construction. The
review includes visual
survey for evidence of
exact well location,
strict construction,
pump test and sampling
requirements. However,



in the past 15 years, well drillers have encountered crude in the upper aquifer 3 times while installing the water well. On one occasion, the well water contained dissolved oil byproduct detected in the sample. Despite attempts to ensure safe drinking water, experience has shown that the oil, brine and related pollutants often are pulled into the water intake only after prolonged use of the water supply. In addition, there is evidence the natural release of gasses deep within the oil bearing strata is re-pressurizing the oil and gas bearing layers, and pushing oil, gas, and brine up the improperly plugged casings into upper water bearing zones. Therefore, there is no way to determine if or when oil field byproducts may contaminate the upper drinking water aquifer. Thus, the abandoned oil field continues to threaten drinking water.

The Oil and Gas Wells and Municipal Water Services map, shown below, indicates where the significant concentrations of improperly plugged oil wells exist in relation to areas currently served by public water supply, areas where public water supply is planned, and areas where no public water supply is planned.



State Information on Contaminated Sites:

The Michigan Department of Natural Resources and Environment (DNRE) administers programs that involve the cleanup and redevelopment of contaminated properties to achieve a healthier, cleaner, and more productive environment for Michigan's citizens. The primary legislative authority for the state cleanup program is Part 201, Environmental Remediation, and Part 213,

Leaking Underground Storage Tanks, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. The state program has a unique, causation-based liability scheme, land use based cleanup requirements, and a strong emphasis on redevelopment and reuse of contaminated property. Resources are available on the DNRE Remediation and Redevelopment Division website that explain the options available to a person who is cleaning up contaminated property, the obligations of liable parties, and the responsibilities of parties who own contaminated property (known as "Due Care"). Technical information about aspects of the program such as cleanup criteria and laboratory analytical methods are also covered. For more information, utilize the contact information provided below.

MDEQ, Remediation and Redevelopment Division
P.O. Box 30426, Lansing, MI 48909-7926
517-373-9837
http://www.michigan.gov/deq/0,1607,7-135-3306_28608---,00.html

The DNRE publishes several databases regarding contaminated properties on the internet, including Part 201, sites of contamination; Part 213, leaking underground storage tanks; and Brownfield-USTfields. Each of the databases is described below.

Part 201 (Environmental Remediation) of the Natural Resources and Environmental Protection Act (NREPA) regulates sites of environmental contamination (or facilities) in Michigan. The Part 201 database includes properties which are regulated; including liable party cleanup sites, sites assessed to require no further remediation, and those sites addressed by the state. The identified sites have undergone environmental risk assessments, to rank them according to the risk each poses to human health and the environment, and been scored. This database lists 109 Part 201 sites in Muskegon County, and can be accessed through the following website: <http://www.deq.state.mi.us/part201/>.

Part 213 of the NREPA regulates Leaking Underground Storage Tanks (LUSTs) and the inventory includes both those sites where corrective actions have not been completed to meet the appropriate land use criteria (OPEN LUSTs) and those where corrective actions have been completed (CLOSED LUSTs). Usually petroleum products are involved but there are other regulated substances, additionally covered by Part 213, which could be leaking. This database lists 141 Part 213 sites in Muskegon County, and can be accessed through the following website: http://www.deq.state.mi.us/sid-web/LUST_Search.aspx.

The Brownfield-USTfield database contains property information about state funded cleanup and redevelopment sites, from the Part 201 list, as well as LUST sites which have had a Baseline Environmental Assessment (BEA) submitted to MDEQ for redevelopment purposes. The definition of a USTfield is very similar to the definition of brownfield: abandoned or under-used industrial and commercial properties where revitalization is complicated by real or perceived environmental contamination from underground storage tanks. This database lists 51 sites in Muskegon County, and can be accessed through the following website: <http://www.deq.state.mi.us/ustfields/>.

Federal Information on Contaminated Sites:

The U.S. Environmental Protection Agency (EPA) also publishes on the Internet several databases identifying contaminated sites. They are related to the Superfund program, created by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 and amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986. The goal of CERCLA is to clean up the nation's uncontrolled hazardous waste sites which contain abandoned, accidentally spilled, or illegally dumped hazardous waste that pose a current or future threat to human health or the environment.

Sites become superfund sites through an evaluation process, including completion of Hazard Ranking System (HRS) evaluation, screening and public solicitation of comments about the proposed site, and nomination to the National Priorities List (NPL). Should a site be placed on the NPL, it is regarded as posing an immediate or significant public health threat to the local community. It is, therefore, eligible for extensive, long-term cleanup action under the Superfund program.

There are eight National Priority List (NPL) sites of environmental contamination in Muskegon County. The NPL sites, also known as Superfund sites are among the nation's top priorities for environmental cleanup. Detailed information about the status of each Superfund site can be found at the local data repository, normally located at the city or township hall in which the site is located. Fact sheets about the sites are available at <http://www.epa.gov/region5superfund/npl/michigan/index.html>. To ensure that the most current information is received, communities are encouraged to contact the site EPA Project Manager directly.

Listed below are the National Priority List Superfund sites in Muskegon County, their locations, and contact information for the EPA Remedial Project Manager in charge of the site.

- Bofors Nobel, Inc., Egelston Township
John Fagiolo
fagiolo.john@epa.gov
(312) 886-0800
- Ott/Story/Cordova Chemical Company, Dalton Township
John Fagiolo
fagiolo.john@epa.gov
(312) 886-0800
- Thermo-Chem, Inc., Egelston Township
John Fagiolo
fagiolo.john@epa.gov
(312) 886-0800
- Peerless Plating Company, Muskegon
Linda Martin
martin.lindab@epa.gov
(312) 886-3854

- SCA Independent Landfill, City of Muskegon Heights
Ronald Murawski
murawski.ronald@epa.gov
(312) 886-2940
- Duell and Gardner Landfill, Dalton Township
Pamela Molitor
molitor.pamela@epa.gov
(312) 886-3543
- Kaydon Corporation, City of Norton Shores
Sam Chummar
chummar.sam@epa.gov
(312) 886-1434
- Muskegon Chemical Company, City of Whitehall
Sheri Bianchin
bianchin.sheri@epa.gov
(312) 886-4745

According to available data, three of the eight sites in Muskegon County, remain a potential threat to private drinking water well supplies. They are Ott/Story/Cordova, Duell and Gardner Landfill, and Muskegon Chemical Company. The following groundwater and drinking water information was obtained from www.scorecard.org, a pollution information website.

Ott/Story/Cordova

Were drinking water wells shut down due to contamination?	Yes
Population served by the wells now shut down:	101 - 500
Are drinking water wells potentially threatened?	Yes
Population served by the threatened wells:	1 - 24
Aquifer discharges into:	Surface water
Population served by water wells in the aquifer:	1 - 24

Duell and Gardener Landfill

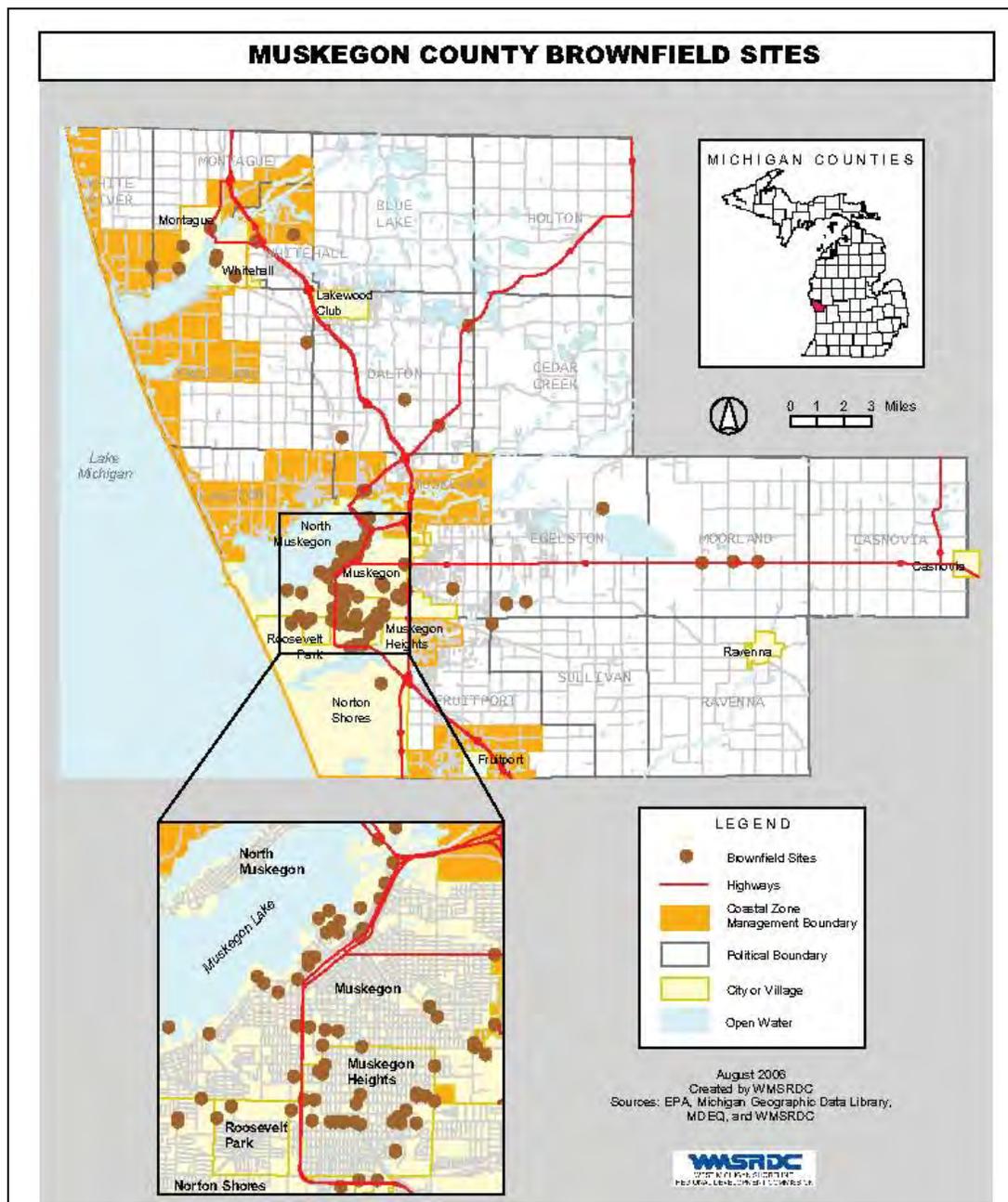
Were drinking water wells shut down due to contamination?	No
Are drinking water wells potentially threatened?	Yes
Population served by the threatened wells:	1 - 24
Aquifer discharges into:	Surface water
Population served by water wells in the aquifer:	101 - 500

Muskegon Chemical Company

Were drinking water wells shut down due to contamination?	No
Are drinking water wells potentially threatened?	Yes
Population served by the threatened wells:	25 - 100
Aquifer discharges into:	Surface water
Population served by water wells in the aquifer:	No data

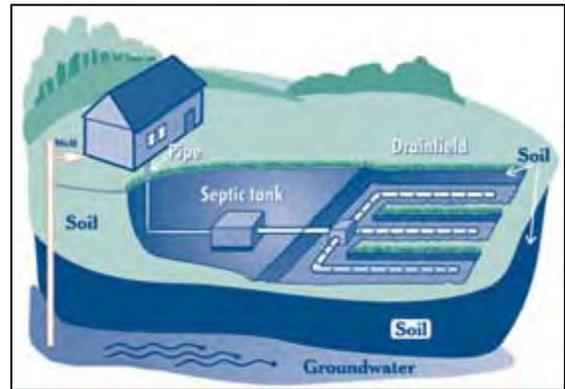
Muskegon County Brownfields:

The West Michigan Shoreline Brownfields Inventory and Plan for Implementation, authored by the WMSRDC in 2006, identified 103 brownfield sites in Muskegon County. Research for the document included the state and federal databases discussed in the preceding pages. The Muskegon County Brownfield Sites map, taken from the Brownfields plan, reveals a close correlation between urban areas and brownfield sites. Even though most of the county's brownfields are located within populated areas with public water service, there are some brownfields located in areas where private households rely on private water wells for drinking water. These areas should receive special attention in order to prevent contamination of groundwater resources.



Wastewater Treatment Systems:

On-site systems serve as the permanent wastewater infrastructure for a significant sector of Michigan's residents, and have been cited as significant contributors to contamination of groundwater and surface water. There are an estimated 1.4 million individual on-site wastewater systems serving homes and businesses in the state; with the total number of systems continuing to increase. Presently approximately 50% of new homes constructed utilize individual or small community systems.



The MDEQ regulation of on-site wastewater systems has been identified as a necessary critical component of effective land use. A secure long-term state funding mechanism for the conduct of DEQ on-site wastewater program activities does not exist. Historically the program has had general fund support, which has been eliminated. The Michigan Groundwater Discharge Program targets groundwater monitoring to specific sites with groundwater permits, to assess potential impacts on private wells from these sites. It regulates discharge to groundwater under Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act (NREPA), 1994 PA 451 and Part 22 Rules. Groundwater staff reviews applications for authorizations to discharge wastes and wastewaters to the ground or groundwaters of the state. Authorizations include permits, self-certifications, and exemptions.

Some of the duties performed by groundwater staff include:

- Review of effluent and groundwater sampling data;
- Inspection of discharge facilities to ensure legal requirements are being met;
- Review and issuance of permits for the construction of public sewerage systems, under Part 41 of the NREPA;
- Review of compliance with hazardous material storage requirements under the Part 5 Rules, under Part 31 of the NREPA.

Upon completion of an application review, staff makes recommendations leading to the determination of appropriate action including issuance or denial of an authorization to discharge. It should be noted that the issuance of a Groundwater Discharge permit does not authorize violation of any federal, state or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any other DEQ permits, or approvals from other units of government as may be required by law.

Chapter 4: Wetlands

The Michigan Department of Environmental Quality (MDEQ) defines a wetland according to Michigan's wetland statute, Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451 (NREPA, as amended, as "land characterized by the presence of water at a frequency and duration sufficient to support, and that under normal circumstances does support, wetland vegetation or aquatic life, and is commonly referred to as a bog, swamp, or marsh." The definition applies to public and private lands regardless of zoning or ownership.

A wetland is...

"land characterized by the presence of water at a frequency and duration sufficient to support, and that under normal circumstances does support, wetland vegetation or aquatic life, and is commonly referred to as a bog, swamp, or marsh."

-MDEQ

Most people are familiar with the cattail or lily pad wetland found in areas with standing water, but wetlands can also be grassy meadows, shrubby fields, or mature forests. Many wetland areas have only a high ground water table and standing water may not be visible. Types of wetlands include deciduous swamps, wet meadows, emergent marshes, conifer swamps, wet prairies, shrub-scrub, swamps, fens, and bogs. The State of Michigan wetland website offers more information at (<http://www.michigan.gov/deqwetlands>).

According to the NREPA Part 303, Wetlands Protection, a person may not do any of the following activities in a wetland without a permit from the DEQ:

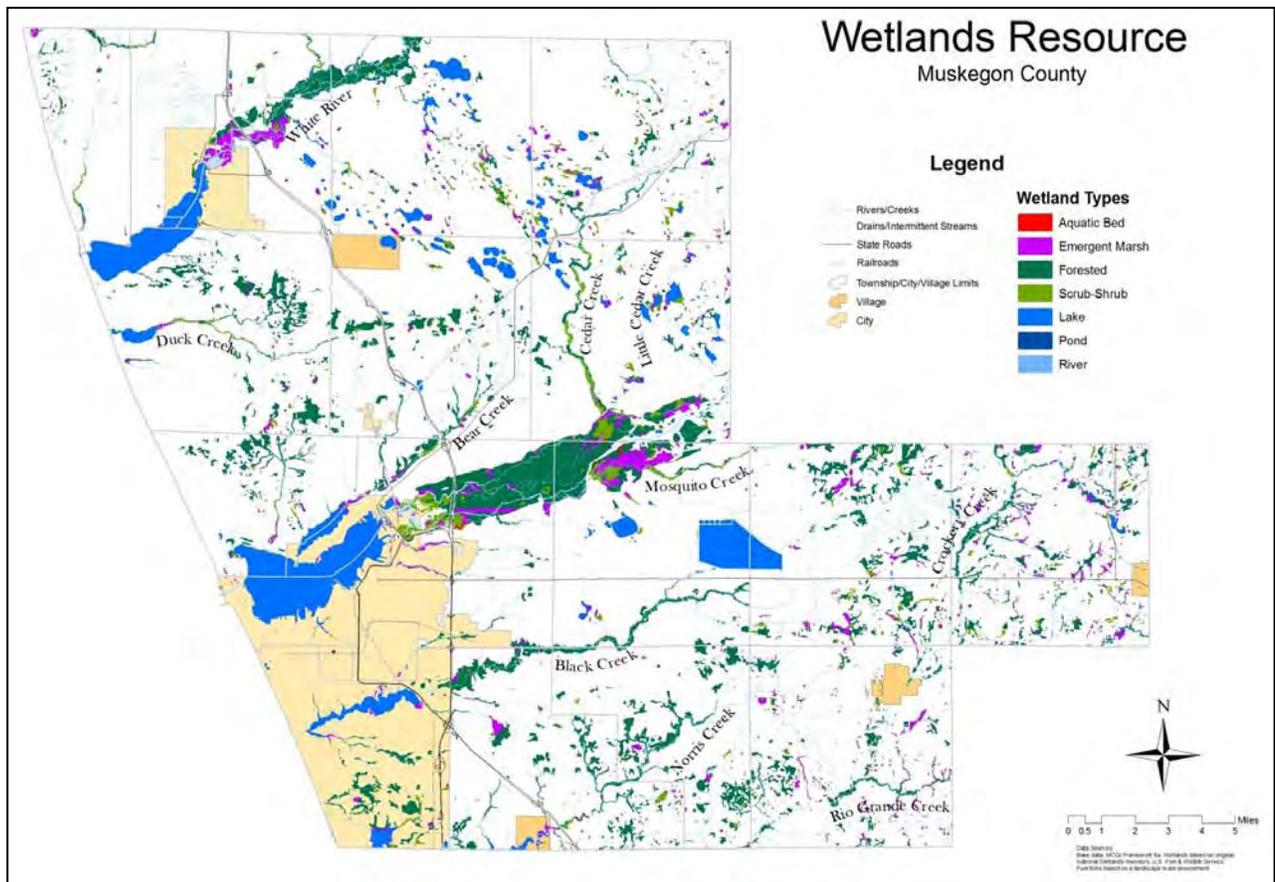
Activity	Example (Partial List Only)
Deposit or Permit the Placing of Fill Material	Bulldozing, Grading, Dumping
Dredge, Remove, or Permit the Removal of Soil or Minerals	Removing Tree Stumps, Bulldozing, Digging a Pond
Construct, Operate, or Maintain any Use or Development	Construction of Buildings or Structures, Boardwalks, Peat mining, Water treatment
Drain Surface Water	Diverting Water to Another Area via Ditch, Pump or Drain

Muskegon County Wetlands:

Out of 527 square miles in Muskegon County, 74 sq. miles are wetlands, or 14%, of the landscape is considered a wetland. Pursuant to the NREPA, the MDEQ completed a County Wetland Inventory to provide potential and approximate locations of wetlands and wetland conditions throughout the state. It is intended to be used as a tool in planning for development, open space designations, zoning, etc. as a way to protect wetland resources. The maps are not intended to be used to determine the specific locations and jurisdictional boundaries of wetland areas subject to regulation under Part 303. Only an on-site evaluation performed by the MDEQ in accordance with Part 303 can be used for jurisdictional determinations. The MDEQ has a

Muskegon County Wetland Resources		
Waterbody Type	Acres	Percent
Natural Lake	10,809	76.0
Dammed River Valley Lake	138	1.0
Excavated Lake	2,067	14.5
Diked/Impounded Lake	42	0.3
Natural Pond	313	2.2
Diked/Impounded Pond	55	0.4
Excavated Pond	190	1.3
River (Wide)	452	3.2
Open Water Wetlands	14,226	

Source: Annis Water Resources Institute



Ecological Services of Wetlands:

Wetlands are a significant factor in the health and existence of other natural resources such as inland lakes, groundwater, fisheries, wildlife, and the Great Lakes. Michigan's wetland statute recognizes the following benefits provided by wetlands:

- Flood and storm control by the hydrologic absorption and storage capacity of wetlands.
- Wildlife habitat by providing breeding, nesting, and feeding grounds and cover for many forms of wildlife, waterfowl, including migratory waterfowl, and rare, threatened, or endangered wildlife species.
- Protection of subsurface water resources and provision of valuable watersheds and recharging ground water supplies.
- Pollution treatment by serving as a biological and chemical oxidation basin.
- Erosion control by serving as a sedimentation area and filtering basin, absorbing silt and organic matter.
- Sources of nutrients in water food cycles and nursery grounds and sanctuaries for fish.

These benefits, often referred to as wetland functions and values, often play a vital role in recreation, tourism, and the economy in Michigan. According to a 1991 United States Fish and Wildlife Service Wetland Status and Trends report, over 50% of Michigan's original wetlands have been drained or filled, thereby making the protection of remaining wetlands that much more important.

AWRI Functional Wetlands Assessment:

The information presented in this section illustrates the beneficial functions of wetlands that can be considered by local communities as part of their green infrastructure planning, site development planning, and wetland restoration projects. As part of the Mega Model Project - Muskegon Watershed Research Partnership, funded by the Great Lakes Fishery Trust, the Grand Valley State University Annis Water Resources Institute (AWRI) completed the "Landscape Scale Functional Wetlands Assessment - for Muskegon County." This assessment utilized data from the National Wetlands Inventory of the U.S. Forest and Wildlife Service to help identify how different types of wetlands can function to benefit communities through the ecological services that they naturally provide.

