

## Environmental White Paper

The 2005-2030 [Environmental Technical Report](#) (November 2006) identified key environmental resources, characteristics, trends, and implications of statewide environmental and historic resources relative to the transportation system in Michigan. The purpose of this white paper is to identify any significant changes in Michigan's environmental and cultural resources, policies and procedures, and strategies since the 2005-2030 MI Transportation Plan (MITP) was completed.

### Key Environmental Resources

#### Wetlands

The Michigan Department of Transportation (MDOT) continues its stewardship efforts to protect and preserve wetlands in Michigan. Since 2005, a total of 10 wetland bank sites have been constructed by MDOT. These bank sites provide mitigation for projects located in the nine represented watersheds. However, for those watersheds not having a bank site, MDOT continues to build individual mitigation sites to compensate for impacts from specific transportation projects.

#### Water Resources

MDOT complies with the National Pollutant Discharge Elimination System (NPDES) Permit Program administered by the Michigan Department of Environmental Quality (MDEQ). The NPDES permit issued to MDOT in 2004 is still valid. MDOT has been working with MDEQ since 2014 on the application process for a new permit.

MDOT also has developed a process to determine the impacts of road and bridge projects on waters of the state. In addition, MDOT is committed to using storm water [Best Management Practices](#) to mitigate for impacts.

#### Threatened, Endangered, and Special Concern Species

Michigan recognizes the importance of preserving and protecting its biological diversity and listed species. The state has implemented a number of programs to preserve, protect, and enhance natural communities and associated flora and fauna. In addition, federal and state governments have enacted laws to protect threatened, endangered, and special concern species that may inhabit these communities. The 2005-2030 [Environmental Technical Report](#) includes information indicating the location and concentration of threatened, endangered, and special concern species known to occur in Michigan. Many of these species are located in the southern portion of Michigan's Lower Peninsula. However, a statewide, comprehensive and systematic survey has yet to be completed. Most of the survey work performed to date has occurred in the southern part of the state. As the transportation system in Michigan changes to meet demands over the next 25 years, it is certain that potential impacts to threatened, endangered, and special concern species and their habitats will occur.

In recent years, MDOT has emphasized system preservation over the construction of new highways. This has resulted in a decrease in the number of overall impacts on threatened and endangered species and their habitats. MDOT's emphasis on system preservation is expected to continue for the foreseeable future.

MDOT's goal is to plan for and design transportation improvements that respect sensitive communities and mitigate impacts on species and their habitats. MDOT is committed to implementing this goal by reviewing designs for environmental impacts; proposing effective mitigation and monitoring measures; ensuring compliance with local, state, and federal laws and permit requirements; and investigating public and agency concerns. MDOT has several ongoing efforts to protect endangered plants and animals within MDOT right of way (ROW). These efforts include:

- Review of permit applications requesting the use of state ROW for other activities, such as utility work. MDOT biologists advise MDOT permit agents and permit requestors on ways to avoid, minimize, or mitigate impacts on listed species.
- Creation of guidance documents and training materials for maintenance staff to assist them in the proper management of listed species and their habitats.
- Systematic surveying of MDOT ROW for endangered species so project managers and maintenance staff can be advised on ways to avoid negative impacts on these species during construction and maintenance of these facilities.
- Implementation of the Protected Areas Program that actively manages more than 150 known locations for listed species within MDOT ROW. Each site contains a maintenance and management plan to help maintain these areas and support the species that live within them.

## Air Quality

### National Ambient Air Quality Standards

The Federal Clean Air Act of 1970, and subsequent amendments, established national ambient air quality standards (NAAQS) for seven criteria air pollutants: ozone (O<sub>3</sub>), carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), coarse and fine particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>, respectively), and lead (Pb). These standards are meant to protect the health of people and the environment. Ozone, carbon monoxide, and particulate matter are the most important pollutants to consider for transportation projects. A geographic area is known to be in *attainment* if it meets the standards or in *non-attainment* if it fails to meet the standards. A non-attainment area proven to meet the NAAQS for that pollutant is re-designated to be in *attainment/maintenance*. An area in attainment/maintenance is required to include activities in the Statewide Transportation Improvement Plan (STIP) or Transportation Improvement Program (TIP) for metropolitan planning organizations (MPOs), which maintain attainment in the area, for that pollutant, for at least 10 years after re-designation. Michigan is in attainment/maintenance for CO, PM<sub>10</sub>, and PM<sub>2.5</sub>, and in non-attainment for SO<sub>2</sub>. Michigan is currently in compliance with the other criteria air pollutants.

## Pollutants

Ozone is a pollutant of particular concern to people with lung and respiratory problems, such as asthma. It is not created directly by cars and trucks, but rather by chemical reactions in the atmosphere involving sunlight and precursor emissions, such as volatile organic compounds and oxides of nitrogen. These precursors are emitted by motor vehicles and industrial sources. Ozone precursors can be transported by wind for long distances from where they are initially emitted. Consequently, ozone is a regional concern and not just a localized issue. All Michigan counties are in attainment for ozone. However, the Environmental Protection Agency (EPA) announced the strengthening of the ozone standard in the Oct. 1, 2015, Federal Register to improve the public health and environmental protection. The EPA will announce the designation of attainment and non-attainment areas on Oct.1, 2017, and Michigan expects to have as many as 19 counties receive a non-attainment designation.

PM<sub>2.5</sub> (particulates 2.5 microns or smaller) are generally emitted from activities such as industrial and residential combustion and from vehicle exhaust. PM<sub>2.5</sub> is a health concern since fine particles can reach the deepest regions of the lungs. Health effects include asthma, difficult or painful breathing, and chronic bronchitis, especially in children and the elderly. Fine particulate matter associated with diesel exhaust also is thought to cause lung cancer. The standards for PM<sub>2.5</sub> are exceeded for a seven-county area comprising of the Southeast Michigan Council of Governments (SEMCOG).

The following pollutants have partial area designations, which means they do not encompass full counties. Figure 1 illustrates the areas for the pollutants discussed below.

PM<sub>10</sub> (inhalable particles between 10 and 2.5 microns) are found near roadways and dusty industrial sources. PM<sub>10</sub> poses a health concern because the particles can be inhaled, accumulating in the respiratory system and exacerbating asthma and other adverse respiratory conditions.

Carbon monoxide (CO) is a colorless, odorless gas emitted from combustion processes. Nationally, and particularly in urban areas, the majority of CO emissions to ambient air come from mobile sources. CO can cause harmful health effects by reducing oxygen delivery to organs like the heart and brain, and tissues. At extremely high levels, CO can cause death. A “hot-spot” analysis of CO at the project level must be done under certain conditions as defined in 23 CFR 93.123. The last review of the CO NAAQS was completed in 1994 and the EPA chose not to revise the standards at that time. Hot-spot analyses of CO for transportation projects have shown that CO levels have not exceeded the standard for many years due to cleaner engines and fuels.

The EPA has designated a partial area to be in non-attainment for sulfur dioxide (SO<sub>2</sub>). SO<sub>2</sub> is one of a group of highly reactive gasses known as “oxides of sulfur.” SO<sub>2</sub> is linked to a number of adverse effects on the respiratory system. The largest sources of SO<sub>2</sub> emissions are from fossil fuel combustion at power plants (73 percent) and other industrial facilities (20 percent). Smaller sources of SO<sub>2</sub> emissions include industrial processes, such as extracting metal from ore, and the

burning of high sulfur-containing fuels by locomotives, large ships, and non-road equipment. As of 2014, the amount of sulfur in diesel fuel for all on and off-road diesel engines has been reduced from 500 part per million (ppm) to 15 ppm, greatly reducing vehicle SO<sub>2</sub> emissions.