Functions of importance include:

- Floodwater storage
- Streamflow maintenance
- Nutrient transformation
- Retention of sediment
- Shoreline stabilization
- Fish, Waterfowl, Marsh Bird, Amphibian and Other Habitat

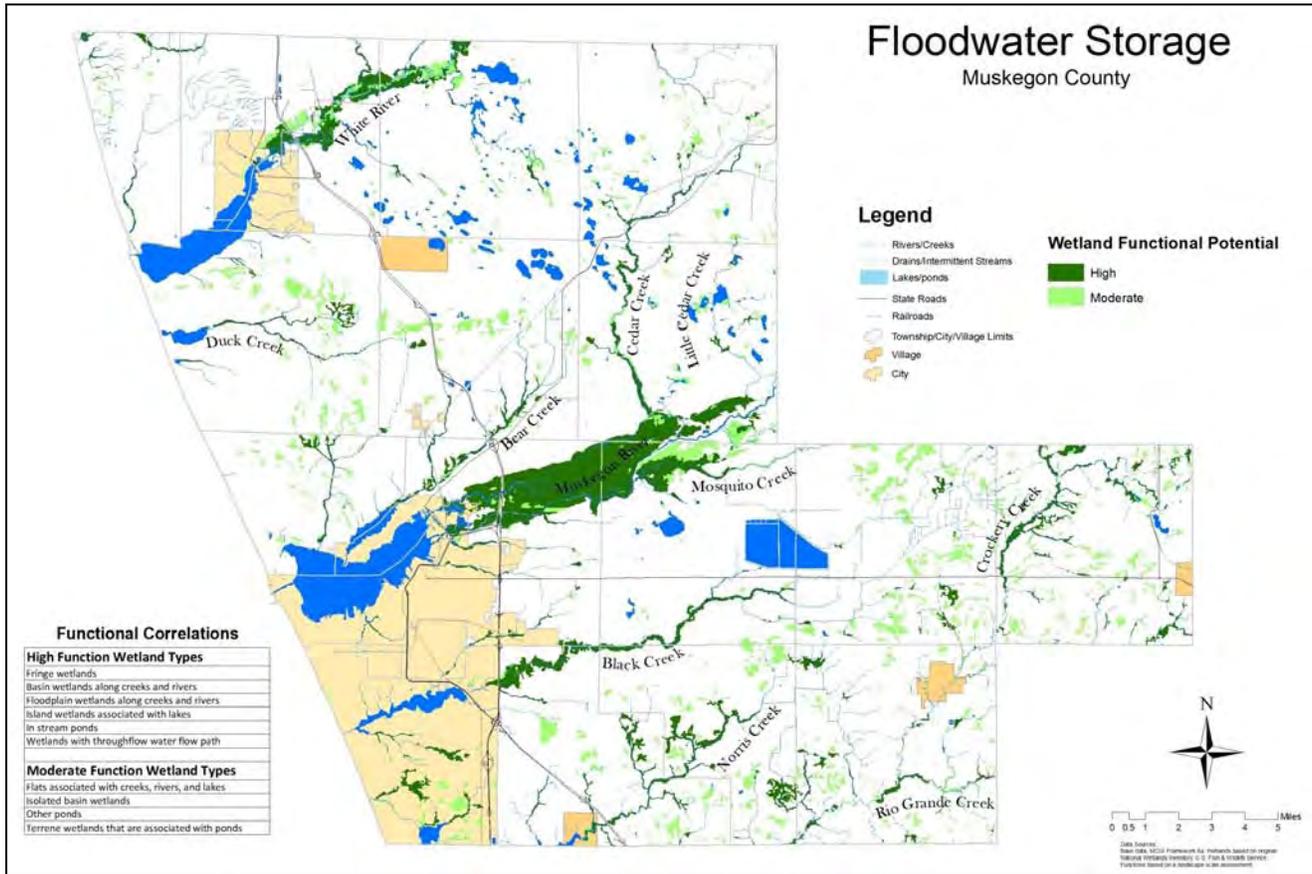
The table below summarizes the potential of wetlands in Muskegon for provided various ecological services. It was a product of the Functional Wetlands Assessment.

High Function Potential	
Wetland Function	% of Vegetated Wetlands
Floodwater Storage	50
Streamflow Maintenance	41
Nutrient Transformation	78
Sediment and other Particulate Retention	55
Shoreline Stabilization	50
Fish Habitat	68*

* Of all wetland types

Floodwater Storage:

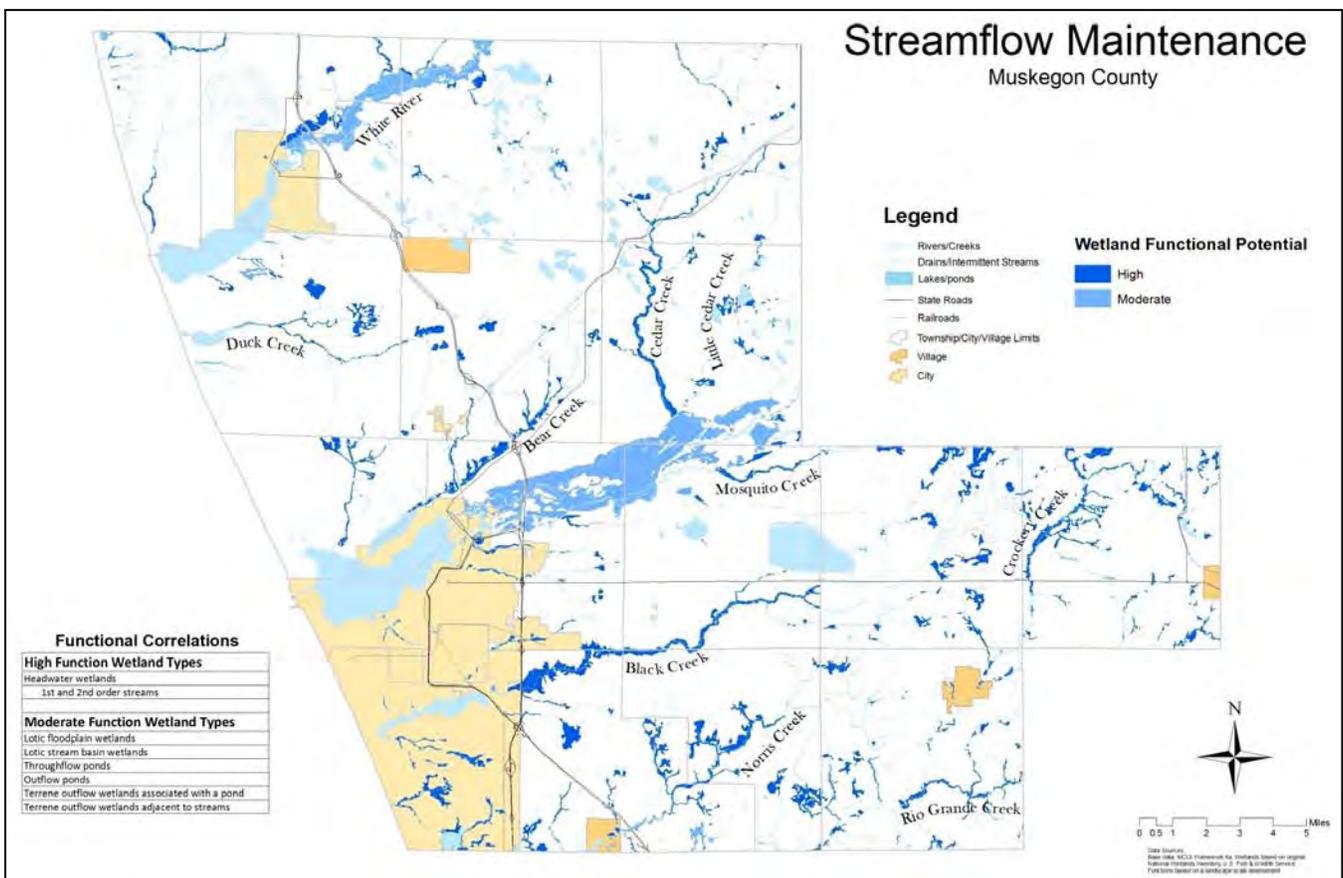
Floodwater storage is an important benefit provided by wetlands. In Muskegon County, 50% of vegetated wetlands, have a high capacity to prevent flooding. The water-holding capacity of wetlands reduces downstream flooding, including the “flashiness” of urban and rural creeks. Even moderate storm events can cause flashiness, which in turn is damaging to the quality of stream habitats for the fish and wildlife that depend on them.



Watersheds with 40% wetland coverage can significantly reduce flood flows, by as much as eighty percent (80%) (Novitzki, 1979). Wetlands that provide this ecological service include fringe wetlands, floodplain wetlands along rivers and creeks, and basin wetlands along rivers and creeks.

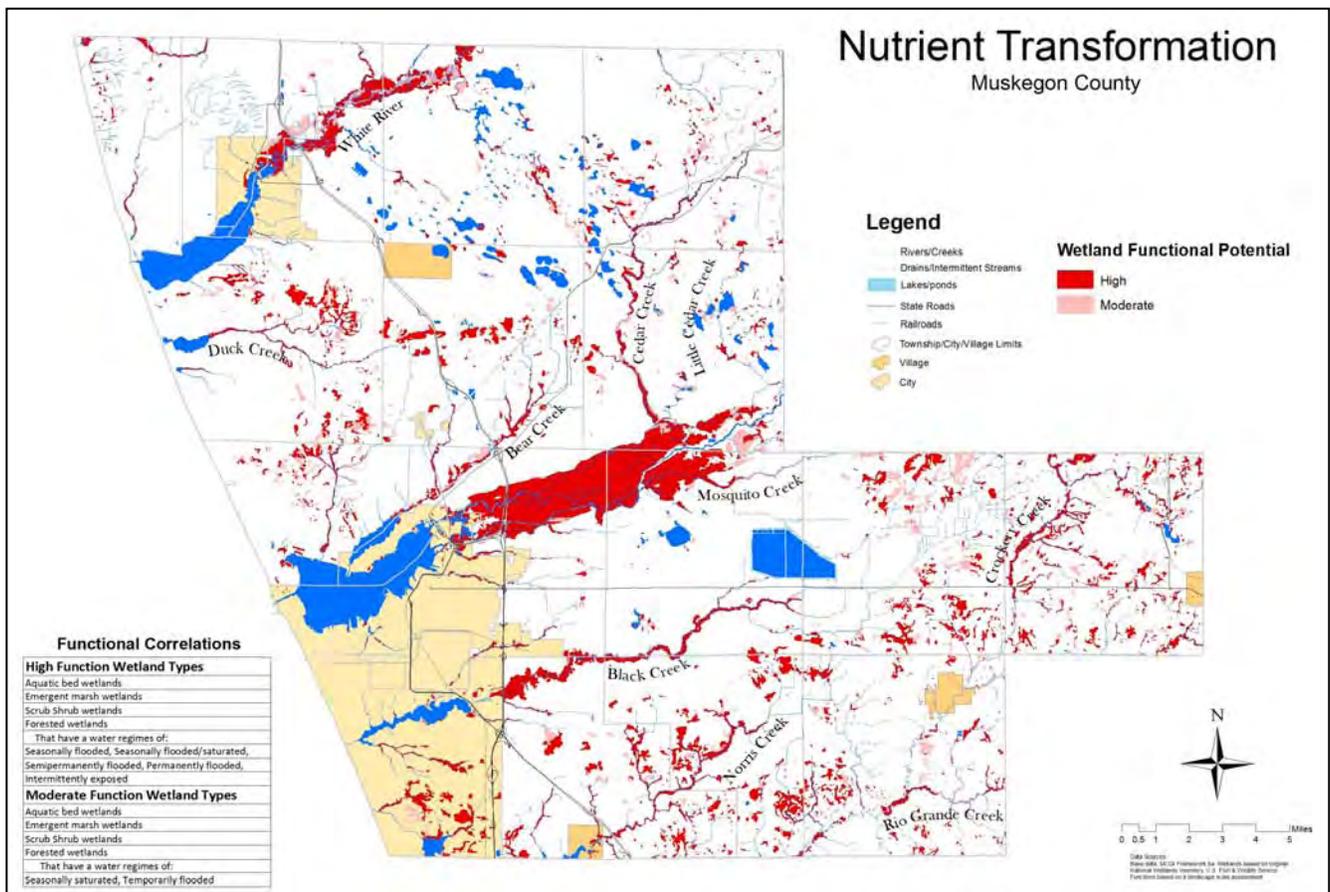
Streamflow Maintenance:

Many wetlands are sources of groundwater discharge, and if in a headwater position, typically are sources of streams. Examples of wetlands that are sources of surface water are those that are present along 1st and 2nd order streams. Approximately 41% of the vegetated wetlands in Muskegon County have a high functional potential for streamflow maintenance.



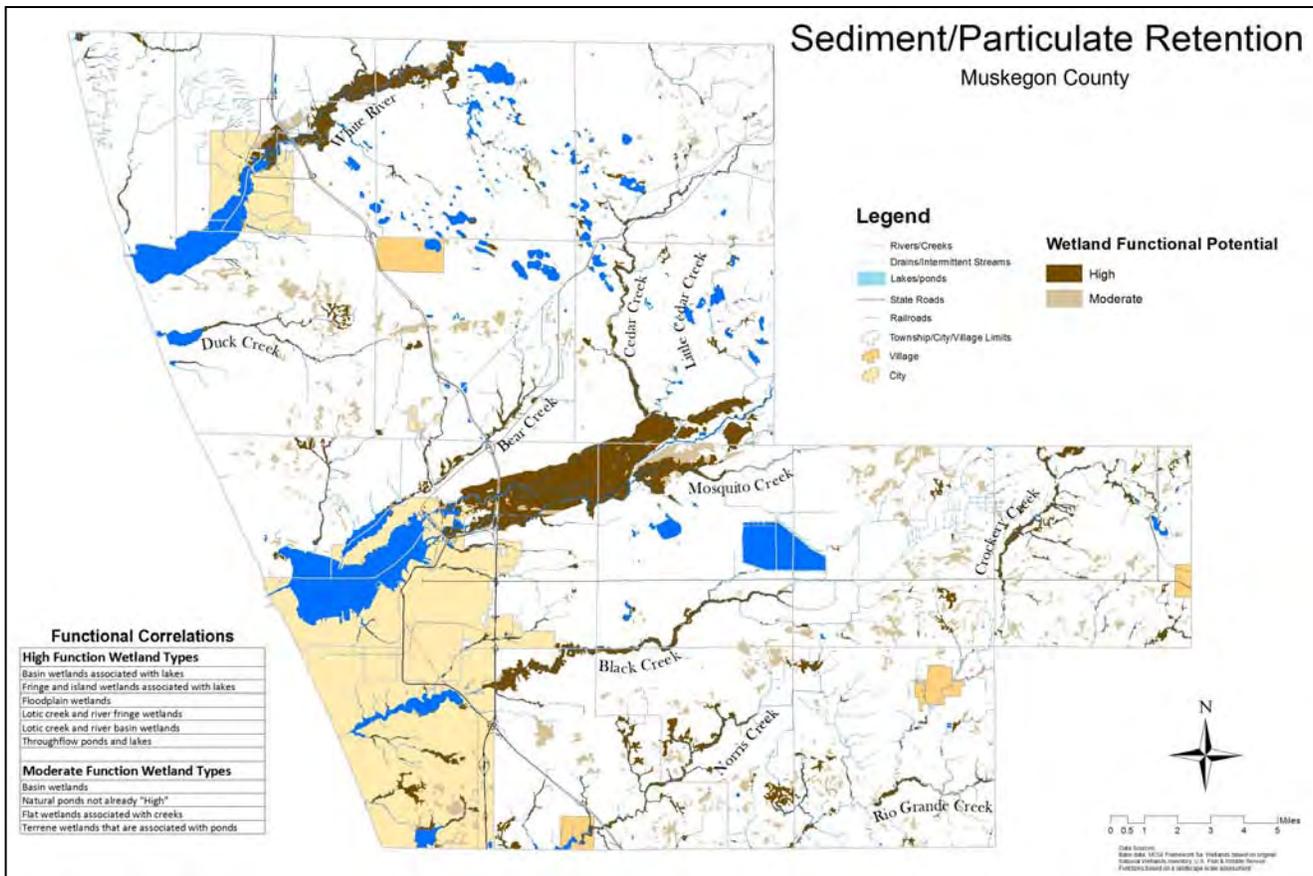
Nutrient Transformation:

Of the vegetated wetlands in Muskegon County, 78% are estimated to have a high functioning potential for nutrient transformation. Recycling nutrients such as nitrogen and phosphorous is an important function that a wetland can provide. Organic soils found in wetlands are well-equipped to process nutrients, and wetland vegetation is responsible for phosphorous uptake. All vegetated wetlands that are seasonally flooded, semi-permanently flooded, permanently flooded, or intermittently exposed aid in the uptake of phosphorous. Phosphorous is a nutrient that can cause algae blooms in surface water. The uptake of phosphorous within wetlands helps to prevent the accelerated aging of lakes, or eutrophication. In Muskegon County, 7 of lakes are considered eutrophic, and 2 are hypereutrophic. These water features are further addressed in Chapter 7, Surface Water.



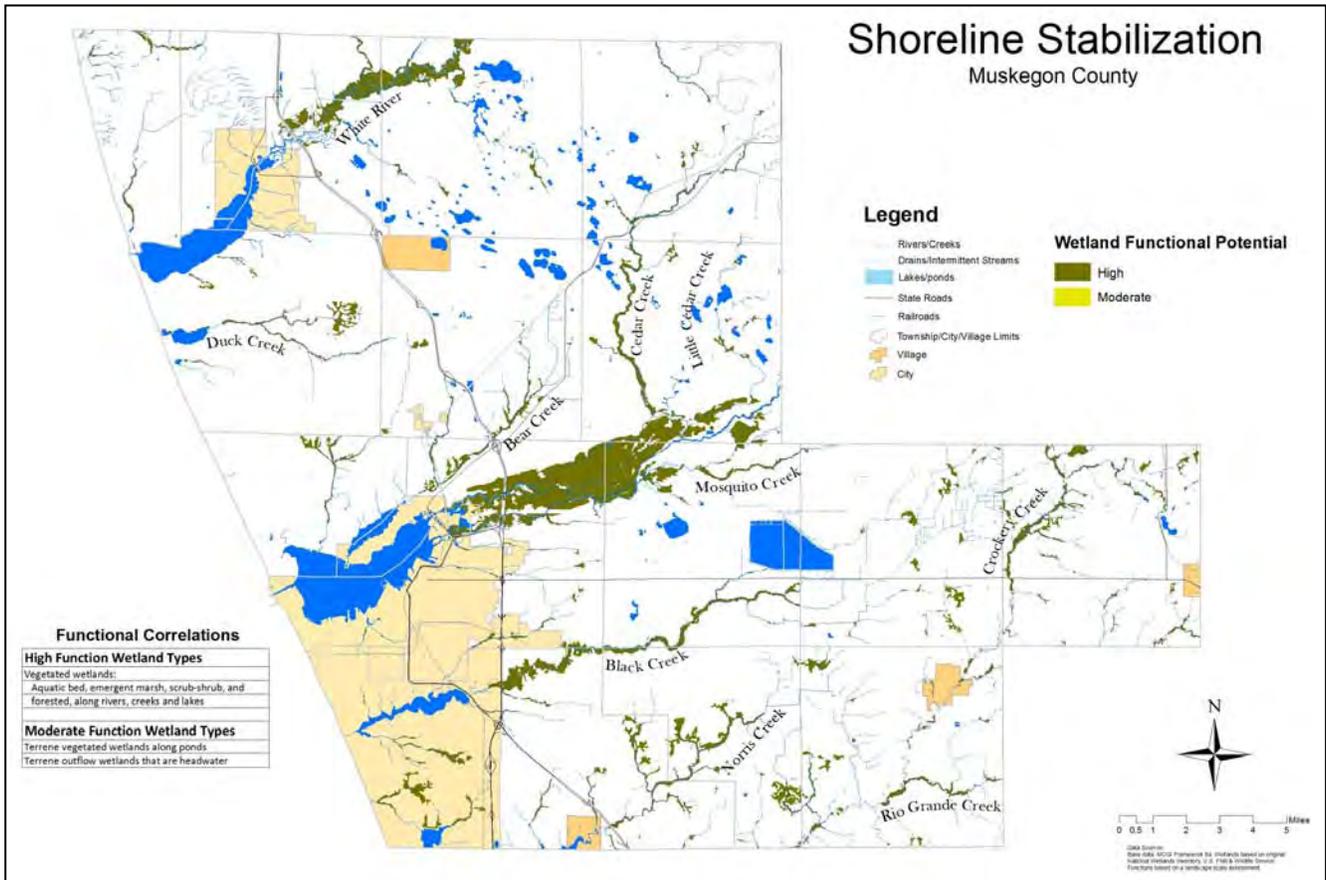
Sediment and other Particulate Retention:

Floodplain wetlands, basin and fringe wetlands associated with lakes, lotic river/creek basin and fringe wetlands, and lakes/ponds with throughflow all possess the potential to aid in sediment and other particulate retention. This function captures sediments with bonded nutrients or heavy metals. Of all the vegetated wetlands in Muskegon County, 55% are estimated to have a high potential to provide this function.



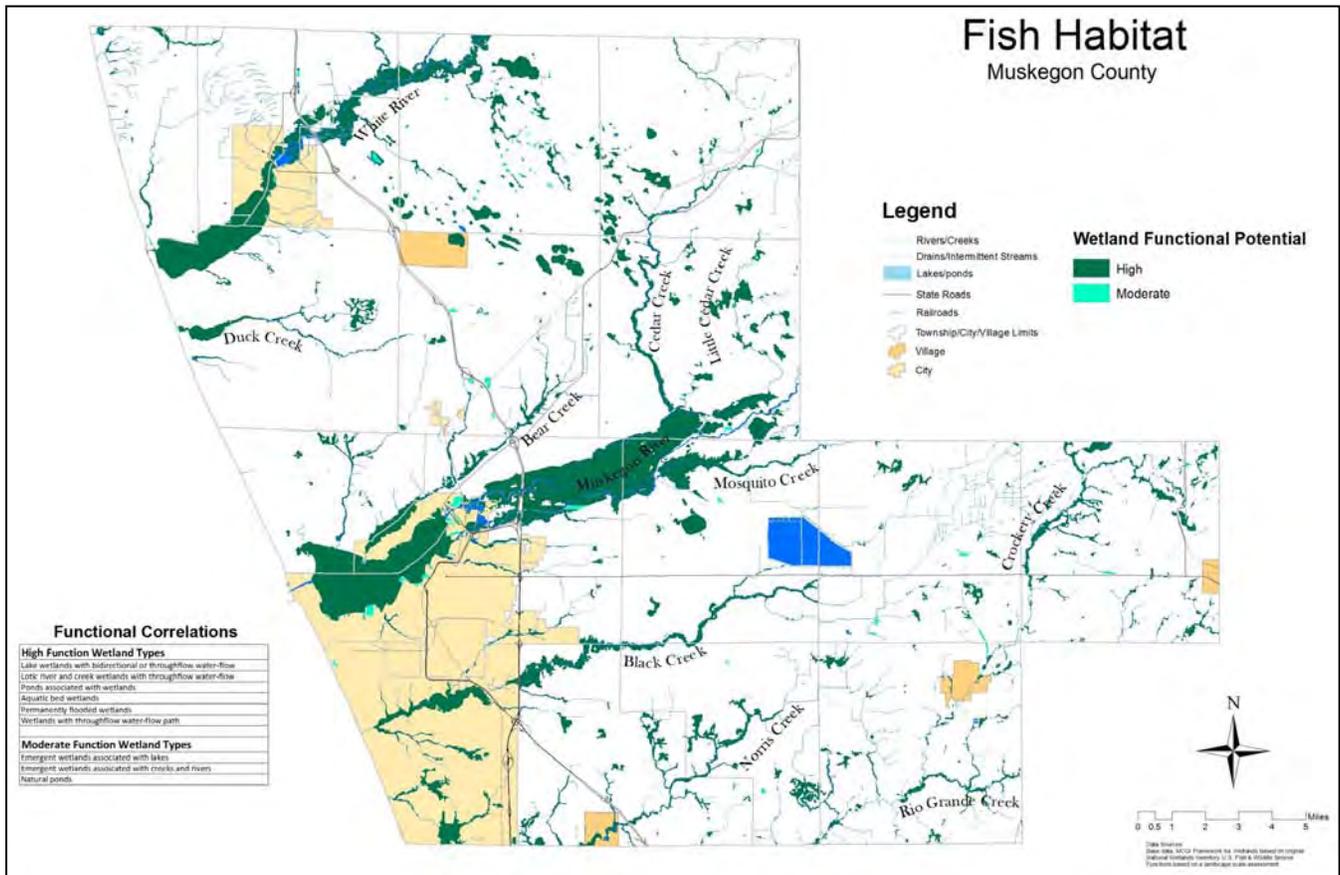
Shoreline Stabilization:

Erosion is accelerated by the velocity of flowing water in rivers and creeks and wave action along shorelines. Wetland vegetation reduces the potential for erosion by stabilizing soil. Examples of wetlands that prevent erosion are aquatic bed, emergent marsh, shrub-scrub, and forested wetlands along rivers and creeks. In Muskegon County, 50% of vegetated wetlands possess a high functional potential for shoreline stabilization.

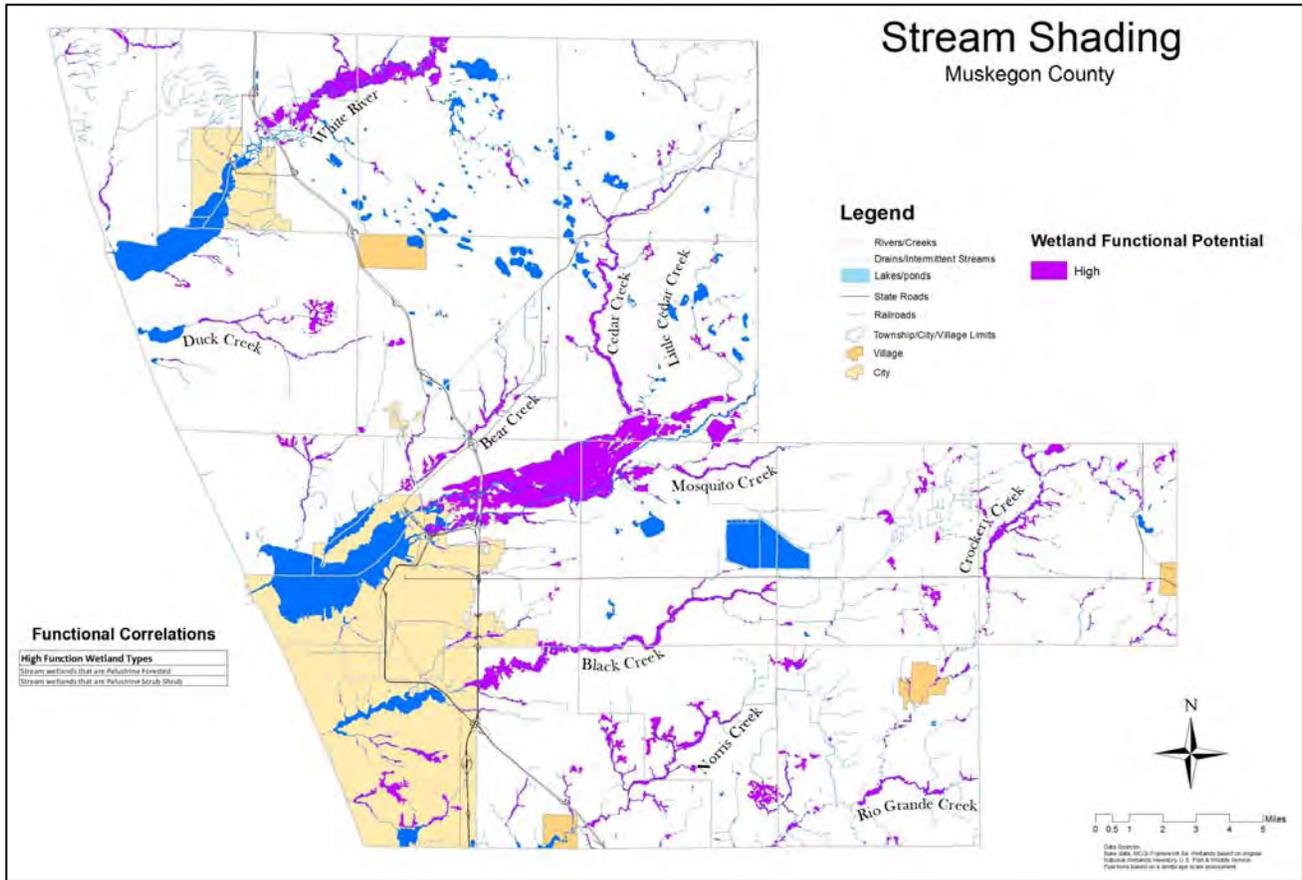


Fish Habitat:

A healthy fishery depends on the availability of diverse, quality aquatic habitats. Wetlands provide nursery grounds for juvenile fishes, and feeding grounds for some adult fishes. Wetlands help to moderate water levels, ensuring a longer duration of adequate water levels for the life cycles of many important fish species. Examples of wetlands that provide quality fish habitat are lentic wetlands, wetlands associated with ponds, and outflowing aquatic bed wetlands. Out of all wetlands in Muskegon County, 68% carry a high functional potential to provide fish habitat.



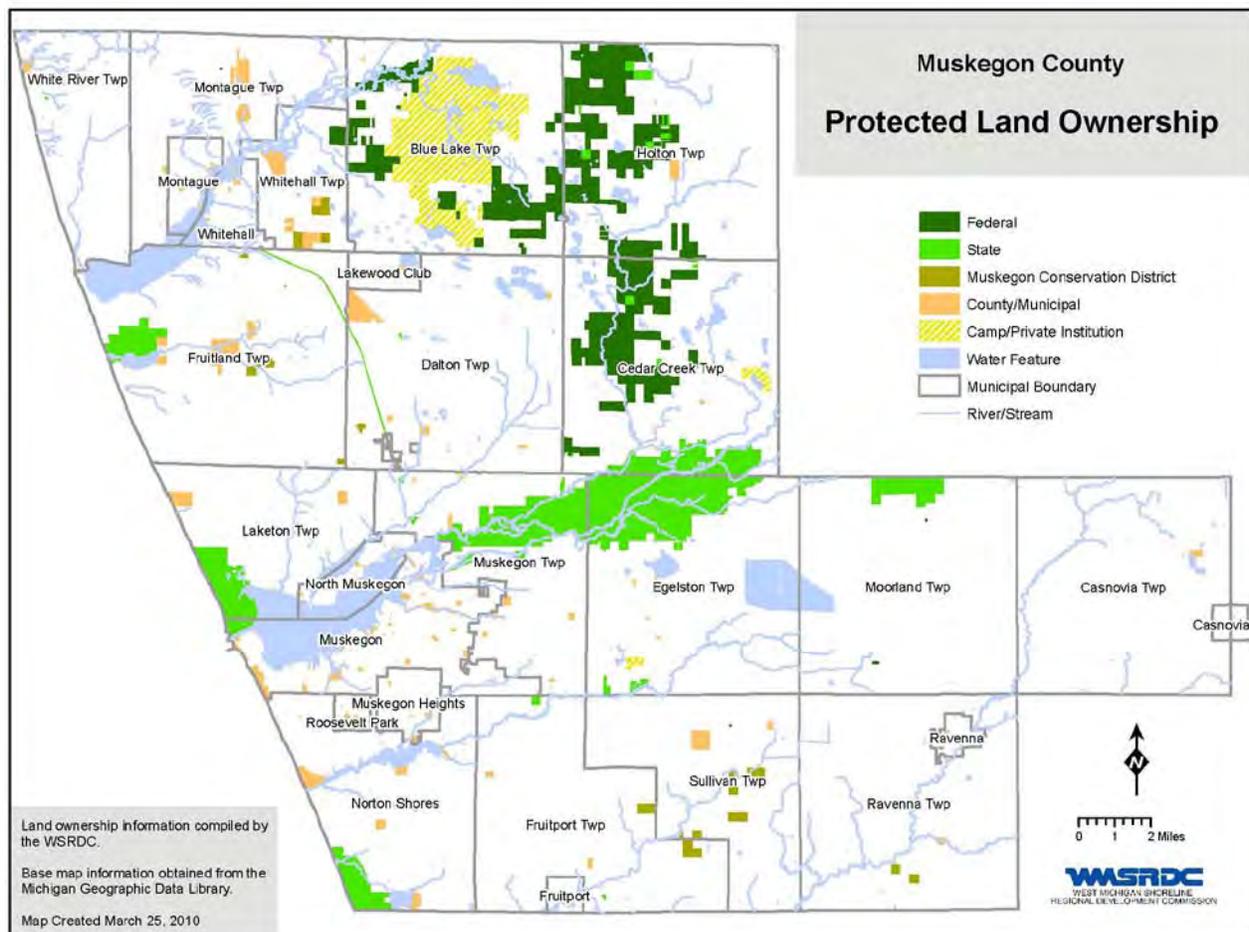
Stream corridors that are shaded by vegetation have cooler water, the ability to sustain food supplies, and other necessary habitat components for quality fish and wildlife habitat. Natural woody debris and leaf litter provide food for aquatic insects, which are needed by juvenile fish, ducks, and other wildlife. Examples of wetlands that provide these benefits are forested and shrub-scrub wetlands along rivers and creeks.



Chapter 6: Forests

Large, forested natural areas provide communities with benefits associated with wildlife, recreation, hunting, water quality, clean air, wild foods, and scenic views. In urban areas, tree canopies provide cooler temperatures in residential neighborhoods. Trees provide creeks and streams with the shade necessary to protect water quality by keeping them cool. Communities that protect and maintain large trees in commercial corridors and town centers offer visitors and residents a unique and attractive sense of place.

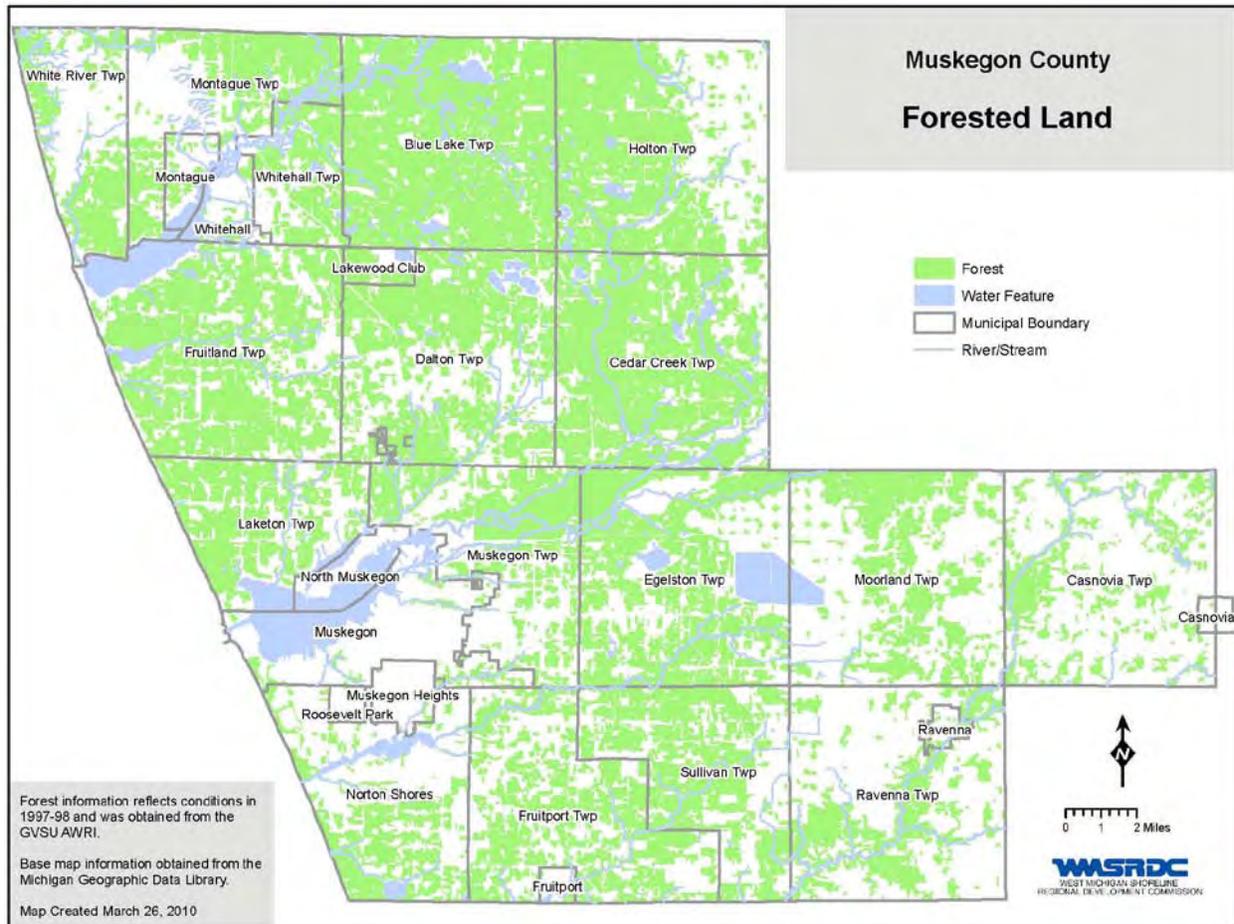
Muskegon County contains significant areas of protected land under the ownership of federal, state, local, or private institutions; much of which is forested. This chapter includes discussion of the extent, condition, and ownership of forested areas in the county.



Forestry:

Muskegon County's largest land use is in forest cover, approximately 50%. A majority of this forest land is in private ownership with the principal forest cover types as oak/hickory and maple/beech/birch. Standing softwood in the county is almost half that of hardwoods and

continues to decrease as original stands are being converted for urban development or are maturing to hardwood dominated stands.



Much of Michigan is worried about the emerald ash borer and trying to figure out how to stop its progress. That is not the case in Muskegon County, where the primary concerns of landowners revolve around the pine bark beetle in pine plantations in the eastern townships, and oak wilt and other diseases throughout the county. Muskegon County has many scotch pine and red pine plantations that are no longer being managed. Most of the scotch pine plantations came about as Christmas tree farms that were not successful or have been sold to new owners no longer managing trees. The red pine plantations were originally planted to prevent erosion of the sandy soils that exist throughout the county. Many of these plantations are now being divided up and sold as smaller parcels to new landowners that lack knowledge, ambition, or know-how when it comes to management of these stands. As a result, there are high populations of the pine bark beetle in many areas of the county that are feeding on and killing both stressed and healthy pine trees and stands. Proper management of the pine stands is the best defense against the pine bark beetle and includes thinning the stand when the trees become crowded.

Oak wilt has also become a threat to all oak trees in Muskegon County and throughout the state. Oak wilt is a disease that is caused by a fungus within the vascular tissue of the tree. It kills red oaks within the first year of showing symptoms and white oaks can be killed anytime from one

to twenty years after being infected. Because there is not cure for oak wilt, prevention is key to management success.

Management issues in the near future will surround managing small parcels and urban lots with a focus on turning from marketability to merely maintaining forestry health. Fortunately, because of Muskegon's forestry heritage and abundant forest resources from prior large lot management, the overall health of parcels are sustainable and should remain so for the next few decades; especially in the southeastern and northern portions of the county. However, it is still imperative that District integrate larger land use initiatives to preserve open space for the forest product market and wildlife populations.

Forests and Water Quality:

Trees and forests improve stream quality and watershed health primarily by decreasing the amount of stormwater runoff and pollutants that reaches nearby waters. Trees and forests reduce stormwater runoff by capturing and storing rainfall in the tree canopy and releasing water into the atmosphere through evapotranspiration. In addition, tree roots and leaf litter create soil conditions that promote the infiltration of rainwater into the soil. This helps to replenish our groundwater supply and maintain streamflow during dry periods.

The presence of trees also helps to slow down and temporarily store runoff, which further promotes infiltration, and decreases flooding and erosion downstream. Trees and forests reduce pollutants by taking up nutrients and other pollutants from soils and water through their roots, and by transforming pollutants into less harmful substances. In general, trees are most effective at reducing runoff from smaller, more frequent storms.

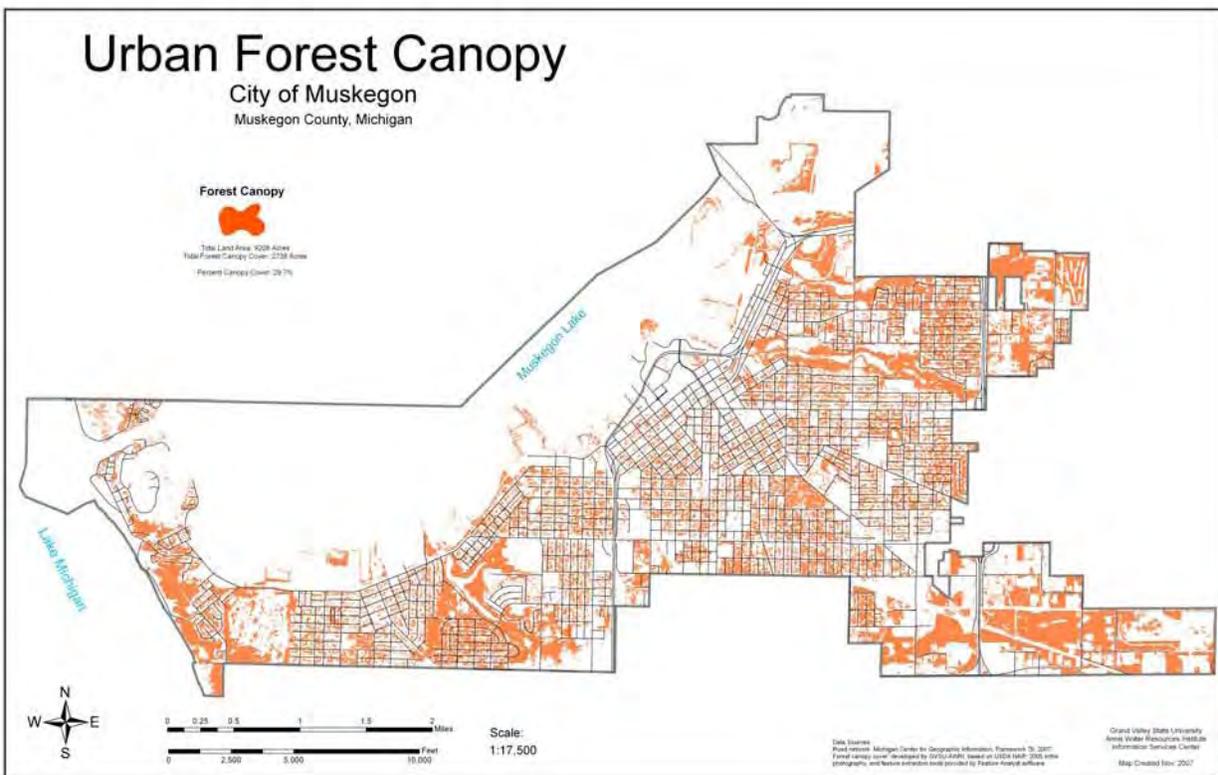
Urban Forestry:

Trees and vegetation within an urban setting provide numerous benefits to the community. By adsorbing and filtering out pollutants in their leaves, urban trees perform a vital air cleaning service that directly affects the well-being of urban dwellers. Trees remove carbon dioxide from the air through their leaves and store carbon in their biomass. Approximately half of a tree's dry weight is carbon. For this reason, large-scale tree planting projects are recognized as a legitimate tool in many national carbon-reduction programs. Trees also decrease total stormwater volume helping cities to manage their stormwater and decrease detention costs.

The Annis Water Resources Institute (AWRI) completed an Urban Forest Ecological Services Assessment for the City of Muskegon in 2008. The study identified the city's forest canopy and quantified the value of urban forestry in Muskegon. Some of the study's findings are summarized on the next page.

By The Numbers: Muskegon Urban Forestry	
30	Percent of land in the city covered by tree canopy.
2,738	Acres of land in city covered by tree canopy.
118,692	Metric tons of carbon that trees absorb annually.
177,691	Pounds of air pollutants that trees remove annually.
\$451,390	Amount of money saved by trees absorbing air pollutants.
\$706,656	Money saved annually by trees absorbing carbon.
15,884,398	Cubic feet of rainwater stored by the city's trees when 2.2 inches of rain falls in a 24-hour period.
\$88,522,236	Value of ecological services that Muskegon's urban tree canopy provides.