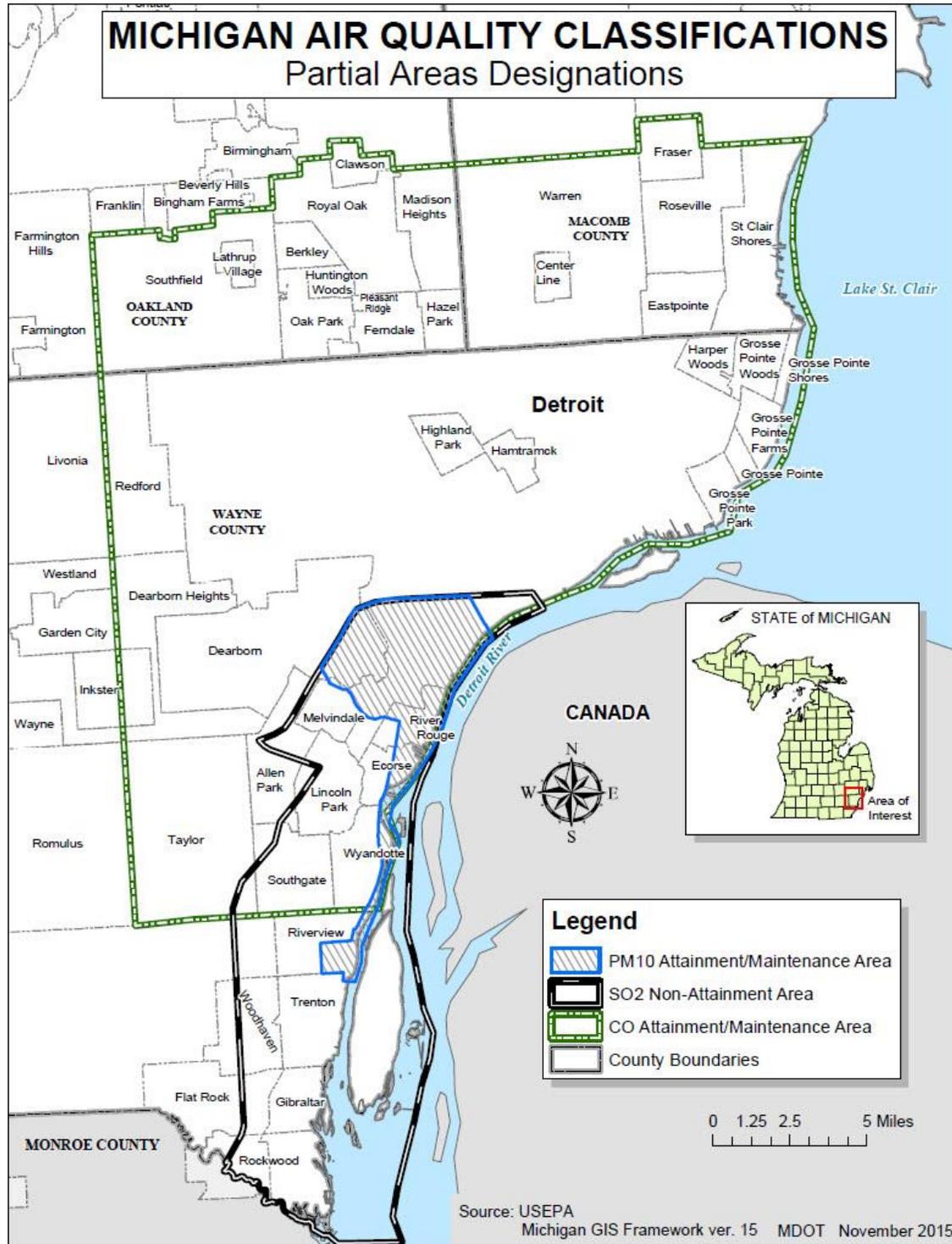
### **Conformity**

The Clean Air Act requires the State of Michigan to develop a specific plan to attain the standards for each area designated non-attainment and attainment/maintenance for a NAAQS. The plan, known as the State Implementation Plan (SIP), is developed by MDEQ and MPOs, with input from MDOT, and is submitted to the EPA for approval. The SIP serves two main purposes:

1. Demonstrate the state has the basic air quality management program components in place to implement a new or revised NAAQS.
2. Identify the emissions control requirements the state will rely upon to attain and/or maintain the primary and secondary NAAQS.