Source: Grand Valley State University. AWRI



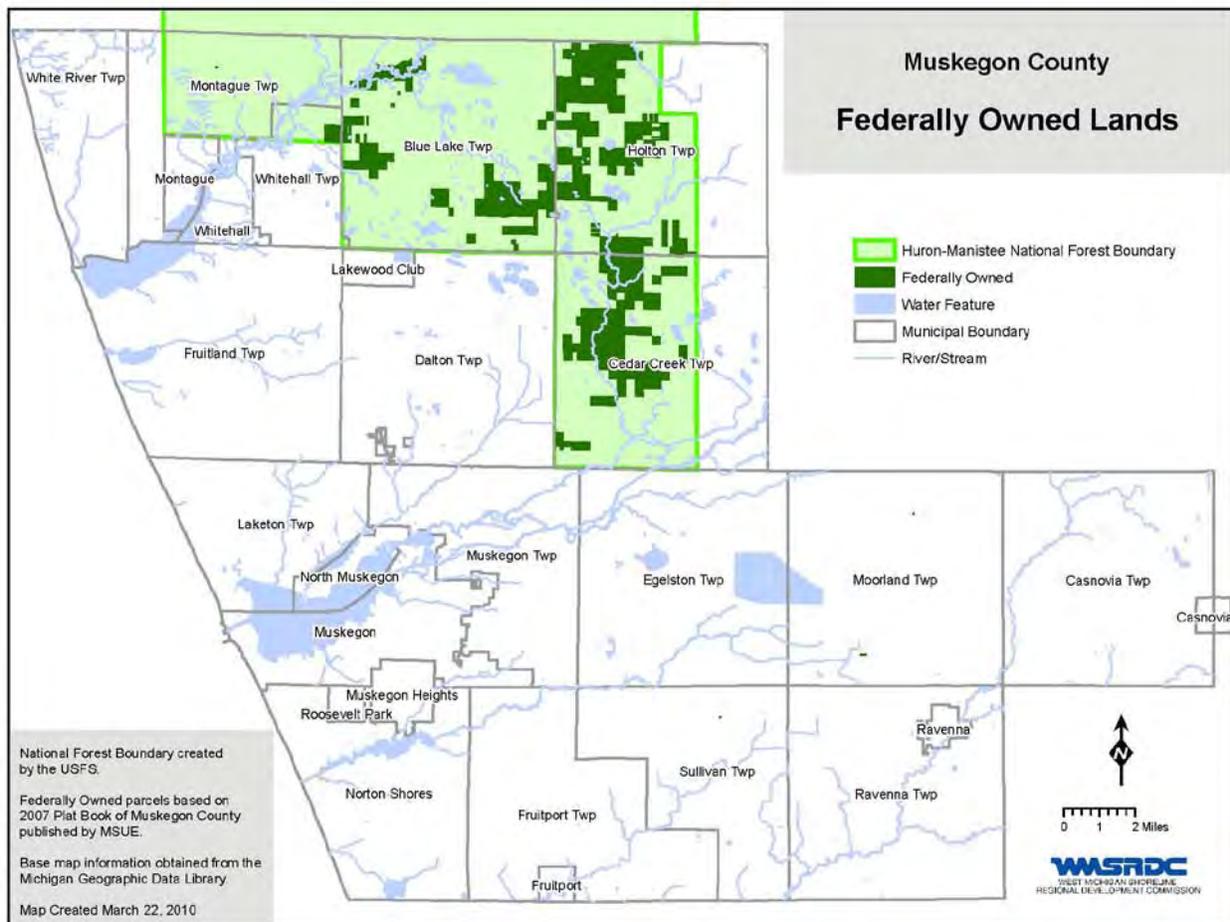
There are three Certified Tree Cities in Muskegon County, including Muskegon, Montague, and Whitehall. The following description of the Tree City USA program is quoted from the Arbor Day Foundation’s website, www.arborday.org. “Tree City USA program, sponsored by the Arbor Day Foundation in cooperation with the USDA Forest Service and the National Association of State Foresters, provides direction, technical assistance, public attention, and national recognition for urban and community forestry programs in thousands of towns and cities that more than 135 million Americans call home. The many benefits of being a Tree City include creating a framework for action, education, a positive public image, and citizen pride.”

Tree Cities in Muskegon County	
City	Tree City Years
Montague	6
Muskegon	10
Whitehall	17

Huron-Manistee National Forest:

The Huron and Manistee National Forests are two separate forests administered together out of the US Forest Service Office in Cadillac, Michigan. Together they total approximately one million acres of public land. The forests' boundary extends from the shores of Lake Michigan to the shores of Lake Huron. Water is one of the most important natural resources flowing from forests. The US Forest Service manages the largest single source of water in U.S., with about one-fifth originating from 193 million acres of land. A network of water and watershed resource specialists support stewardship efforts at all levels of the organization to promote healthy, sustainable watersheds fundamental to ecosystems and people. More information about forests and watersheds can be found at <http://www.fs.fed.us/biology/watershed/index.html>.

Manistee National Forest land in Muskegon County is located within the townships of Blue Lake, Cedar Creek, Holton, Montague, and Whitehall. The US Forest Service District Office serving Muskegon County is located at the Huron-Manistee National Forest's Baldwin/White Cloud Ranger Station at 650 North Michigan Avenue, Baldwin, MI 49304. Other federally-owned parcels are located in Moorland and Sullivan townships.



U.S. Fish and Wildlife Service:

The U.S. Fish and Wildlife Service (FWS) is a bureau within the Department of the Interior. Its mission is to work with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.

The National Survey of Fishing, Hunting, and Wildlife-Associated Recreation is a partnership effort between the FWS, states, and national conservation organizations. It is a useful tool that quantifies the economic impact of wildlife-based recreation, and has become one of the most important sources of information on fish and wildlife recreation in the United States. Federal, state, and private organizations use this detailed information to manage wildlife, market products, and look for trends. The 2006 survey is the eleventh in a series of surveys conducted about every 5 years that began in 1955. The survey was conducted by the Census Bureau for the FWS, who in turn prepares printed reports of the survey.

According to the 2006 National Survey 87.5 million U.S. residents fished, hunted, or watched wildlife in 2006. They spent over \$122 billion pursuing their recreational activities, contributing to millions of jobs in industries and businesses that support wildlife-related recreation. Funds generated by licenses and taxes on hunting and fishing equipment pay for many of the conservation efforts in Muskegon County and provide many hours of fishing, hunting, and wildlife-associated recreation.

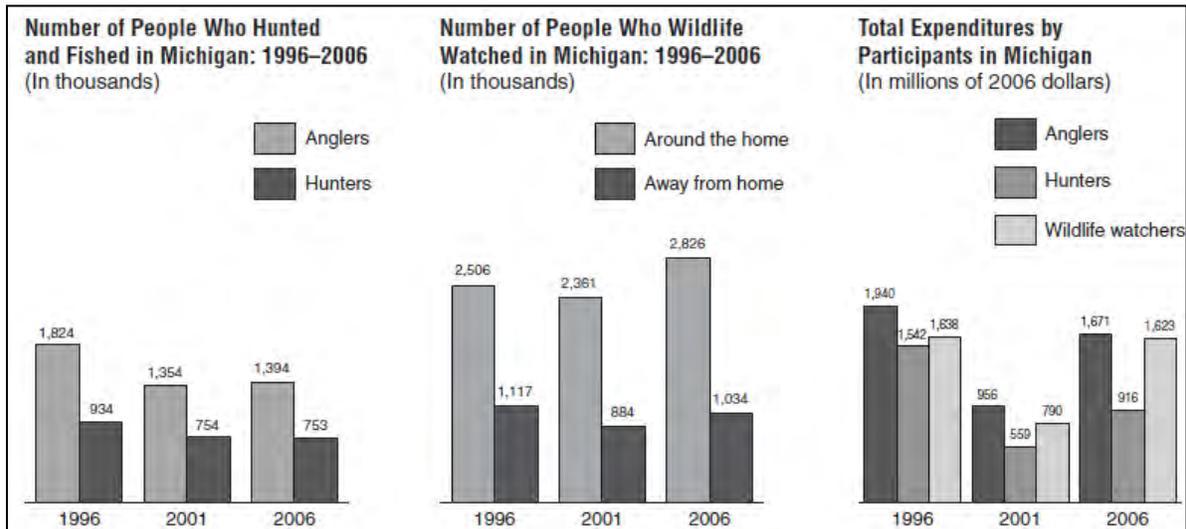
National Survey of Fishing, Hunting, and Wildlife-Associated Recreation reports and data are organized by survey year and are available for download from the Census Bureau website at <http://www.census.gov/prod/www/abs/fishing.html>. The 2006 Michigan Survey can be found at <http://www.census.gov/prod/2008pubs/fhw06-mi.pdf>.

The types of data presented in the reports include:

- Number of anglers, hunters, and wildlife-watching participants, by type of activity.
- Trips and days spent on different types of activities.
- Expenditures (trip, equipment, etc.), by type of fishing and hunting and wildlife-watching activity.
- Number of persons and days of participation by animal sought.
- Demographic characteristics of participants (including age, income, sex, race, and education).

A CD containing data used to prepare the reports and hard copies of the reports and products still available can be obtained by contacting the U.S. Fish and Wildlife Service:

NCTC Publication Unit
698 Conservation Way
Shepherdstown, WV 25443
(304) 876-7203 or email: pubs@fws.gov

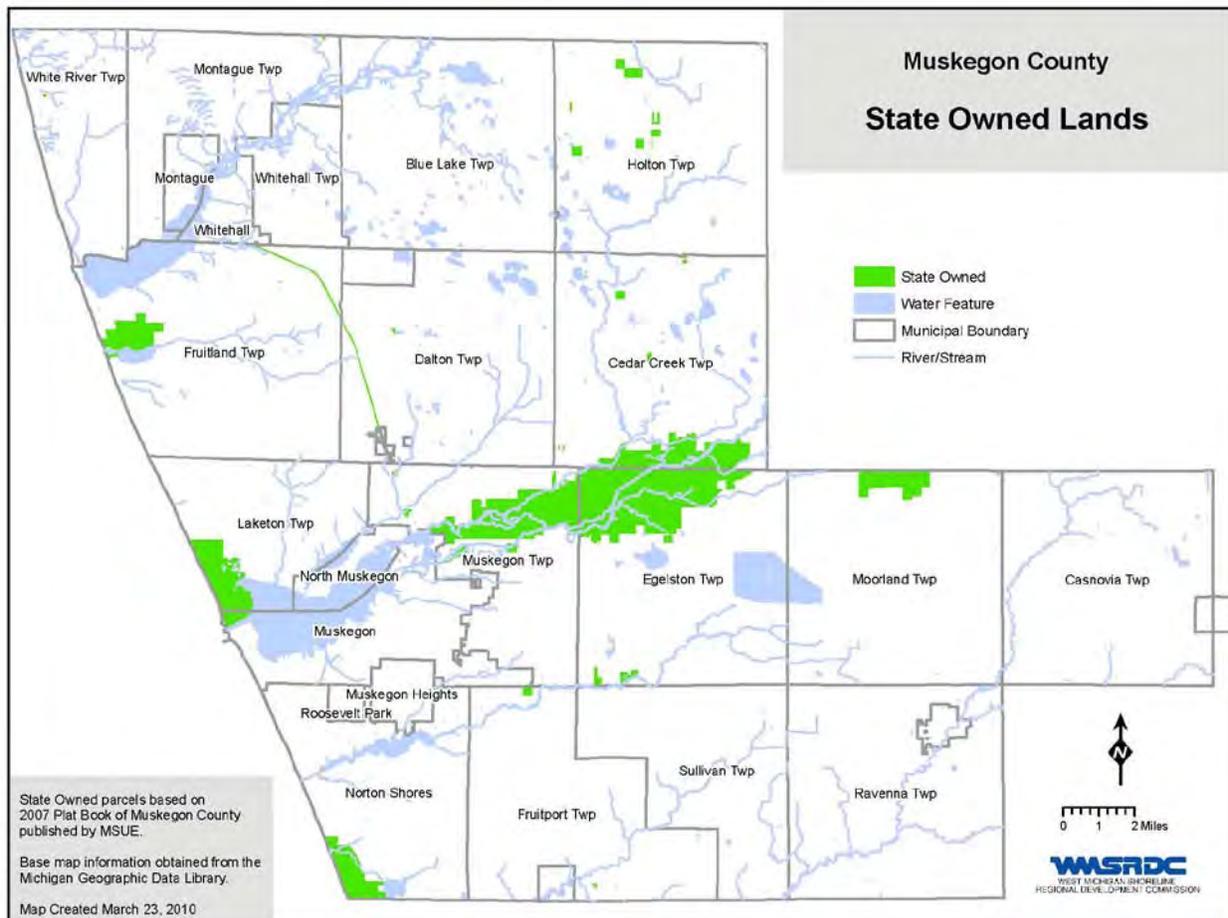


U.S. Fish & Wildlife Service

2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation—Michigan

Muskegon State Game Area:

The Muskegon State Game Area is a 10,500-acre natural area in Muskegon and Newaygo counties along the Muskegon River and its tributaries. The site is primarily forested, with river floodplain and wetland areas spread throughout the interior. Most of the area is not accessible by vehicles, so hikers and canoeists can enjoy an excellent wilderness experience. Area headquarters are located off of Maple Island Road, just south of the Muskegon River.

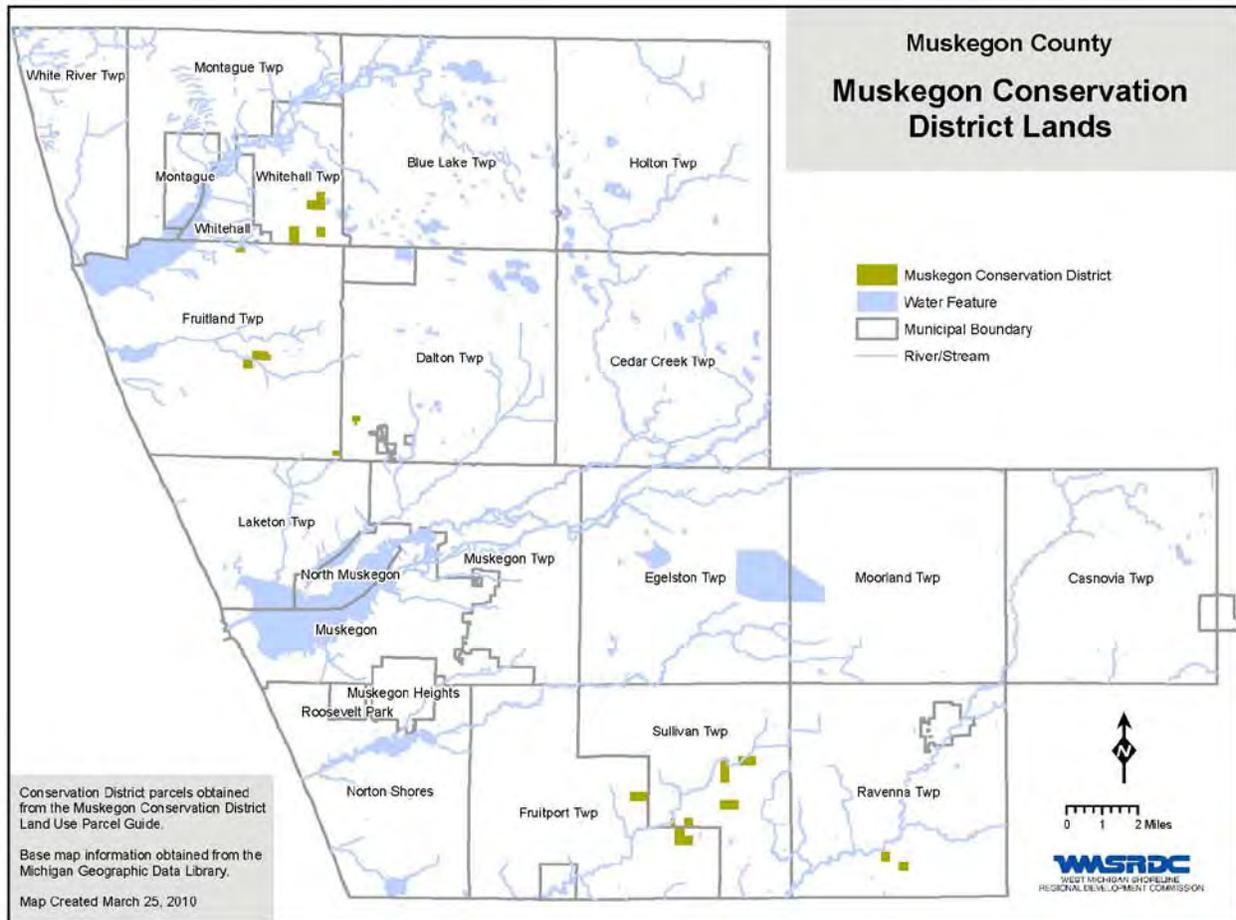


Muskegon Conservation District:

The Muskegon Conservation District is a unique governmental subdivision of the state created to serve as stewards of our natural resources. The guiding philosophy is that local people should make decisions on conservation issues at the local level, with technical assistance provided by local resource professionals. District projects and programs are as diverse as the landscape and are continually changing to meet the environmental challenges in local communities. The Muskegon Conservation District was formed in 1938, and remains active to this day helping the community restore, protect, and manage natural resources.

The mission of the Muskegon Conservation District is serving, educating, and empowering our community for natural resource protection by providing site-specific technical assistance and information to landowners in all aspects of natural resource management.

The Muskegon Conservation District owns a total of 1,025 acres of land scattered throughout the Muskegon County townships of Dalton, Fruitland, Fruitport, Ravenna, Sullivan, and Whitehall. These properties have a conservation easement in place that will protect them from future development. This land is open to the public for minimal impact recreation, and in certain cases it can be used for hunting and trapping. The majority of these parcels were deeded over to the



District from the U.S. Forest Service. They range in size from 20 to 120 acres. These lands are open to recreational activities that do not hinder the ability of the District to utilize the property for its intended purpose, forest management demonstration.

Muskegon Conservation District contact information:

940 N. Van Eyck St.
Muskegon, MI 49442
Phone (231) 773-0008
Fax (231) 767-1207

Forestry Assistance Program:

Almost 50% of the forestland in Michigan is owned by private individuals. That's over 8.3 million acres in the hands of private landowners. Many of these private lands are small parcels, under 30 acres, and are not actively managed. For many landowners, they are not sure what value their woodlot has financially, but are also not sure as to the benefits they provide as wildlife habitat, as recreational areas, or for aesthetic appeal.

The Forestry Assistance Program (FAP) is offered to residents of Muskegon County through the Muskegon Conservation District to provide those non-industrial private landowners with information on how they can manage their forest resources in a way that will achieve their specific goals. Management is not always the cutting of trees for financial gain. A woodlot or forest can be managed to attract more wildlife, or provide recreational areas such as nature trails, ski trails, wildlife viewing opportunities and more.

With the idea that “good stewardship begins with good planning,” the FAP helps citizens achieve forest management goals. Conservation planning begins by walking through the forest with a Conservation District Forester to learn about its condition, its potential, management options, and the landowner’s goals. A plan is then written, to include a description of the forestland, management objectives, and actions needed to achieve those objectives. The plan may include practices such as invasive species control and removal, forest erosion control, timber harvesting, forest stand improvement, windbreak establishment, and wildlife habitat enhancement.

*Good stewardship begins
with good planning.*

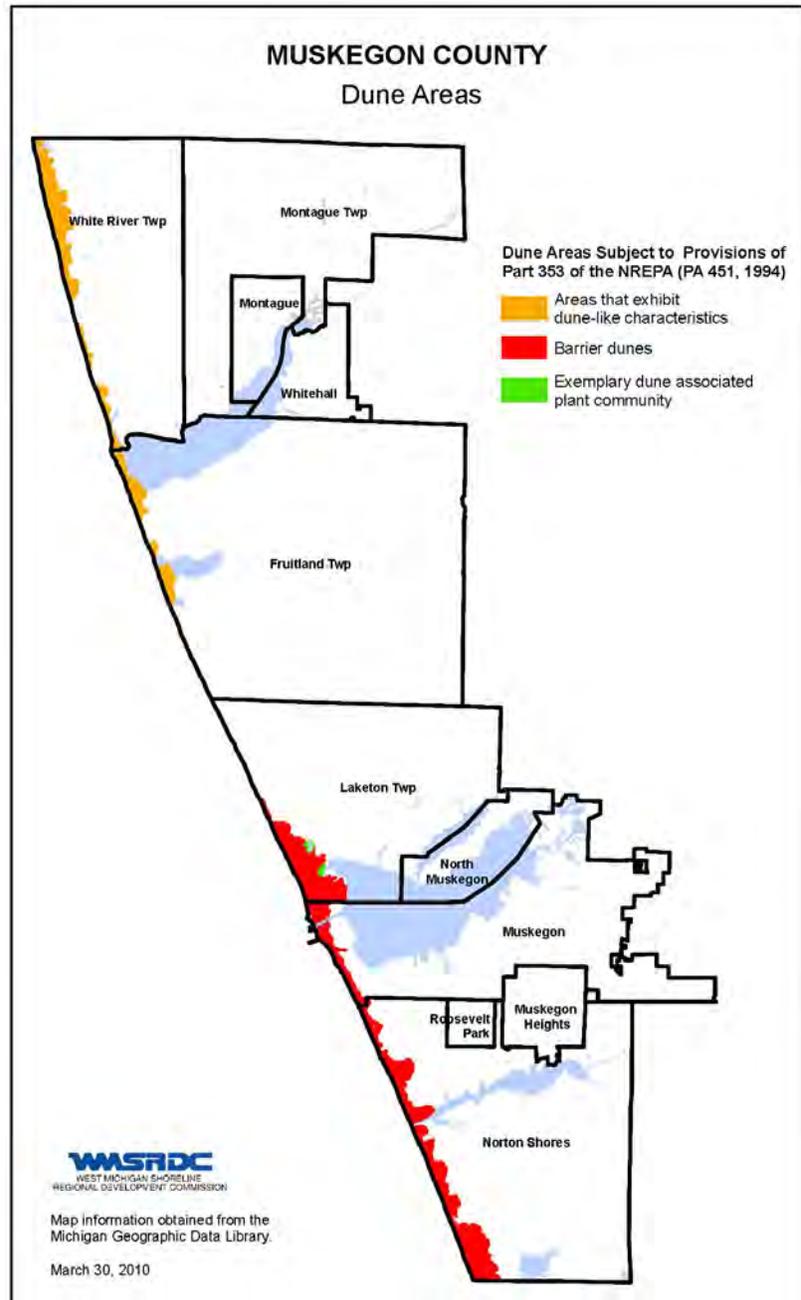
Once the plan has been written, the Muskegon Conservation District can help carry out many of the management activities. It can provide referral to professionals including tree planters, private consulting foresters, industrial foresters, loggers, and seeding contractors. In addition, many conservation practices are eligible for cost sharing through government programs. The Muskegon Conservation District can help identify the appropriate programs based on a landowner’s planned activities. To participate in the Forestry Assistance Program, contact the Muskegon Conservation District office and arrange a site visit.