Transportation conformity is required under the Clean Air Act to ensure that all federally supported transportation projects are consistent with, and conform to, the purpose of the SIP. A conformity determination demonstrates that the implementation of a project will not cause any new violations, increase the frequency or severity of violations of the standard, or delay timely attainment of the standard or interim milestone (Clean Air Act, Section 176(c)(1)). Project-level transportation conformity determination involves compliance at both the region and local levels, which is determined through a hot-spot analysis.

Figure 1: Michigan Air Quality Classifications



## Mobile Source Air Toxics (MSAT)

The EPA identified seven compounds with significant contributions from mobile sources that are among the national and regional cancer risk drivers from their 1999 National Air Toxics Assessment (NATA). These are acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter. The Federal Highway Administration (FHWA) has published a memorandum, [\*Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents\*](#), (Dec. 6, 2012), that provides guidance in reviewing projects that may require an MSAT analysis, and the supplement, [\*Frequently Asked Questions \(FAQ\) Conducting Quantitative MSAT Analysis for FHWA NEPA Documents\*](#), (Sept. 2, 2015), to aid in analyzing MSAT. The projects with MSAT concerns have a 140,000 – 150,000 or greater average daily traffic (ADT) and significant diesel traffic.

## Historic and Archaeological Resources

Michigan's historic, archaeological, and natural resources give the state a unique identity. Historic and archaeological resources are publicly or privately owned buildings, structures, sites, objects, features, or open spaces that are significant in history, architecture, archaeology, engineering, or culture at the local, state, or national levels (National Park Service). These cultural resources are found across the state, although the vast majority of both above and below-ground sites remain unidentified. Due to the intensive nature of archaeological survey work, below-ground surveys have been performed on only roughly 5 percent of Michigan's land area. Archaeological sites are fragile and are often found in the top 12 to 18 inches of soil. These sites are under constant threat from ground disturbance activities, such as road construction, utility installation, and housing developments. While above-ground surveys are less intensive, they require regular updating as resources age, change, or are lost. Two of the biggest threats to above-ground historic resources are neglect and new construction.