Critical Dune Areas:

Muskegon County contains significant dune areas along the shores of Lake Michigan; many of which are forested. Forests and vegetation help to prevent erosion and preserve coastal dune ecosystems.

Sand dunes are globally unique, irreplaceable, and fragile resources that provide significant recreational, economic, scientific, geological, scenic, botanical, educational, agricultural, and ecological benefits. Designated areas of Michigan are legally protected by provisions of Part 353 of the Michigan Natural Resources and Environmental Protection Act (NREPA), PA 451 of 1994. The Critical Dune Areas (CDA) program is administered under the authority of Part 353, Sand Dune Protection and Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. The CDA program protects the extremely fragile areas of Michigan's dunes by promoting the use of design and construction techniques to minimize impacts of uses on the dunes. As defined in part 353, "use" means "a developmental, silvicultural, or recreational activity done or caused to be done by a person that significantly alters the physical characteristic of a critical dune area or a contour change done or caused to be done by a person."

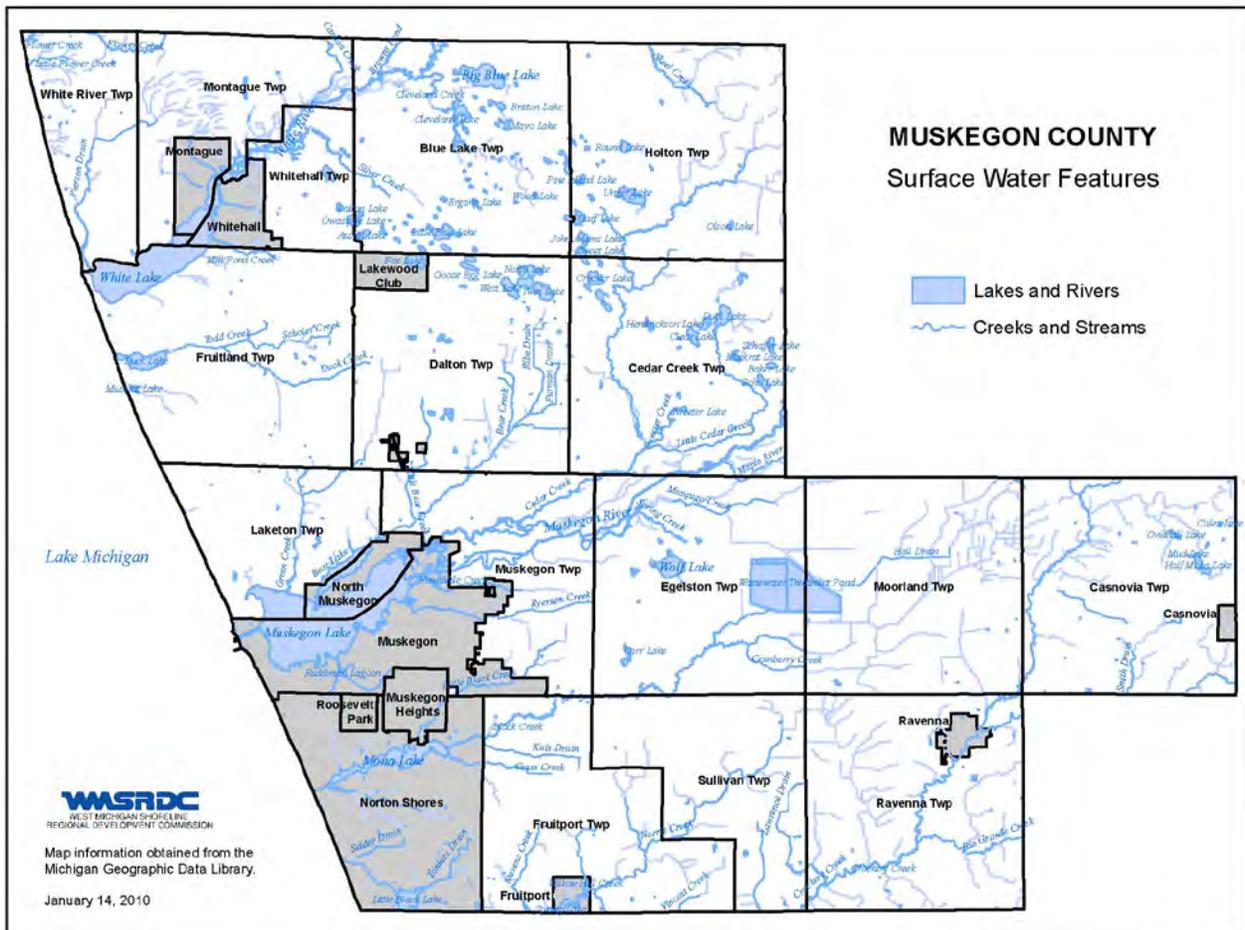
A Michigan Department of Natural Resources and Environment permit is required for any use within a CDA. Regulated activities include construction of buildings, septic systems, water wells, driveways, all excavation and filling, and vegetation removal within the CDAs. These



areas are identified in the “Atlas of Critical Dune Areas” dated February 1989, and adopted by the Michigan Legislature under Part 353. Section 35313(c) requires that all applications for permits for the use of a CDA include in writing: “assurances that the cutting and removing of trees and other vegetation will be performed according to the instructions or plans of the local soil conservation district. These instructions or plans may include all applicable silvicultural practices as described in the “voluntary forestry management guidelines for Michigan” prepared by the Society of American Foresters in 1987. The instructions or plans may include a program to provide mitigation for the removal of trees or vegetation by providing assurances that the applicant will plant on the site more trees and other vegetation than were removed by the proposed use.”

Chapter 7: Surface Water

A clean and healthy water body can contribute to a community's quality of life by providing fresh water for drinking, as well as offering numerous recreational opportunities such as swimming, fishing, boating, and kayaking. Quality water bodies also support vast biological networks which provide habits for wildlife such as fish, water fowl, and migratory birds. With literally hundreds of miles of shoreline in the county along creeks, rivers, lakes, and Lake Michigan, surface water is one of the most visibly prominent forms of green infrastructure in Muskegon County.



Surface water is also an important factor in the location of industrial facilities. This is a fragile aspect of surface water as a form of green infrastructure. Some industries require waterways for shipping and transportation, while others may require large quantities of cool, fresh water for their industrial processes.

The existence and prosperity of many Muskegon County communities can be linked to the presence of surface water resources. In the late 1800's and early 1900's the Muskegon and White rivers were utilized to transport fresh-cut timber downstream to lumber mills, which

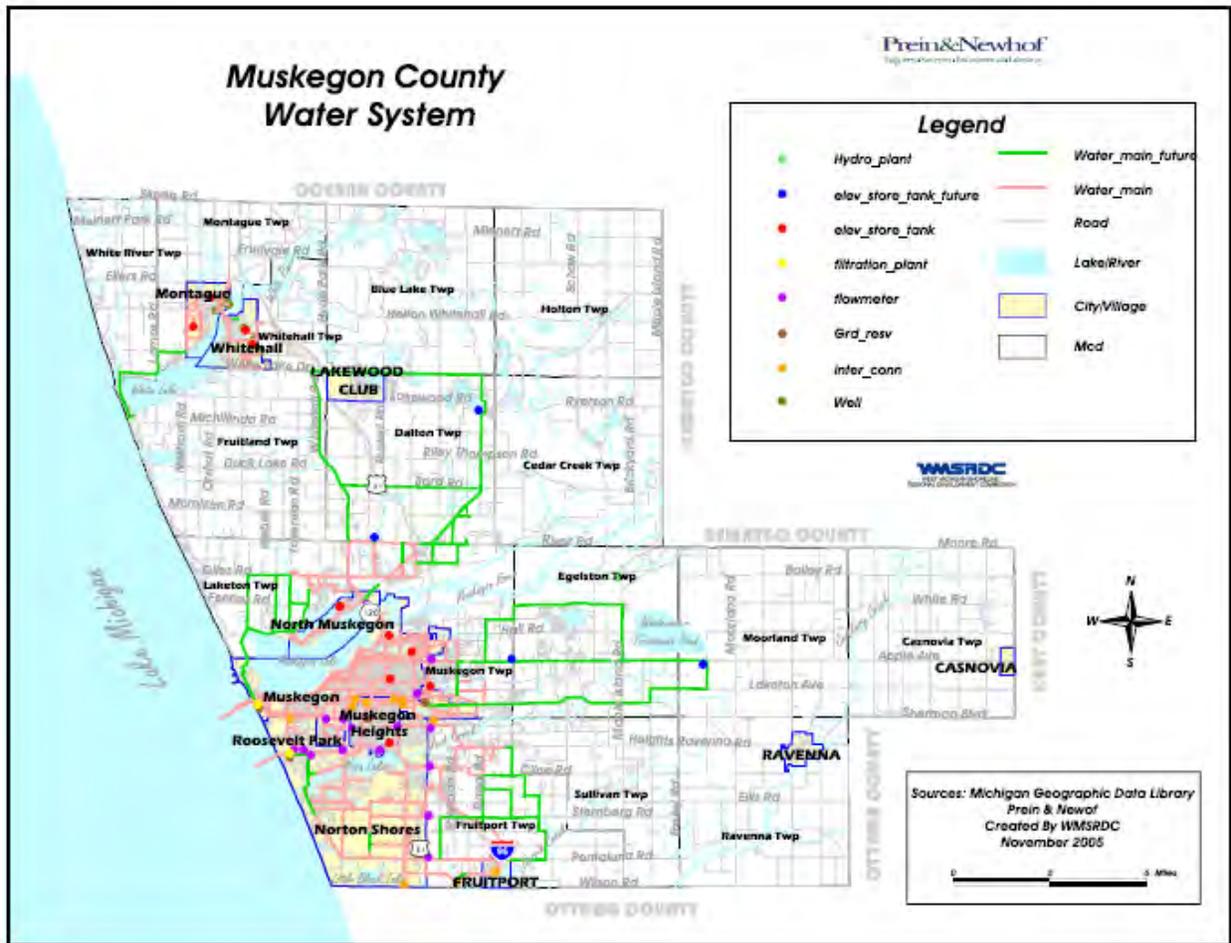
would process the wood and then ship it out via Lake Michigan. As the lumber industry waned, new industries stepped in over time to utilize the seemingly abundant and endless fresh water resources. The historical presence of lumber mills, foundries, and other industry has left many of the county's water bodies polluted; however recent planning and remediation efforts have been successful in mending some of the damages sustained in the past. Today, the water bodies of Muskegon County remain a tremendous asset as economic turmoil takes its toll. The presence of surface water has allowed Muskegon to maintain a sense of place, and has continued to provide its citizens with a wealth of outdoor activities.

The Muskegon County Wastewater Management System (MCWMS) collects and transmits the wastewater to the MCWMS facility via a network of County owned and operated gravity sewer, pump stations, and force mains. MCWMS is the only permitted wastewater facility in the County of Muskegon besides a small lagoon in Ravenna. MCWMS serves 15 municipalities and permits 177 industries. The cities include Montague, Muskegon, Muskegon Heights, North Muskegon, Norton Shores, Roosevelt Park, and Whitehall. The townships include Cedar Creek, Dalton, Egelston, Fruitport, Laketon, Montague, Muskegon, and Whitehall.

Within the 15 municipalities, there are 177 general industrial permits which include 31 Significant Industrial Users and 10 groundwater cleanup sites. Each municipal and industrial user owns and operates its own wastewater collection system which connects to the county system.

The 11,000-acre MCWMS site is permitted to receive 43 million gallons per day and consists of a complete mix aeration basin, an aerated settling basin, 5 billion gallon storage lagoons, and a 5,000-acre, slow-rate irrigation system. The treated effluent and intercepted groundwater is gathered through underdrains and drainage ditches running throughout the site and discharged to the Muskegon River. The map on the following page was originally published in the Muskegon County Strategic Infrastructure Plan, authored by the WMSRDC in 2006. It provides an overview of existing and planned municipal water services in the county.

As of April 2007, the MCWMS had not discharged any untreated wastewater into the surrounding streams, lakes, or wetlands. In 2005, MCWMS took the initiative to upgrade the system to handle storm events from all 15 communities. The county continues to reduce any potential discharges and is obligated to help other communities eliminate their inflow and infiltration into the system.



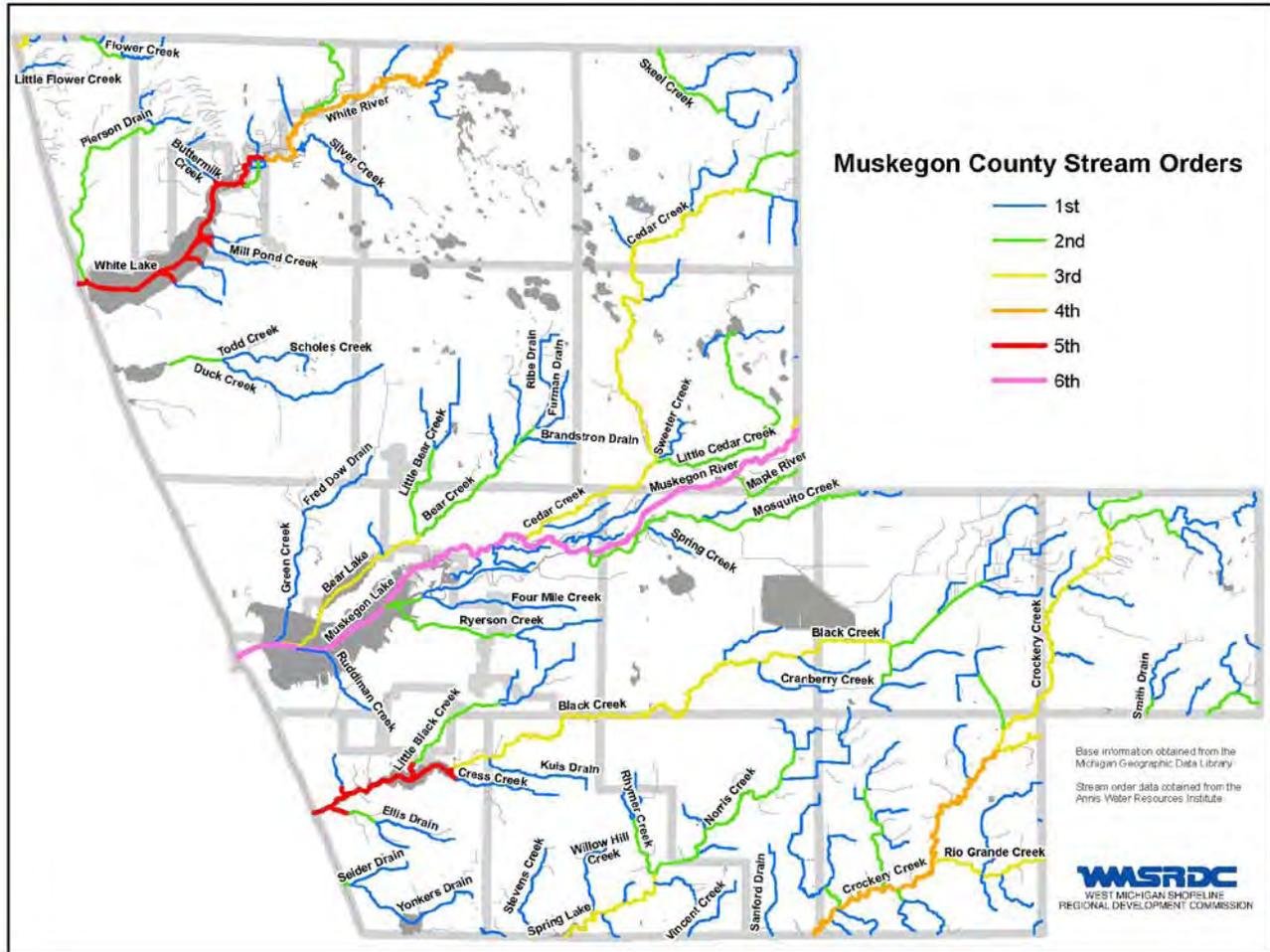
Lakes, Rivers, and Streams:

Anchored by Lake Michigan, the lakes of Muskegon County are plentiful. They provide for a range of activities, from commercial shipping to boating, fishing, swimming, and paddling. While lakes Mona, Muskegon, and White have battled industrial, wastewater, and stormwater pollution in the past, their current conditions are ever-improving. Smaller, more rural lakes risk pollution from individual septic systems and stormwater runoff. This is an issue of increasing importance as areas without public wastewater service become developed.

Muskegon County contains a diverse collection of waterways, ranging from first- and second-order streams, to navigable rivers. The navigable rivers include the Muskegon and the White. These rivers are important features of their respective communities, Muskegon and Whitehall/Montague, and mirror each other in numerous ways: both were utilized during the lumber era; both flow from east to west; and both terminate in lakes that feed into Lake Michigan. The Muskegon River is about 234 miles long, making it the second longest river in Michigan. The White River, which begins in Newaygo County near the City of White Cloud, is an MDEQ-designated “Natural River.” Both of these waterways are considered coldwater fisheries which depend on feeder creeks and streams in order to maintain their cool temperatures.

Surface Water Quality:

One of the many benefits of clean and healthy surface waters is the presence of fish and wildlife. Water quality and overall health of water bodies in Muskegon County greatly rely upon the condition of the sources that feed them, such as groundwater, wetlands, and streams. The county contains a number of first- and second-order streams, which are revealed on the Muskegon County Stream Orders map shown below. These areas, in addition to groundwater and wetland resources discussed in Chapters 4 and 5, should be a high priority for protection and/or conservation as critical natural areas.



The quality of a water body is often linked to its trophic state. Trophic status is a measure of nutrients the water. In general, a lake with more nutrients will contain less oxygen, and therefore hinder the fishery. The table below reveals the “trophic status” of Muskegon County’s largest public access lakes. The table includes three levels of water quality, ranging from mesotrophic (fewer nutrients), to eutrophic (well-nourished), to hypereutrophic (nutrient-rich).

Muskegon County Water Quality			
<i>Name</i>	<i>Watershed</i>	<i>Acreage</i>	<i>Trophic Status</i>
Bear Lake	Muskegon Lake/River	415	H
Blue Lake	White River	330	M
Duck Lake	Duck Creek	313	M
East Twin Lake	Bear Creek	111	E
Fox Lake	White River	80	H
Half Moon Lake	Crockery Creek	58	M
Mona Lake	Mona Lake	695	E
Muskegon Lake	Muskegon River	4,150	E
North Lake	Bear Creek	59	E
White Lake	White River	2,571	E
Wolf Lake	Muskegon River	207	E
Spring Lake	Grand River	1,047	E

Trophic Status Key: M = Mesotrophic; E = Eutrophic; H = Hypereutrophic

Sources: MDEQ Water Quality and Pollution Control in Michigan 2006 Sections 303(d), 305(b), and 314 Integrated Report; Michigan CGI, Dept. of Information Technology; MDEQ Land and Water Management Division, Hydrologic Studies Unit. Compiled by West Michigan Shoreline Regional Development Commission

Muskegon County contains nine Total Maximum Daily Load (TMDL) water bodies that do not meet state and federal water quality standards. A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still safely meet water quality standards. The MDEQ is required to perform TMDL assessments to help determine actions that will assist communities in bringing them into attainment. These bodies are listed in the table below, along with additional details regarding challenges they face.

Impaired Water Body Problem Summary by Lake and Stream		
<i>Name</i>	<i>Problem Summary</i>	<i>Local Description</i>
Muskegon Lake Watershed		
Bear Lake	FCA-PCBs; nutrient enrichment, nuisance algal growths	Tributary to Muskegon Lake located north of Muskegon Lake, Laketon Twp., T10N,R17W, Section 13, 14 and 23. Entire lake
Muskegon Lake	WQS exceedances for PCBs and mercury	Located in Laketon and Muskegon Twps. T10N,R17W and R16W. Entire lake
Ruddiman Creek	Fish and macroinvertebrate communities rated poor; pathogens (Rule 100)	Trib. to Muskegon Lake. Laketon Twp., T10N,R17W, Sec.36
Ryerson Creek	Fish and macroinvertebrate communities rated poor	Tributary to Muskegon Lake
Mona Lake Watershed		
Black Creek	Fish community rated poor	Trib. to Mona Lake
Little Black Creek	Fish and macroinvertebrate communities rated poor; pathogens (Rule 100); nuisance algae, nutrient enrichment	Tributary to Mona Lake S. of Muskegon. Seven mile reach from Muskegon Twp., T10N,R16W, Sec. 26. Dis. to Norton Shores Twp., T9N,R16W, Sec. 5 (inlet to Mona Lake)
Mona Lake	FCA-PCBs	Trib to Lake Michigan
White Lake Watershed		
White Lake	FCA-PCBs and chlordane	Located in Fruitland and Whitehall Twp USGS Quad Maps- Flower Creek, Michillinda and Montague. Entire lake
Mill Pond Creek	WQS exceedances for triethylene glycol dichloride, bis-2-chloroethyl ether and tetrachloroethylene	Tributary to White Lake just west of Whitehall

Source: Institute of Water Research, Michigan State University and Michigan Department of Environmental Quality

Also located in Muskegon County are two internationally designated Areas of Concern (AOC), Muskegon Lake and White Lake. The Great Lakes Water Quality Agreement, between the United States and Canada provides an international framework for a program to clean up contaminated sediment and to restore beneficial uses in 42 AOCs. Local, watershed-based organizations are very involved with local, state, and federal agencies in planning and carrying out the actions needed to restore these water bodies and to remove them from the Great Lakes list of AOCs.

Water Quality Planning:

There are many environmental and conservation groups and programs working in Muskegon County to improve water quality and fish and wildlife habitat. This section provides examples of international, federal, state, and local programs that are having a positive effect on water quality in the area. A detailed listing of watershed and conservation contacts for Muskegon County and the surrounding region can be found in the “West Michigan Watershed Partners Inventory.” That report, completed by the WMSRDC in December 2008, is available on the WMSRDC web site at www.wmsrdc.org.