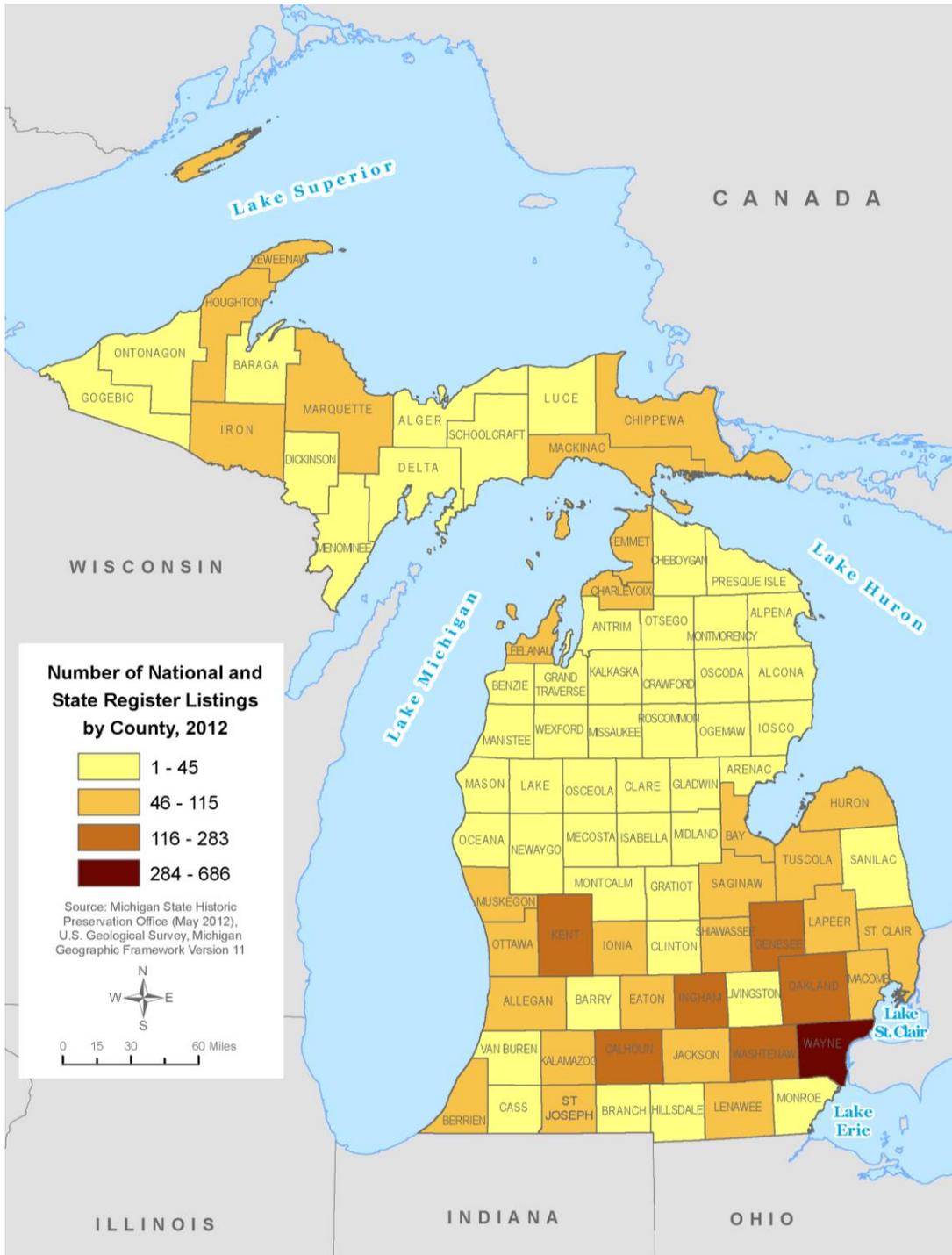
The Michigan State Historic Preservation Office (SHPO) maintains data about known historic and archaeological resources throughout the state. Figure 2 shows the 2012 geographical distribution of national and state register listings by county. There are 1,776 historic resources listed on the National Register of Historic Places and 35 National Historic Landmarks. At the state level, there are 2,913 historic resources listed on the State Register of Historic Sites and 1,621 Michigan Historical Markers. In addition, the archaeological files include 22,528 land sites, 1,534 shipwrecks, and nine Traditional Cultural Properties. SHPO updated the statewide [Historic Preservation Plan](#) in 2014 to provide a framework for preservation activities around the state through 2019.



MDOT initiatives that involve the protection and enhancement of historic resources include:

- Ongoing identification of historic and archaeological resources.
- Utilizing digital spatial data to map resources in coordination with SHPO.
- Exploring the use of new techniques for historic bridge preservation.
- Expanding coordination efforts with Michigan's Native American Tribes over various planning and environmental topics.
- Continuing publication of an Environmental Research Series.

Figure 2: National and State Register Listings by County, 2012



Source: Michigan State Historical Preservation Office, May 2012.

## Policies and Procedures

MDOT continues to follow state and federal laws and regulations listed in Appendix B in the [Environmental Technical Report \(2006\)](#). Since the publication of that report, FHWA has revised 23 CFR 772, *Procedures for Abatement of Highway Traffic Noise and Construction*. The revision to 23 CFR 772 took effect on July 13, 2011.

## Environmental Goals and Objectives

MDOT continues to take steps to implement the goals and objectives identified in the [Environmental Technical Report \(2006\)](#).

The Environmental Committee (EC) continues to ensure that MDOT complies with environmental laws in a focused, effective manner, fostering an environmental ethic throughout the department. The EC is supported by six technical teams that provide environmental analyses and recommendations.

MDOT's Environmental Services Section in the Bureau of Development is responsible for National Environmental Policy Act (NEPA)-related compliance and ensuring that MDOT is a good steward of environmental resources.

MDOT continues to use [Context Sensitive Solutions](#) (CSS) for transportation projects. CSS is a collaborative interdisciplinary approach to developing transportation projects. MDOT is committed to using CSS in its planning, design, construction, operations, and maintenance programs and projects. Under CSS, MDOT solicits dialogue with local governments, road commissions, industry groups, land use advocates, state agencies, and the public early in a project.

The following is a list of CSS initiatives that MDOT has undertaken:

- Providing educational opportunities for staff to learn more about CSS and how to integrate CSS in transportation programs and projects.
- Providing opportunities for stakeholders and public engagement, including visioning sessions, to ensure public views are represented in the project development process.
- Developing strategies for providing project visualizations to promote public understanding of projects and their impacts.
- Working with local agencies to promote CSS on local projects.
- Partnering with stakeholders in planning and developing multi-modal transportation infrastructures.
- Using a corridor approach to planning, including aesthetics, multi-modal, heritage routes and environmental analysis undertaken by an interdisciplinary team working in conjunction with local authorities.
- Integrating CSS into MDOT's planning, development, and delivery processes.

MDOT incorporates CSS into transportation projects whenever possible, including working with stakeholders to identify Complete Streets initiatives. Complete Streets is a more recent approach to transportation planning and design incorporating CSS principles.

Michigan Public Act (PA) 135 of 2010 defines Complete Streets as "roadways planned, designed, and constructed to provide appropriate access to all legal users... whether by car, truck, transit, assistive device, foot or bicycle."

### **Air Quality Strategies**

Promoting transportation solutions that will minimize impacts to the environment remains a top priority. The Fixing America's Surface Transportation (FAST) Act reauthorized the Congestion Mitigation and Air Quality (CMAQ) program. The CMAQ Program supports two of MDOT's goals: improving air quality and relieving congestion.

MDOT has partnered with local agencies to take advantage of eligible CMAQ funds to retrofit diesel trucks and utility vehicles and replace switch engines. Other projects implemented include Freeway Courtesy Patrols and Intelligent Transportation Systems operations and maintenance. The benefits from implementing these projects will help reduce the negative air quality impacts of congestion in areas the EPA has designated as non-attainment for various pollutants.

Federal law now requires the establishment of performance measures for congestion and air quality. This may affect how states and MPOs select CMAQ candidate projects in the future. These performance measures have not been issued and are forthcoming.

### **Integrating Planning and Environmental**

The consideration of environmental resources during the early stages of planning will allow planners, environmental specialists, and stakeholders the opportunity to avoid or minimize impacts on these sensitive environmental resources. A digital spatial analysis of environmental data in a specific study area, or along a corridor, is a valuable planning tool in identifying sensitive environmental resources.

A digital spatial analysis of environmental data was prepared for the 11 Corridors of International and National Significance in Michigan. Figure 3 shows the locations of the significant corridors and their labels, while Figure 4 is a close-up view of the analysis area to illustrate that analyses can be done at multiple scales when characterizing the environmental constraints of any single area within the corridor. The results are summarized in Table 1. This summary shows how data may be compiled to cumulatively estimate environmental constraints on a corridor-wide basis. This same approach can be applied to specific areas within the corridor.