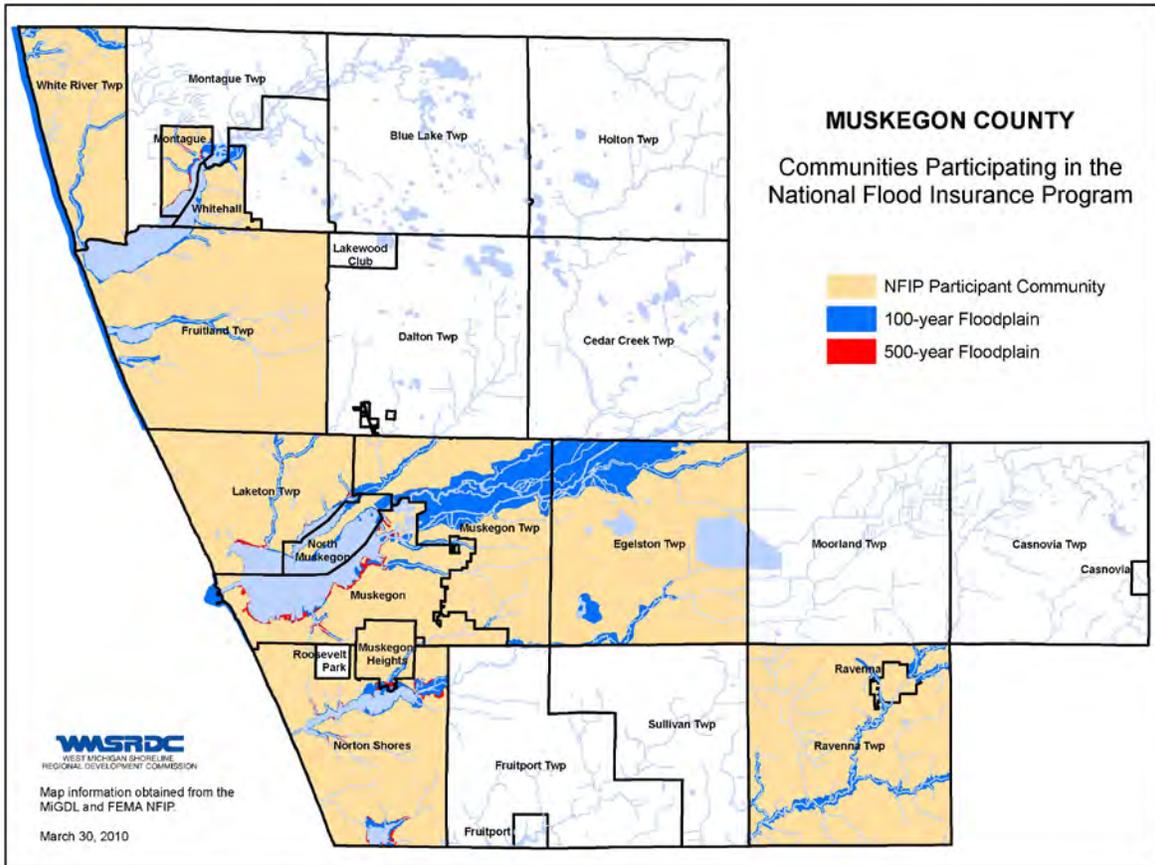
Lake Michigan Lakewide Management Plan:

As part of the Great Lakes Water Quality Agreement between the United States and Canada, work on the *Lake Michigan Lakewide Management Plan (LaMP)* began in the early 1990s. The LaMP is used to identify, guide, and assess restoration of the chemical, physical, and biological functions of Lake Michigan and the water bodies that make up its watershed.

The Lake Michigan LaMP reports that the watershed is undergoing an intermediate to high rate of land development conversions. Of the 3.0 million acre watershed, 24,028 acres of wetland, 193,624 acres of agricultural land, and 142,157 acres of forest land were developed between 1992 and 2001. For more information on the LaMP and the LaMP Forum, visit www.lkmichiganforum.org.

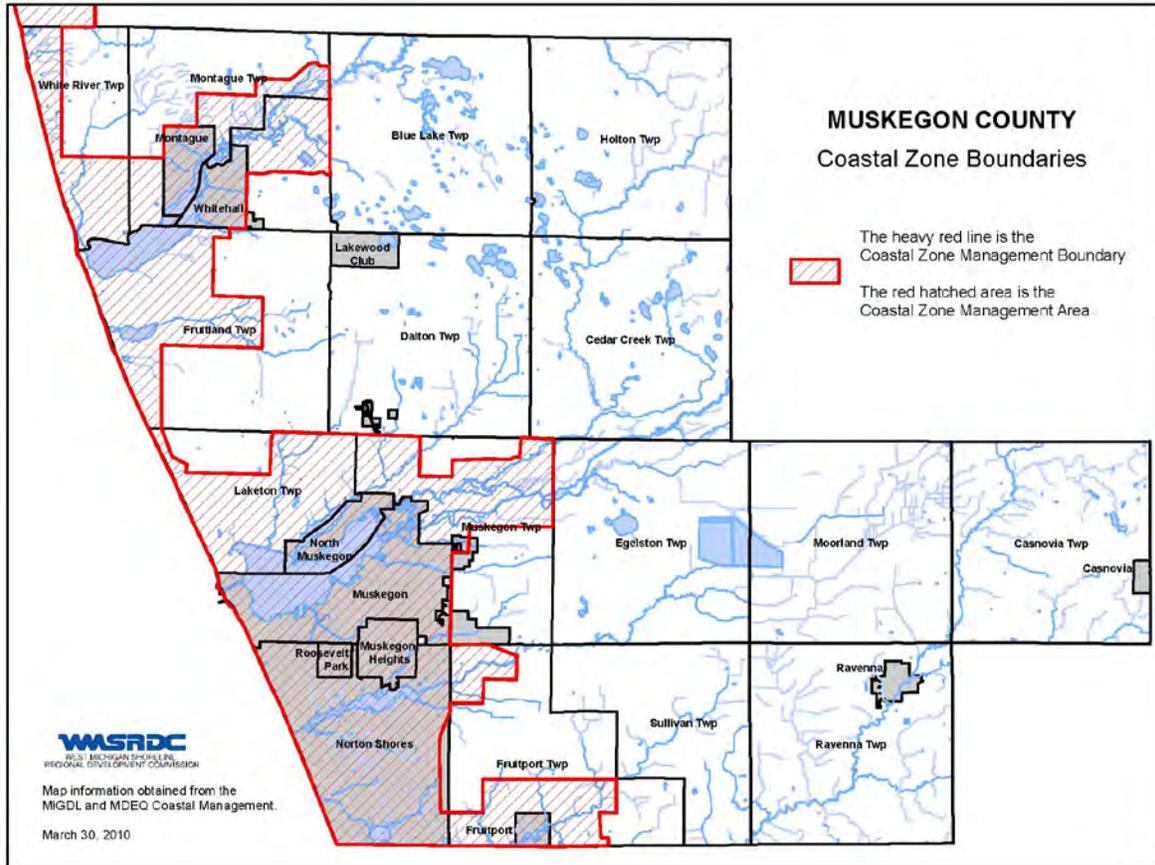
National Flood Insurance Program:

Another program that addresses environmental quality along with community safety is the National Flood Insurance Program. It includes floodplain identification and mapping, floodplain management, and flood insurance. There are 13 communities in Muskegon County that are active participants in the NFIP. Participation at the municipal level is required for a community's citizens to be eligible to purchase flood insurance. For additional information about the NFIP, see <http://www.fema.gov/business/nfip/>.



MDEQ Coastal Zone Management:

An important tool for the protection and enhancement of all coastal watersheds is the Coastal Zone Management (CZM) program, administered by MDEQ. Michigan's CZM program was developed under the federal Coastal Zone Management Act. Since 1978 it has assisted local governments, watershed groups and community organizations by funding coastal management projects that enhance Great Lakes coastal habitats and increase recreational opportunities.



Muskegon Area-wide Plan:

In addition to producing the West Michigan Watershed Partners Inventory, the WMSRDC organized and authored the first-ever Muskegon County land use plan, known as the Muskegon Area-wide Plan (MAP) in April 2005. One section of this comprehensive planning document identifies goals, objectives, and recommendations for Muskegon County regarding natural resources and the environment. This Muskegon County Green Infrastructure Inventory is a specific task listed in the MAP, which available to the public on the WMSRDC website, www.wmsrdc.org.

Muskegon County Watersheds:

Muskegon County is home to three major river watersheds, several smaller lake and stream watersheds, and coastal areas that drain directly to the Lake Michigan nearshore through creeks and groundwater. All water bodies are important from both a local and regional perspective. Green infrastructure planning on a watershed-basis is an important way for communities in West Michigan to realize positive results in local water quality, and to contribute to the overall health of the Lake Michigan and its unique and fragile ecosystem.

The remainder of this section identifies Muskegon County watersheds, along with detailed information originally compiled in the afore-mentioned West Michigan Watershed Partners Inventory.

Bear Creek / Bear Lake Watershed – HUC Code: 04060102

Size and Location:

The Bear Creek / Bear Lake Watershed is located north of Muskegon Lake and is approximately 11.5 miles long from its start in Dalton Township down to its mouth at Bear Lake Channel at Muskegon Lake. The Bear Creek and Bear Lake Watershed covers a land area of 19,058 acres or approximately 29 square miles. The watershed lies entirely within Muskegon County and is shared by five local governments: Dalton Township, Laketon Township, Cedar Creek Township, Muskegon Township, and the City of North Muskegon.



Watershed Management:

The Bear Creek and Bear Lake Watershed Management Plan was completed by the Muskegon River Watershed Assembly and the Muskegon Conservation District in 2005. It was approved under the CMI administrative rules and was funded under section 319. It improved the water quality of its watershed by reducing non-point source pollutants to restore warm-water and cold-water fishery.

Remedial Action Plan:

The Bear Creek / Bear Lake watershed also lies within the boundary of the Muskegon Lake Area of Concern (AOC). In 2006, the Muskegon Lake Watershed Partnership set a water quality improvement target to restore water quality and to remove eutrophication as one of the AOC's Beneficial Use Impairments.

Stormwater Management:

The Muskegon County Municipal Stormwater Committee includes all of the Bear Creek / Bear Lake watershed local governments. They work together to meet requirements of the Phase II stormwater rules through MDEQ's Voluntary Stormwater Permit Program. The Muskegon

Area Stormwater Committee (MASC) completed their watershed plan in November, 2005. The Muskegon Lake Watershed Partnership provides public input for the watershed plan and stormwater pollution prevention initiatives. The Muskegon Conservation District provides public education. The City of North Muskegon developed a Phase II stormwater permit program independently from the MASC.

Total Maximum Daily Load Assessment:

The 2008 TMDL Assessment for Bear Lake is being developed by the Michigan Department of Environmental Quality. Water quality sampling for nutrients was completed by GVSU-Ann Arbor Water Resources Institute in 2007. Three public meetings have been held to engage the public in the TMDL process. The MDEQ developed the TMDL Assessment and it was approved by US EPA in December, 2008.

Fisheries and Habitat:

Little Bear Creek is a designated coldwater trout stream.

Watershed Highlights:

As of 2008, the Phase II stormwater regulated townships no longer participate in the voluntary stormwater permit program. Local organizations and agencies are developing a watershed-based partnership to utilize the TMDL and to build on the 319 Plan to develop a focused Information & Education Strategy and to work with local governments to develop policies for improved natural resources and water quality.

Duck Lake Watershed – HUC Code: 04060102

Size and Location:

The Duck Lake Watershed, which includes Duck Creek, is located north of Muskegon Lake and is approximately 9 miles long. It lies entirely within Muskegon County and is shared by three local governments: Dalton Township, Fruitland Township and Lakewood Club. The watershed covers a land area of 13,950 acres, or approximately 22 square miles. The coverage begins in western Dalton Township and drains into Lake Michigan in Fruitland Township through the Duck Lake Channel.



Watershed Management:

The Muskegon Conservation District applied for a MDEQ 319 Watershed Management Plan for the Duck Creek Watershed in 2008. If funded, goals and objectives of the plan aim to improve water quality by reducing non-point source pollutants to restore the warm-water and cold-water fisheries.

Fisheries and Habitat:

Duck Creek is a designated coldwater trout stream.

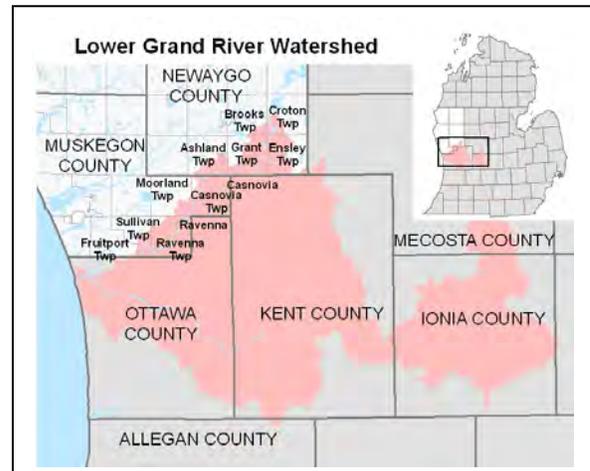
Watershed Highlights:

Duck Creek is an MDEQ-recognized high quality watershed. A Duck Creek Watershed Assembly meets regularly to engage stakeholders in the development of a watershed plan and related conservation planning to preserve and restore the integrity of the Duck Creek / Duck Lake ecosystem.

Lower Grand River Watershed – HUC Code: 04050006

Watershed Size and Location:

The Lower Grand River watershed is approximately 3,020 square miles. The Grand River flows into Lake Michigan at Grand Haven. Most of the watershed is covered by residences, urban centers, forests, and agriculture. The watershed is 53% agricultural, and includes the metropolitan area of Grand Rapids. The riparian habitat is 25-50% forested and includes 1,108 perennial stream/river miles. The drainage area encompasses portions of Ottawa, Muskegon, Newaygo, Kent, Ionia and Mecosta Counties.



Grand River Watershed in Muskegon County:

In Muskegon County, the Grand River watershed includes portions of the Crockery Creek, Norris Creek and Spring Lake watersheds and traverses portions of Casnovia, Moorland, Ravenna, Sullivan and Fruitport Townships and the Village of Ravenna.

Green Infrastructure Planning and Watershed Management:

The Lower Grand River 319 Watershed Management Plan (WMP) was completed by the Grand Valley Metropolitan Council in September, 2004 to address poor fish and macroinvertebrate communities, sedimentation, elevated nutrient levels, and excessive algae growth. It reduced nutrients, sedimentation, mercury, pathogens, and Polychlorinated Biphenyls contamination to protect and preserve fisheries, agricultural, and recreational opportunities.

Total Maximum Daily Load Assessment:

The Total Maximum Daily Load (TMDL) assessment for *Escherichia coli* for Rio Grande Creek in Muskegon and Ottawa Counties was completed by MDEQ in January, 2003. The MDEQ has identified 36 water bodies within the LGRW that require TMDLs. Pollutants of concern include polychlorinated biphenyls (PCBs), mercury, sediment, nutrients, pathogens (*E. coli*), low dissolved oxygen, and untreated sewer discharges. MDEQ biological surveys have reported that urbanization of the watershed, with increased impervious surfaces, is accelerating sedimentation and flow fluctuations from storm water runoff, which causes impairments to its streams. Nonpoint source pollution from agricultural sources was cited as a source of nutrients and possibly pathogens. Biota TMDLs have been approved by the USEPA for reaches totaling

107 stream/river miles in this watershed, while 53 miles still require TMDL development. *E. coli* TMDLs have been approved by the USEPA for reaches totaling 86 stream/river miles in this watershed, while 62 miles still require TMDL development. Approximately 11.5% (127 of 1,108 perennial stream/river miles) of the Grand River watershed is listed as impaired due to a fish consumption advisory for PCBs or elevated fish tissue mercury concentrations. The entire lower Grand River watershed (1,108 miles) is impaired due to water quality standard (WQS) exceedances for PCBs in water. In addition, 92 stream/river miles are impaired due to WQS exceedances for mercury in water, while 47 miles are impaired due to other water quality parameters. In 2004, macroinvertebrate and habitat surveys were conducted at 45 sites. Of these, 41 were attaining WQS for aquatic life (MDEQ, Rockafellow, 2005). Based on 2004 and previous data, a total of 181 miles are not attaining WQS due to a poor macroinvertebrate/fish community.

Stormwater Management:

The Lower Grand River Watershed (LGRW) includes 39 governmental entities working on stormwater management through the National Pollutant Distribution and Elimination System (NPDES) and the MDEQ's voluntary stormwater permit program. Within the WMSRDC region, there are seven (7) jurisdictions working cooperatively on the watershed-based program, including Ferrysburg, Grand Haven, Spring Lake Village, Spring Lake Township, Ottawa County Road Commission and Ottawa County Administration and Drain Commission. Robinson Township is utilizing the jurisdictional permit to meet NPDES stormwater regulations.

Fisheries and Habitat:

A Michigan DNR acquisition, through the Michigan Natural Resource Trust Fund and other sources preserved the 550-acre Bakale Tract (Ottawa County) parcel on the Grand River by Grand Haven. It protects a diverse wetland habitat complex and provides recreational opportunity. The project generated sufficient partner match to facilitate a \$1 million North American Waterfowl Conservation Act (NAWCA) grant for the Grand River watershed. It was administered by Ducks Unlimited and provided almost 2,000 additional acres of wetland and associated upland habitat projects in the Grand River watershed.

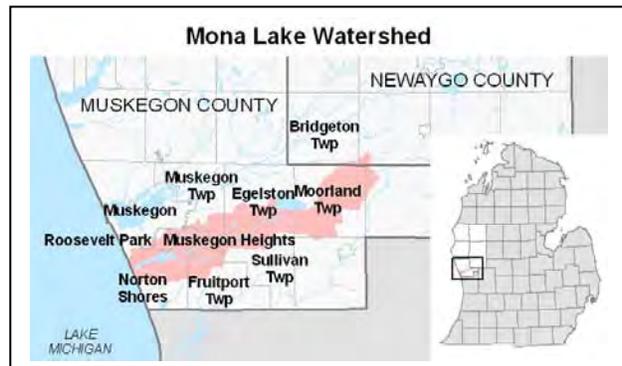
Watershed Highlights:

Recent and ongoing monitoring and protection activities for the lower Grand River watershed include: in FY 2004, ongoing NPS grant projects in the lower Grand River watershed included one Section 319, one Clean Water Action Program, and four CMI grants (MDEQ, 2004a); MDEQ-approved NPS watershed management plans have been written for several streams/ivers in the watershed; the MDNR, Fisheries Division, has completed the first two years of a five-year river assessment project (the completion date is scheduled for 2007); the MDNR, Fisheries Division, awarded an Inland Fisheries Grant to the village of Diamondale to remove the Wilson Dam (Diamondale Dam); and several volunteer monitoring organizations, including the Coldwater River Watershed Council, Friends of the Looking Glass River, and West Michigan Environmental Action Council, monitor sites in the lower Grand River watershed.

Mona Lake Watershed – HUC Code: 04060101

Size and Location:

The Mona Lake watershed is 46,000 acres in size, covering areas of Muskegon and Newaygo counties. The watershed includes portions of the cities of Norton Shores, Muskegon, Muskegon Heights, and Roosevelt Park and the townships of Fruitport, Sullivan, Egelston, Muskegon, Moorland, Bridgeton, Casnovia, Ashland and Ravenna.



Watershed Management:

The Mona Lake Watershed Study was published by WMSRDC in 1996 as a service to the Mona Lake Watershed Study Steering committee. The document served as both a policy guide for decision-makers and as a useful reference tool regarding conditions in the watershed.

In December, 2003 Grand Valley State University Annis Water Resources Institute published a preliminary watershed / ecological assessment. It was conducted to provide a new baseline of information, in the hope that this effort would catalyze actions to improve the health of the watershed. Mona Lake water quality has improved since the early 1970s, although nutrient concentrations are still above water quality standards. The complete study can be viewed at www.gvsu.edu/wri/director.

In 2004, the Mona Lake Watershed Council began work on a Watershed Management Plan, outlining pollutants, sources and causes and specific projects for implementation. The completed plan is posted on the MDEQ website at http://www.michigan.gov/deq/0,1607,7-135-3313_3682_3714_4012-95955--,00.html. The Citizen's Version of the plan can be downloaded from the Mona Lake Watershed Council's website at www.monalakewatershed.org.

Total Maximum Daily Load Assessment:

The MDEQ performed a Total Maximum Daily Load assessment for biota in Black Creek in August, 2003 and in September, 2003 completed one for Little Black Creek.

Stormwater Management:

Municipalities within the Mona Lake watershed participate in the MDEQ voluntary stormwater permit program to meet Phase II stormwater requirements. A Mona Lake watershed management plan was developed for the Muskegon County Municipal Stormwater Committee and approved by MDEQ. In 2007, GVSU Annis Water Resources Institute (AWRI) began a \$348,415 project to study the effects of surface runoff from the highly concentrated road network impacting the Little Black Creek basin. The study will assist decision makers in selecting and implementing appropriate restoration and remediation activities.

Fisheries and Habitat:

A reach of Black Creek above Maple Island Road does not meet water quality standards due to habitat modifications from channelization.

Watershed Highlights:

During the spring and summer of 2003, the Lake Michigan Forum, a committee of public stakeholders providing input to the US Environmental Protection Agency on the Lake Michigan Lakewide Management Plan (LaMP), conducted an assessment of environmental stewardship in Michigan's Mona Lake watershed. The Mona Lake Watershed Stewardship Assessment process was aimed at identifying opportunities for creating a permanent ethic of environmental stewardship among leaders and the general public in the local watershed. The study provided baseline information about the watershed tributaries and water quality.

Green Infrastructure:

Some of the green infrastructure practices that the MLWP plans to pursue include the following:

- Urban reforestation to increase city tree canopy and transform unnecessary paved areas into areas landscaped with trees, creating new green infrastructure.
- Working with a few large land owners in the industrial park to better manage stormwater on site with cisterns and other LID techniques.
- Repairs to Little Black Creek corridor by connecting the creek channel to adjacent wetlands. Dredge spoils along the banks have separated stream flow from adjacent wetlands.
- Looking along the Black Creek and Little Black Creek corridor for conservation easement and restoration projects.

Contact:

Brenda Moore, AICP, PCP
Mona Lake Watershed Council
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Muskegon, MI 49444
info@monalakewatershed.org
(231) 740-7521

Muskegon River Watershed – HUC Code: 04060102

Size and Location:

The Muskegon River Watershed (Clare, Lake, Mecosta, Missaukee, Montcalm, Muskegon, Newaygo, Osceola, Roscommon, and Wexford Counties) is the second largest watershed in Michigan.

Watershed Management:

A watershed management plan was approved under the CMI administrative rules and was funded under section 319. The Muskegon River was originally threatened by development and a variety of nonpoint sources. Logging, the clearing of land for agriculture, development, and the location of hydro dams on the river have aggravated the impact of sedimentation on the waterways.

Total Maximum Daily Load Assessments:

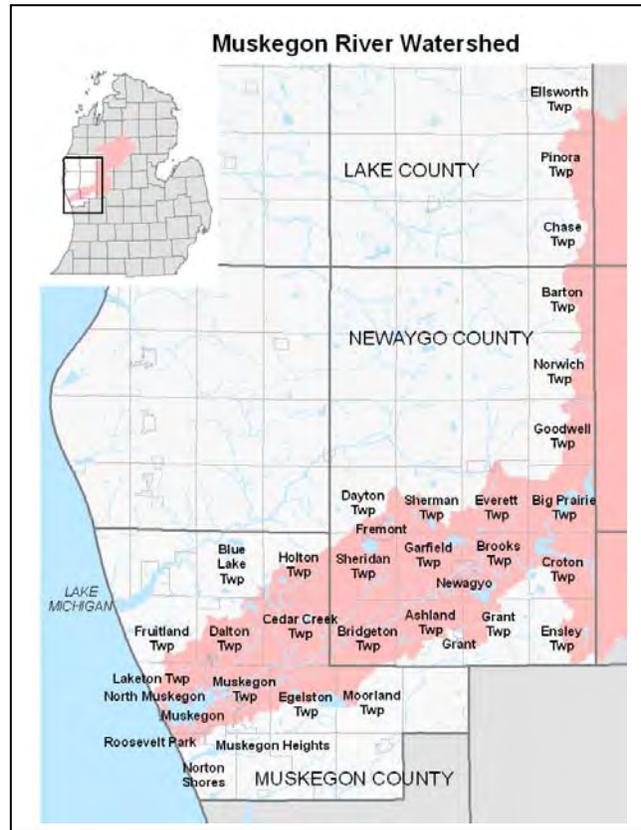
All TMDL water bodies are in the Muskegon Lake watershed. For more information, see the Muskegon Lake Watershed summary (below) and Chapter 3.

Stormwater Management:

All of the Muskegon River watershed Phase II, regulated stormwater communities are within the Muskegon Lake portion of the watershed. They are summarized under Muskegon Lake Watershed (below).

Fisheries and Habitat:

The Muskegon River Management Plan was published by the Michigan Department of Natural Resources Fisheries Division in February, 2003. The Plan is a companion document to the Muskegon River Watershed Assessment, (O’Neal 1997). The river assessment describes physical characteristics and biological communities of the Muskegon River as well as unique resources found within the watershed. The purpose of the river assessment is to identify opportunities and problems related to the aquatic resources and fisheries within the watershed; provide a mechanism for public comment into fisheries management decisions; and serve as a reference document for those seeking information regarding the Muskegon River watershed. The Muskegon River Watershed Assessment was drafted by Fisheries Division personnel, then went through a significant period of peer and public review and comment, and was completed in July, 1997.



The following reports and management plans are available to guide fisheries and watershed management efforts in Muskegon Lake and the Muskegon River watershed:

- O'Neal, R. P. 1997. Muskegon River Watershed Assessment. Michigan Department of Natural Resources, Fisheries Division Special Report 19, Ann Arbor.
- O'Neal, R. P. 2003. Muskegon River Management Plan, River Management Plan 04, Michigan Department of Natural Resources, Fisheries Division, Ann Arbor.
- O'Neal, R. P., and G. J. Soulliere. 2006. Conservation Guidelines for Michigan Lakes and Associated Natural Resources. Michigan Department of Natural Resources, Fisheries Division Special Report 38, Ann Arbor.

The Muskegon River Watershed Assessment can be found at this website:

http://www.michigan.gov/dnr/0,1607,7-153-10364_10951_19056---,00.html

The Walleye Population and Fishery of the Muskegon Lake System, Muskegon and Newaygo Counties, Michigan in 2002 can be found at this website:

http://www.michigan.gov/documents/dnr/Sr40_199576_7.pdf

For additional information, contact: Richard P. O'Neal, Michigan Department of Natural Resources Fisheries Division Muskegon State Game Area 7550 E. Messenger Road Twin Lake, MI 49457 Telephone, 231-788-6798; Fax, 231-788-5249; E-mail: onealr@michigan.gov

Watershed Highlights:

The Muskegon River watershed begins at Houghton and Higgins Lake and enters Lake Michigan at Muskegon Lake. The river is considered a “cool” water stream, including warm and cold water fisheries. Muskegon Lake is a “drowned river mouth” lake and an internationally designated Area of Concern (AOC). For more information about watershed improvement and stewardship in the Muskegon River watershed, please visit the Muskegon River Watershed Assembly web site at www.mrwa.org

Muskegon Lake Watershed – HUC Code: 04060102

Size and Location:

Muskegon Lake is a 4,149 acre drowned river-mouth coastal lake located in Muskegon County, Michigan along the east shoreline of Lake Michigan.

Watershed Management:

Muskegon Lake is a high quality fishery, but it is impacted by urban storm water runoff, agricultural runoff, erosion, and sedimentation. Boating, fishing, urban runoff, road-stream crossings and residential encroachments all deliver sediment to Muskegon Lake tributaries, which alters channel morphology and increases bank erosion. Several non-point source



projects have been implemented to reduce sediment, nutrient and storm water pollution into the Muskegon River and Muskegon Lake by stabilizing eroding banks and installing vegetative buffers along the water's edge.

Remedial Action Plan:

The 1978 Muskegon Lake Remedial Action Plan, along with the 1994 and 2002 updates, were developed to address the 1985 Muskegon Lake designation as an Area of Concern (AOC). The lake was identified as an AOC because of water quality and habitat problems associated with shoreline alterations, the historical discharge of pollutants into the AOC, and the potential adverse effect the pollutants could have on Lake Michigan. The high levels of nutrients, solids, and toxics entering the lake had caused a series of problems including nuisance algal blooms, reduced oxygen in the lake's deeper water, tainted taste of fish due to petroleum products in the water and contaminated sediments. The pollutant discharges also were suspected of contributing to the degradation of benthos (bottom-dwelling organisms, also referred to as the benthic community), the contamination of fish, and the reduction in fish and wildlife habitat. In addition, the post-World War II development of chemical, petrochemical, and heavy industries was causing localized groundwater contamination that was moving toward the lake and its tributaries.

The AOC includes the entire lake and its immediate tributaries, including Ryerson Creek, Ruddiman Creek, Green Creek, Four Mile Creek, Bear Lake and a portion of Little Bear Creek. Mosquito Creek and Cedar Creek are not within the AOC boundary.

The Muskegon Lake Watershed Partnership (MLWP) provides coordination, educational and technical support to implement the 2002 Muskegon Lake Community Action Plan. Priorities include remediation of contaminated sediments in the lake and tributaries, prevention of eutrophication, nonpoint source pollution control, brownfield and waterfront restoration, and habitat restoration. The MLWP works on projects to improve the ecosystem and to restore nine Beneficial Use Impairments (BUIs). In 2006 and 2007, the MLWP worked with Grand Valley State University-Annis Water Resources Institute and the MDEQ to develop a set of targets to measure progress toward restoring BUIs.

Total Maximum Daily Load Assessment:

A total of four TMDL assessments are scheduled for the Muskegon Lake watershed, including each of the following water bodies: Muskegon Lake, Bear Lake, Ruddiman Creek and Ryerson Creek. (For more information about TMDLs, see chapter 3.)

Stormwater Management:

The Muskegon Lake Stormwater Management Plan was completed by Fishbeck, Thompson, Carr & Huber for the Muskegon County Municipal Stormwater Committee, in consultation with the Muskegon Lake Watershed Partnership. The plan was approved by the MDEQ in 2005. The watershed municipalities have each developed Storm Water Pollution Prevention Initiatives (SWPPIs) outlining Best Management Practices that meet the goals of the watershed plan.

Fisheries and Habitat:

The following reports and management plans are available to guide fisheries and watershed management efforts in Muskegon Lake and the Muskegon River watershed:

- O'Neal, R. P. 1997. Muskegon River Watershed Assessment. Michigan Department of Natural Resources, Fisheries Division Special Report 19, Ann Arbor.
- O'Neal, R. P. 2003. Muskegon River Management Plan, River Management Plan 04, Michigan Department of Natural Resources, Fisheries Division, Ann Arbor.
- O'Neal, R. P., and G. J. Soulliere. 2006. Conservation Guidelines for Michigan Lakes and Associated Natural Resources. Michigan Department of Natural Resources, Fisheries Division Special Report 38, Ann Arbor.

The Muskegon River Watershed Assessment can be found at this website:

http://www.michigan.gov/dnr/0,1607,7-153-10364_10951_19056---,00.html

The Walleye Population and Fishery of the Muskegon Lake System, Muskegon and Newaygo Counties, Michigan in 2002 can be found at this website:

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For additional information, contact: Richard P. O'Neal, Michigan Department of Natural Resources Fisheries Division Muskegon State Game Area 7550 E. Messenger Road Twin Lake, MI 49457 Telephone, 231-788-6798; Fax, 231-788-5249; E-mail: onealr@michigan.gov

Watershed Highlights:

In 2006, 90,000 cubic yards of contaminated sediments in Ruddiman Creek were cleaned up through the US Environmental Protection Agency (EPA) Great Lakes Legacy Act and Michigan Clean Michigan Initiative (CMI) partnership.

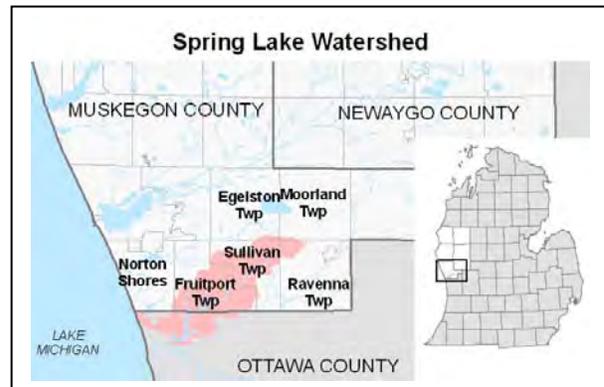
In 2007, the Division Street Outfall sediment investigation was completed and a 2008 feasibility study is underway to develop alternatives for the cleanup of approximately 180,000 cubic yards of sediment contaminated with mercury, oil, grease and PAHs.

In 2007, the US EPA Great Lakes National Programs Office, Biohabitats and the MLWP developed a community-based ecological habitat restoration master plan for a portion of Muskegon Lake's south shoreline and the Ruddiman Creek riparian corridor. The US Fish and Wildlife Service Coastal Program is partnering with MLWP and Muskegon River Watershed Assembly with support for fish and wildlife habitat restoration, invasive species management and monitoring.

Spring Lake Watershed – HUC Code: 04050006

Size and Location:

Spring Lake is eutrophic lake, located in west Michigan along the shores of Lake Michigan near the mouth of the Grand River. The Ottawa County lake was being impacted by agricultural land in the headwater region of the 16,263-acre watershed and urban lands surrounding the lake. Spring Lake and the Grand River are impacted by high levels of phosphorus and potentially-toxic cyanobacteria blooms and the nearshore areas of Lake Michigan are showing signs of impairment from nonpoint source pollution.



Watershed Management:

The Spring Lake Watershed Plan (Spring Lake – Lake Board, 2001) was approved under the CMI administrative rules and was funded under section 319. The overall goal of the plan is to protect threatened designated uses and restore impaired designated uses of navigation, warm water fishery, indigenous aquatic wildlife, partial body contact recreation, and total body contact recreation. Spring Lake is also included in the Lower Grand River Watershed Management Plan (Grand Valley Metro Council, 2004).

Stormwater Management:

The *Lower Grand River Stormwater Management Plan* addresses the Spring Lake watershed. Spring Lake Village, Spring Lake Township, Village of Fruitport, Fruitport Township and Ferrysburg are the Phase II communities included in the plan. (For more information about Phase II Stormwater Communities, see chapter 5).

In March 2010, the Annis Water Resources Institute (AWRI) completed the “*Rein in the Runoff*” *Integrated Assessment of Stormwater Management Alternatives for the Spring Lake Watershed*. This integrated assessment was a collaborative, community-based project that examined the causes and consequences of, and corrective alternatives available to control stormwater discharges to Spring Lake and its tributary streams, the Grand River, and ultimately, Lake Michigan. The goals of this project, funding by Michigan Sea Grant and AWRI, were to:

- Increase Spring Lake area residents' and decision makers' general knowledge and understanding of the causes and consequences of stormwater runoff, and how they apply specifically to Spring Lake, the Grand River, and Lake Michigan
- Increase stakeholder stewardship of the water resources surrounding Spring Lake Township and the Village of Spring Lake, and in particular, increase participation in stormwater control and management
- Identify inconsistencies between state regulations and/or local ordinances that can improve local stormwater management and control

- Provide a suite of alternative stormwater management Best Management Practices (BMPs) tailored to Spring Lake Township and the Village of Spring Lake

For complete details regarding this project, including the results, conclusions, final report, watershed map atlas, and other community resources, please visit the project website: <http://www.gvsu.edu/wri/reininthrunoff>.

Watershed Highlights:

The Reduction of Internal Phosphorus Loading Using Alum in Spring Lake, Michigan was published by GVSU-AWRI in February, 2004.

Green Infrastructure:

The Integrated Valuation of Ecosystem Services Tool (INVEST), provides value estimates for ecosystem services associated with green infrastructure in West Michigan. This project includes Muskegon, Newaygo, Ottawa, Allegan, Kent, Ionia, and Barry counties. Additional information about the INVEST online tool can be found at: <http://INVEST.wri.gvsu.edu>.

Contact:

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 Fax: (616) 331-3864

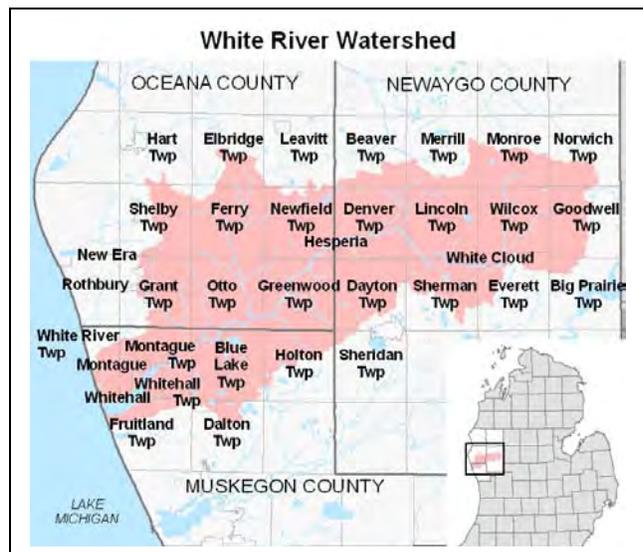
White River Watershed – HUC Code: 04060101

Size and Location:

The White River flows 120 miles through Michigan. Its watershed covers 344,166 acres of mostly forested and agricultural land. The continued loss of stream-side vegetation and the resulting erosion is affecting the system.

Watershed Management:

The Michigan Department of Environmental Quality has awarded GVSU-Annis Water Resources Institute \$154,918 to develop a 319 watershed management plan to reduce the negative impact that nonpoint source pollutants are having on water quality. The White River Watershed



Partnership, the White Lake Association, the Muskegon Conservation District, the White Lake Public Advisory Council, and the Annis Water Resources Institute have committed match to the project bringing the project total to \$177,000. The project will be carried out over a two-year period, beginning November 1st, 2006. Project updates, events, and volunteer opportunities will be posted on the White River Watershed Partnership website and in the newsletter.

Stormwater Management:

There are no Phase II-regulated stormwater communities in the watershed.

Watershed Highlights:

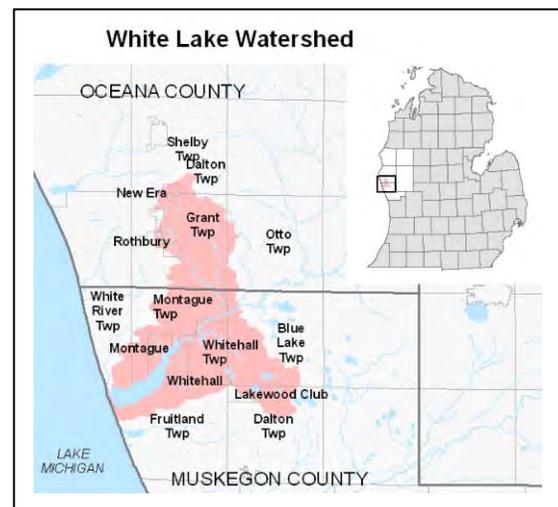
Michigan’s White River and its watershed comprise one of the few urban river systems in the United States that still contains large tracts of relatively pristine landscape. As pressure to develop this land increased, Alcoa and more than 40 local stakeholders worked together to develop preservation strategies to ensure the unique and irreplaceable assets of the river system would not be lost forever. In 2002, Alcoa Foundation provided a \$100,000 grant to initiate the preservation of this freshwater ecosystem, a task carried out by the Community Foundation for Muskegon County, Alcoa, its Howmet Castings Whitehall Operations, and local stakeholder groups. These groups included environmental organizations, citizens groups, corporate interests, school districts, regional university scientists, governmental agencies, and elected officials.

The White River Watershed Partnership (WRWP) is a Michigan 501 (c)(3) Not-for-Profit Organization, established in 2003. The WRWP recognized that the White River Watershed is a unique resource that needs protection. The White River is a MDED designated Natural River.

White Lake Watershed – HUC Code: 04060101

Size and Location:

White Lake is a 2,570 acre coastal, drowned river mouth lake located in Muskegon County along the east shore of Lake Michigan, in the vicinity of the communities of Montague and Whitehall. The Area of Concern (AOC) includes White Lake and White River Watershed. Most of the land around the lake is wooded or grassy, with sand dunes located along Lake Michigan. Land use in the White River Watershed is primarily recreational and agricultural, with the uses around White Lake being residential, commercial, industrial, and agricultural.



Watershed Management:

White Lake / White River priorities for watershed management are eutrophication and nutrient management, and riparian corridor restoration. These White Lake issues are being addressed

as part of the White River Watershed Management Plan (described in White River section, above).

Remedial Action Plan:

The original White Lake AOC Remedial Action Plan (RAP) was developed in 1987. It was updated in 1995 and again in 2002 as the White Lake Community Action Plan. The Muskegon Conservation District and the Natural Resources Conservation Service assist the White Lake Public Advisory Council (PAC) with project staff, as well as educational and technical support to coordinate implementation of the White Lake RAP.

AOC priorities include contaminated sediment remediation, eutrophication control, remediation of groundwater and former industrial site contamination, and wildlife habitat and population restoration. White Lake was originally listed as an AOC primarily due to contaminated groundwater migrating to the lake from the Occidental Chemical Site (formerly Hooker Chemical Company). There are eight other sites of contamination with the potential to affect the lake, some of them in varying states of remediation.

The RAP process identified seven of the Great Lakes Water Quality Agreement's 14 beneficial uses as being impaired. Beneficial Use Impairments (BUI) in the AOC include Restrictions on Fish and Wildlife Consumption, Loss of Fish and Wildlife Habitat, Degradation of Fish and Wildlife Populations, Degradation of Benthos, Restrictions on Dredging Activities, Restrictions on Drinking Water Consumption or Taste and Odor Problems, and Degradation of Aesthetics.

Total Maximum Daily Load Assessments:

The Mill Pond Creek TMDL assessment was completed by MDEQ in 2004. The White Lake TMDL assessment is scheduled for 2009.

Stormwater Management:

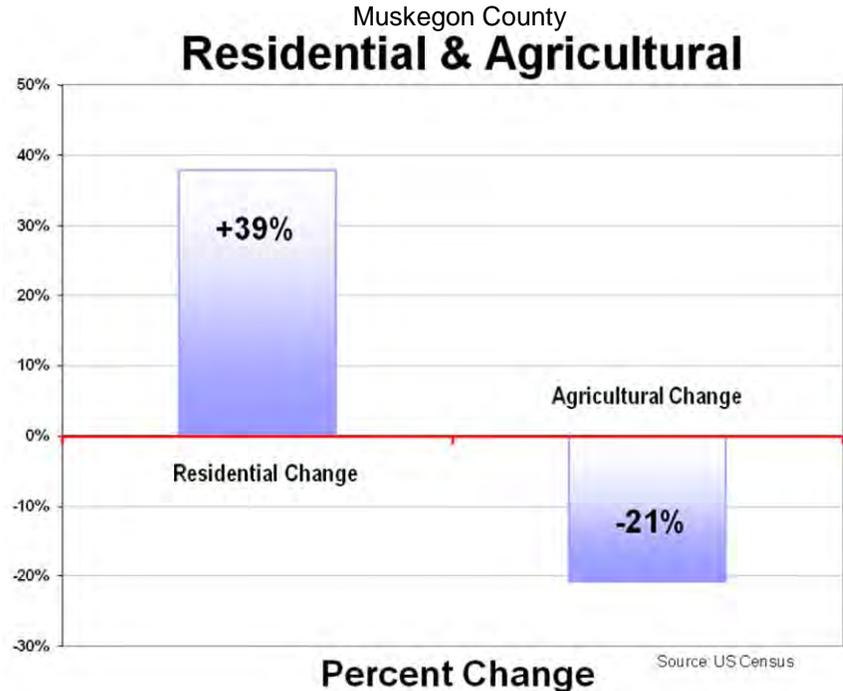
There are no NPDES regulated municipal stormwater communities within the White Lake watershed.

Watershed Highlights:

The White Lake Public Advisory Council (PAC) worked with Grand Valley State University - Annis Water Research Institute (GVSU-AWRI) to develop delisting targets for five of the seven BUIs in 2006. The targets have been approved by the PAC and will go through a technical review by the MDEQ to be officially approved. In 2007, the White Lake Public Advisory Council worked with the Muskegon Conservation District to develop restoration and delisting targets for the Degradation of Fish and Wildlife Populations, Loss of Fish and Wildlife Habitat BUIs and Restrictions on Drinking Water Consumption, to be reviewed for MDEQ approval in 2008.

Chapter 7: Farm Land

People depend on green infrastructure for food. Local food production illustrates the basic, natural connection that people have with the land. People often view themselves as separate from nature, although most agree that food quality and security depend on a healthy ecosystem. Soil health and other natural features make up the building blocks of the green infrastructure that provides people with one of the most critical ecological service benefits – our food.

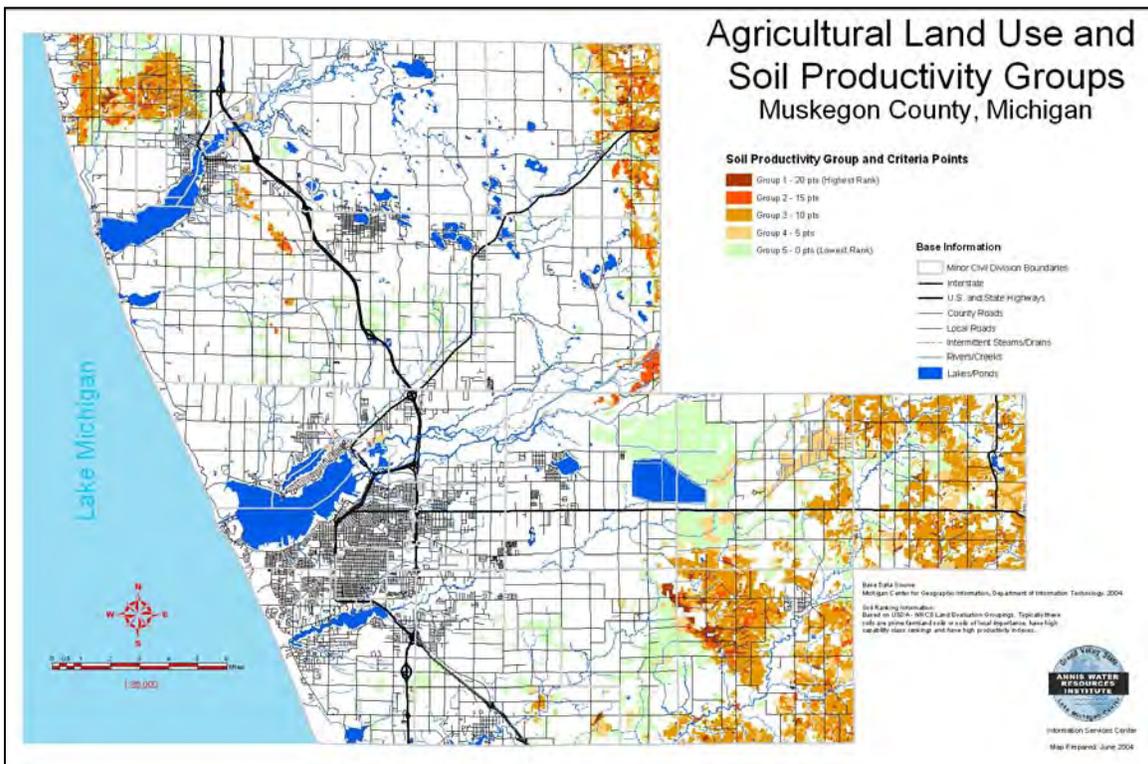
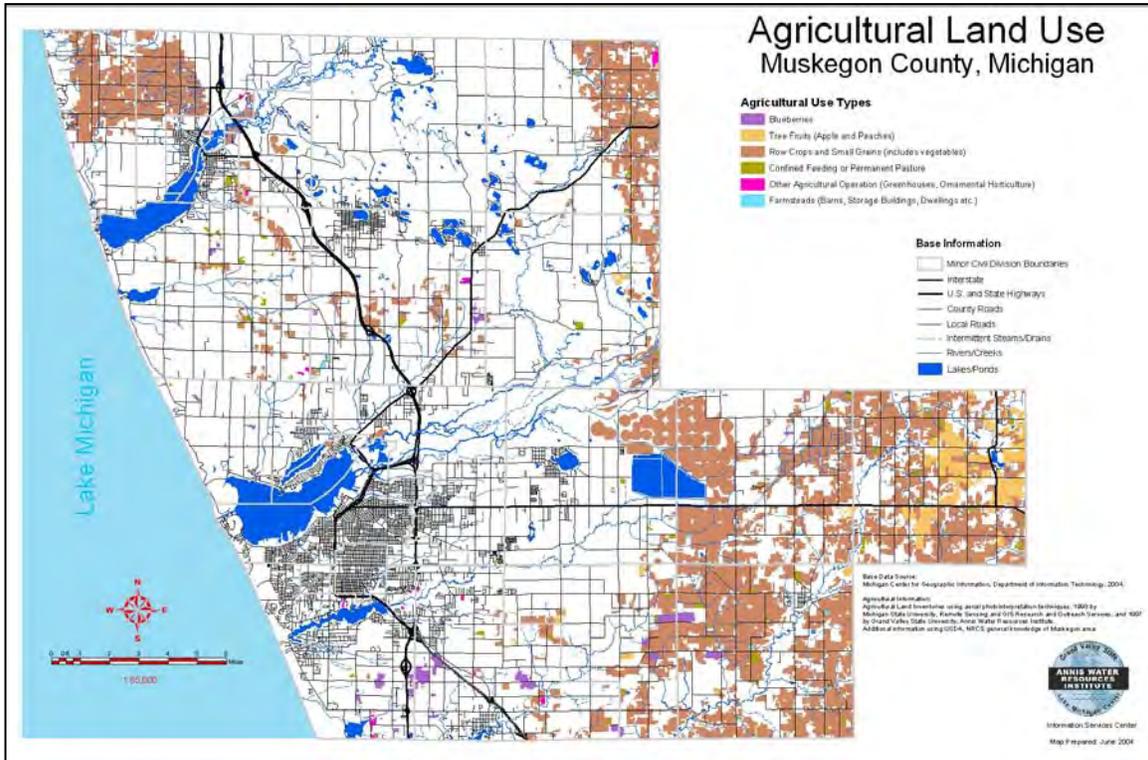


Farmland in Muskegon County:

Muskegon County's agricultural land is a unique and economically important resource. These lands support a locally important and globally unique agricultural industry that includes: dairy, livestock, food from grains, vegetables, fruit and nursery and greenhouse crops. Muskegon County's climate, topography and accessibility, make it well suited to the production, processing and distribution of agricultural products on a regional, national and international level. Muskegon County's economic base is also supported by a variety of agriculturally related businesses, including: farm equipment, fuel, veterinarians, grain dealers, packaging plants, and professional services.

In addition to its economic benefits, the county's farmland contributes significantly to the open space and natural resource benefits, including rural character, scenic beauty, cultural heritage, hunting and other recreational opportunities, and the environmental benefits including watershed protection and wildlife habitat. By enhancing the scenic beauty and rural character of the county and providing other open space benefits, the county's farmland increases the overall quality of life and makes the county an attracting place to live and work for all of the county's residents.

The Agricultural Land Use and Soil Productivity Groups maps, shown below illustrate the locations and extent of agriculture in Muskegon County. Significant concentrations of farmland in Muskegon County are located predominately in the northwest corner and across the eastern one-third.



Muskegon Area-wide Plan:

According to the Muskegon Area-wide Plan (MAP), population in Muskegon County is increasing in rural areas and decreasing in urbanized areas. It is estimated that residential development will replace farmland in 30 to 50 years, and that current development trends will result in a decrease of both farmland and open space lands.

A county-wide survey conducted for the MAP quantified support and opposition to policy ideas to control or encourage growth. Ninety-four percent of the respondents gave support to the idea of purchasing locally grown or produce foods to support local farmers. Eighty four percent supported the idea of tax incentives for landowners who voluntarily preserve farmland and open space.

One of the MAP goals related to agriculture is to “protect the valuable farm and forestlands, wetlands, surface and groundwater resources, wildlife habitat, and opportunities for passive and active recreation. One of the MAP implementation strategies is to “support and foster the farmland preservation program in Muskegon County, which will assist in the use of purchase of development rights to voluntarily conserve private agricultural lands.”

Muskegon County Farmland Preservation Program:

In 2004, the Muskegon County Board of Commissioners initiated a project to preserve farmland and open space. With local contributions and a grant from the Community Foundation for Muskegon County, the Timberland Resource Conservation & Development Council led a collaborative planning effort to develop the Muskegon County Farm Land Open Space Preservation (FLOS) Program. Development of the program was integrated with the development of the MAP. Partners included WMSRDC, Muskegon Conservation District, GVSU Annis Water Resources Institute, local farmers, realtors, cities, villages, and townships. The planning process culminated with the adoption of the enabling ordinance by Muskegon County Commissioners in 2006.

The Muskegon County Farmland Development Rights Ordinance “protects farmland by acquiring development rights voluntarily offered by landowners, authorizes the cash purchase and/or installment purchases of such development rights, places an agricultural conservation easement on the property which restricts future development and provides the standards and procedures for the purchase of development rights and the placement of an agricultural conservation easement.”

Information about the Muskegon County Board of Commissioners, as well as the complete Farmland Development Rights Ordinance, is available on the Muskegon County Board of Commissioners website: <http://co.muskegon.mi.us/boardofcommissioners/citizens.htm>.

Michigan Conservation and Climate Initiative (MCCI):

The Michigan Conservation and Climate Initiative (MCCI) is a joint project between the Michigan Association of Conservation Districts, the Delta Institute, and the State of Michigan. The project allows farmers and landowners to earn greenhouse gas emissions credits when they use conservation tillage, plant grasses or trees, or capture methane with manure digesters. Conservation practices store carbon in the soil and plants that would otherwise form carbon dioxide in the atmosphere. Manure digesters produce energy and prevent methane from being released to the atmosphere. Both carbon dioxide and methane are greenhouse gases that contribute to global climate change.

The Chicago Climate Exchange (CCX) is a voluntary member-based market that quantifies, credits, and sells carbon credits from certain conservation practices. The credits generated through conservation practices are pooled together from many different producers and landowners and are sold to CCX members (large companies, municipalities, and institutions) that have made commitments to reduce their greenhouse gas emissions. Chicago Climate Exchange members must reduce their greenhouse gas emissions to meet legally binding targets or mitigate a portion of their emissions through the purchase of offset credits generated by eligible practices. The Delta Institute, a 501(c)(3) non-profit organization, aggregates and sells these credits on the Chicago Climate Exchange on behalf of the landowner. The revenue from the sale, minus aggregation and trading fees, is returned to the landowner. The Michigan Association of Conservation Districts, and individuals Conservation Districts throughout the State, serve as approved verifiers to ensure enrolled land meets eligibility requirements, and may assist landowners in during the application process.

MCCI provides a financial incentive for farmers and landowners to use conservation practices. While the primary purpose of these conservation practices is to sequester carbon dioxide, the conservation practices have secondary benefits, such as wildlife habitat and limiting soil and nutrient run-off to streams and lakes. Eligible practices may include conservation tillage, grass plantings, tree plantings, and methane digesters. For assistance with the application process, contact the Muskegon Conservation District at (231) 773-0008.

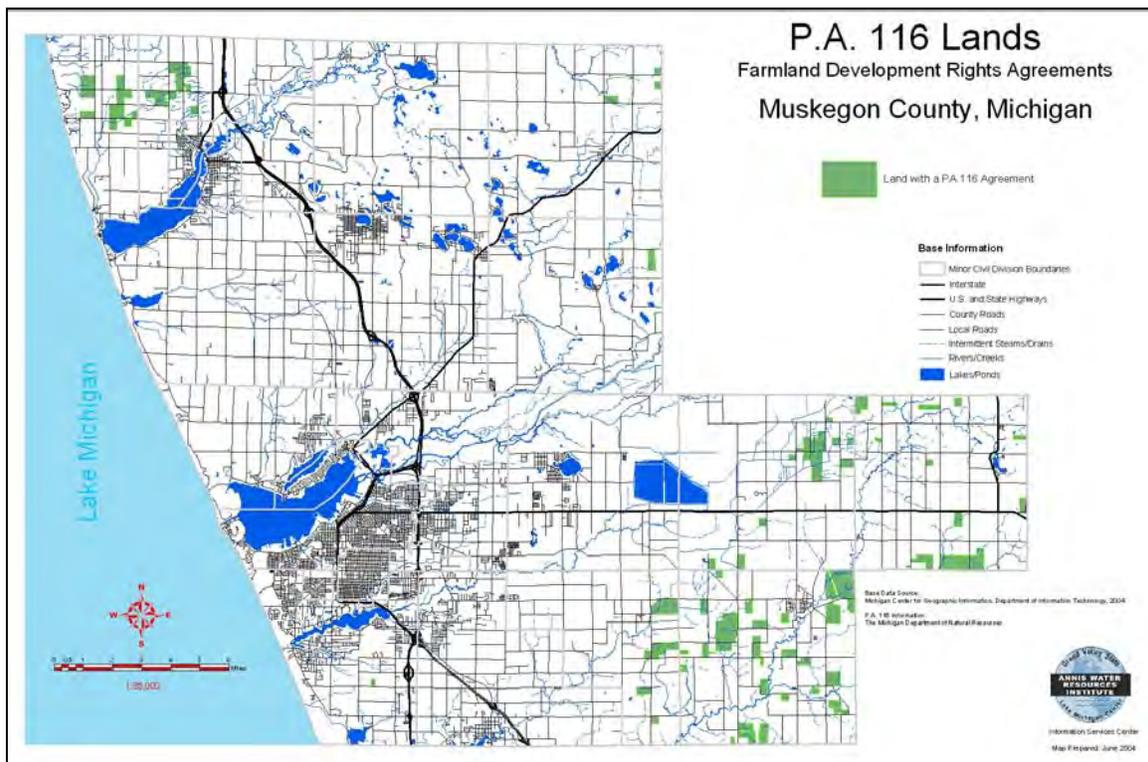
Michigan Department of Agriculture, Farmland and Open Space Preservation Program:

This program is designed to preserve farmland and open space through agreements that restrict development, and provide tax incentives for program participation. The program consists of the following methods for preserving farmland and open space:

- Farmland Development Rights Agreements – A temporary restriction on the land between the State and a landowner, voluntarily entered into by a landowner, preserving their land for agriculture in exchange for certain tax benefits and exemptions for various special assessments. (commonly known as PA 116).
- Conservation Easement Donations – A permanent restriction on the land between the State and a landowner, voluntarily entered into by a landowner, perserving their land for either open space or agriculture.
- Agricultural Preservation Fund – A fund established to assist local units of government in implementing a local purchase of development rights program.

- Local Open Space Easement – A temporary restriction on the land between the local government and a landowner, voluntarily entered into by a landowner, preserving their land as open space in exchange for certain tax benefits and exemptions for various special assessments. Click here for a copy of the registration form.
- Designated Open Space Easement – A temporary restriction on specially designated lands between the State and a landowner, voluntarily entered into by a landowner, preserving their land as open space in exchange for certain tax benefits and exemptions for various special assessments. If you are interested in requesting land be conserved in by applying for a Designated Open Space Easement, click here.
- Purchase of Development Rights – A permanent restriction on the land between the State and a landowner, voluntarily entered into by a landowner, preserving their land for agriculture in exchange for a cash payment for those rights. Currently funding is not available for this program. Contact your township or county to see if there is a local PDR program established.

Much more information about Michigan Department of Agriculture and its agriculture programs is available at its website: <http://www.michigan.gov/mda>.



Other Farm Land Resources:

Know Your Farmer Know Your Food:

This is a USDA-wide effort to create new economic opportunities by better connecting consumers with local producers. It is also the start of a national conversation about the importance of understanding where your food comes from and how it gets to your plate. According to the USDA, there is too much distance between the average American and their farmer. It is therefore marshalling resources from across USDA to help create the link between local production and local consumption.

Visit <http://www.usda.gov/wps/portal/usda/knowyourfarmer?navid=KNOWYOURFARMER> for more information.

Farm to School Network:

Farm to School connects schools (K-12) and local farms with the objectives of serving healthy meals in school cafeterias, improving student nutrition, providing agriculture, health and nutrition education opportunities, and supporting local and regional farmers. Forty-four states in the U.S., including Michigan, have operational Farm to School programs.

For more information about Farm to School, visit www.farmtoschool.org. Details about Farm to School programs operating in Michigan, visit <http://www.farmtoschool.org/state-home.php?id=13>.

Michigan Integrated Food and Farming Systems:

The Michigan Integrated Food and Farming Systems (MIFFS) is a statewide, non-profit organization whose purpose is to improve Michigan's triple bottom line: economy, environment, and the social well-being of communities by promoting family farms, local food, and sustainable agriculture. According to MIFFS, "agriculture is vital to the economy and to the many cultures that give Michigan its unique personality. Although Michigan is diverse and rich in agricultural traditions, our food system faces sobering economic, environmental, and social challenges." The average age of farmers is increasing while the number of farms is steadily dropping.

According to MIFFS, some of the challenges to the preservation of farms include:

- Access to mainstream markets has steadily decreased for small and medium-size farms.
- Consumers often don't understand how or where their food is produced.
- Productive farmland is rapidly being depleted for suburban development.
- Policy makers often don't understand how their decisions impact farmers, consumers, and communities.
- Many groups that have not traditionally worked together as allies share concerns about economic, environmental, and social issues surrounding food and farming.

Muskegon County Community Gardens Program:

Public Health-Muskegon County developed its first county community garden ten years ago with the purpose of growing a healthy community with healthy, non-substance abusing youth. It has been successful in more ways than initially anticipated. First, an abandoned tennis court was reclaimed as prime garden property. Working with city government, county government, and neighborhood volunteers, as well as employees from several county programs, the hard surface was removed and the soil was nourished utilizing organic gardening techniques. This garden project gave participants the opportunity to influence governmental institution watering and fertilizing methodologies, snow removal, and other land-sharing concerns.

Community gardens grow healthy children, healthy families, and neighborhoods that are freer from substance abuse, crime, and violence. Gardens nurture the community, increase property values and provide the very basis for substance abuse prevention – clear boundaries and expectations, understood consequences for behavior, opportunities to serve the community, and recognition for having served, the most critical of protective factors. Garden participants get out in fresh air, grow fresh food, and develop friendships. Local regional food production is also a solution for access to fresh foods to reduce obesity and childhood onset diabetes. To find out more about community gardens in neighborhoods throughout Muskegon County, please refer to the contacts listed below.

Twenty-four community gardeners from Muskegon County met as a group, for the first time, in March, 2010. The group works to promote increased communication and cooperation between gardens and gardeners. Volunteers from the Lakes Community Garden plan to double its size this growing season. The Nelson Neighborhood Garden Committee wants to build more raised beds. The Peace Garden at Bunker Middle School is expanding and developing a relationship with a neighborhood restaurant. The pioneering Healthy Garden at the County Building continues to grow. The Jackson Hill Neighborhood is planting three new community gardens in the spring of 2010. The McLaughlin Grows project is completing its season extending hoop house and it is acquiring an EBT machine to make healthy local food available to neighborhood residents. The Organization for Community Development is building a new garden with 20 raised beds. This is just a sample of the flurry of new garden activity in our community. Mercy Health Partners intend to work with community groups to promote social justice and public health through community gardens.

Community Gardens in Muskegon County

Chris Bedford	chrisbedford@charter.net	Harmony Gardens
Terry & Cathy Luce	tluce@verizon.net	Lakes Community Garden
Tom Parks	tomparks@lakescommunitynaz.com	Lakes Community Garden
Sarah Rinsema-Sybenga	sarah@communityencompass.org	McLaughlin Grows
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Deb Tober	debtober@yahoo.com	Nelson Community Garden

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Michael Miller	millermi@trinity-health.org	Mission Integration
Paul Kurdiel	pkurdzie@mpsk12.net	"From Seed to Feed"
Charlotte Johnson	hnp@communityencompass.org	McLaughlin Grows
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Doug Wood	doug.wood@orchardview.org	MAP
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Terrie Hampel	terriham@hotmail.com	Schneider Haus
Poppy Hernandez	poppysh@aol.com	Seed to Feed
Rae & Rich Mitchell	lumbertownfarm@verizon.net	Lakes Community Garden
Brian Clincy	bclincy@daonlinebiz.com	ACHIEVE Chart
Lowell Kirksey	lowell.kirksey@postman.org	City of Muskegon

For information about Community Gardens in Muskegon County, please contact:

Muskegon County Community Gardens
Public Health-Muskegon County
209 E. Apple Avenue
Muskegon, MI 49442

Contact: Poppy Sias-Hernandez, (231) 724-1211 or hernandezpo@co.muskegon.mi.us

Contact: Jill Montgomery Keast, (231)-557-9440 or montgomerykeastji@co.muskegon.mi.us

Chapter 8: Summary and Conclusion

The Muskegon County Green Infrastructure Inventory is an important step toward the eventual development of a green infrastructure plan for Muskegon County. The inventory builds upon the regional green infrastructure vision, which was developed in part by the West Michigan Strategic Alliance as a “first cut” at identifying West Michigan’s green infrastructure network. The Muskegon County inventory was able to gather available information and refine it to be more precise and accurate to Muskegon County. The inventory reveals the current condition of various green infrastructure components in the county, supplemented with an extensive collection of maps, resources, and contacts.

The process to meet the Muskegon Area-wide Plan recommendation for a county-wide green infrastructure plan has been a step by step, and sometimes piece-meal, approach. Many excellent green infrastructure projects and assessments have been undertaken in Muskegon County. But, in order to develop a county-wide plan, a green infrastructure goal is needed.

The next step in the process of developing a county-wide green infrastructure goal and plan will be to meet with local jurisdictions to discuss the inventory, receive input, enhance the inventory with new information, and to develop a set of recommendations for next steps. Meeting with local leaders will achieve two important outcomes. First, it will educate and inform leaders about the importance and benefits of planning for green infrastructure. Second, the local meetings will help to start building a county-wide consensus on green infrastructure priorities and goals, which will be critical to the development of a meaningful green infrastructure plan.

Special thanks for the expert input and cooperation from our local project partners from the Muskegon Conservation District, Public Health-Muskegon County, and the GVSU Annis Water Resources Institute.

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