Figure 3 – Corridors of Significance

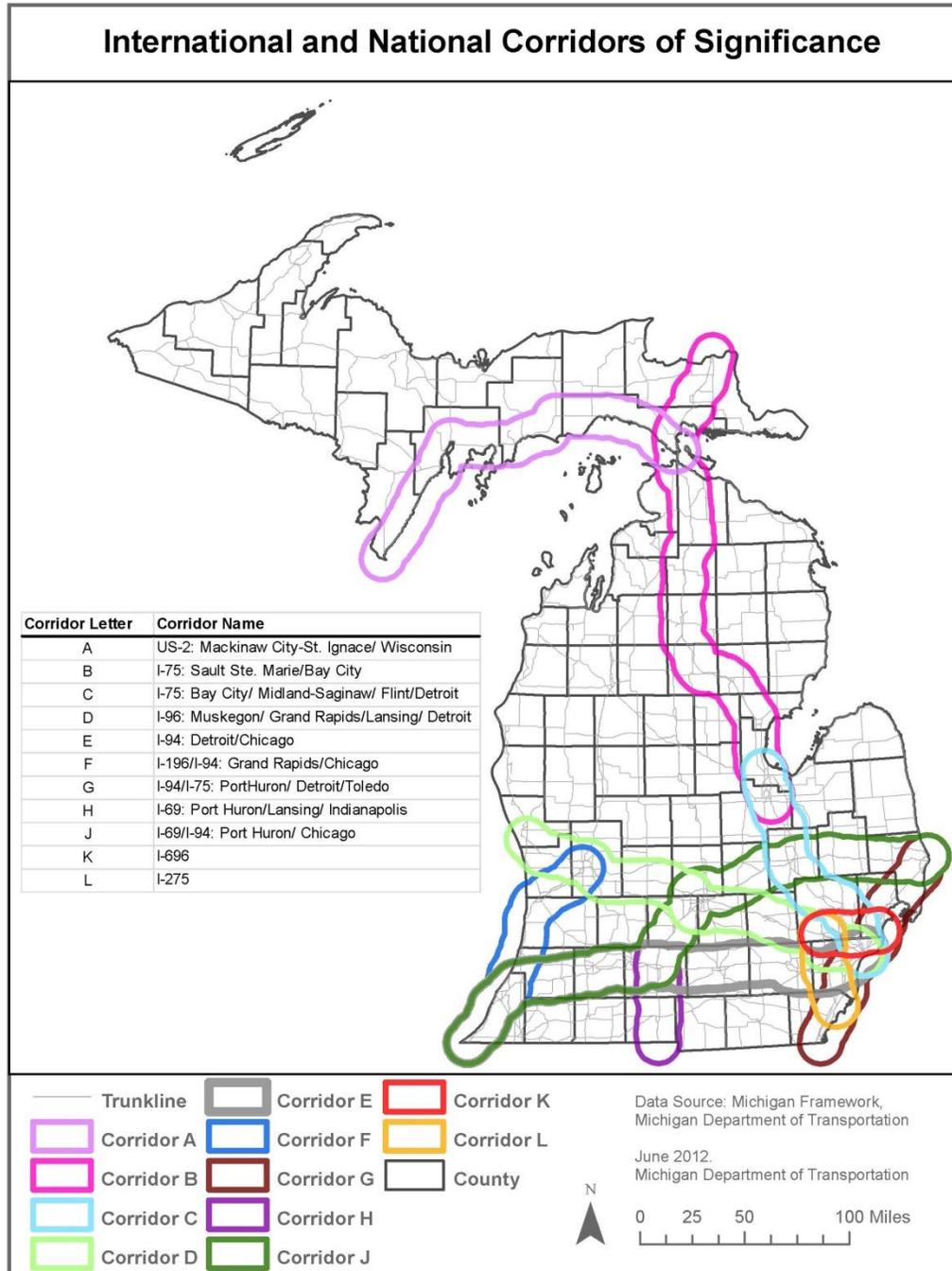


Figure 4 – Analysis Area Characterizing Environmental Constraints

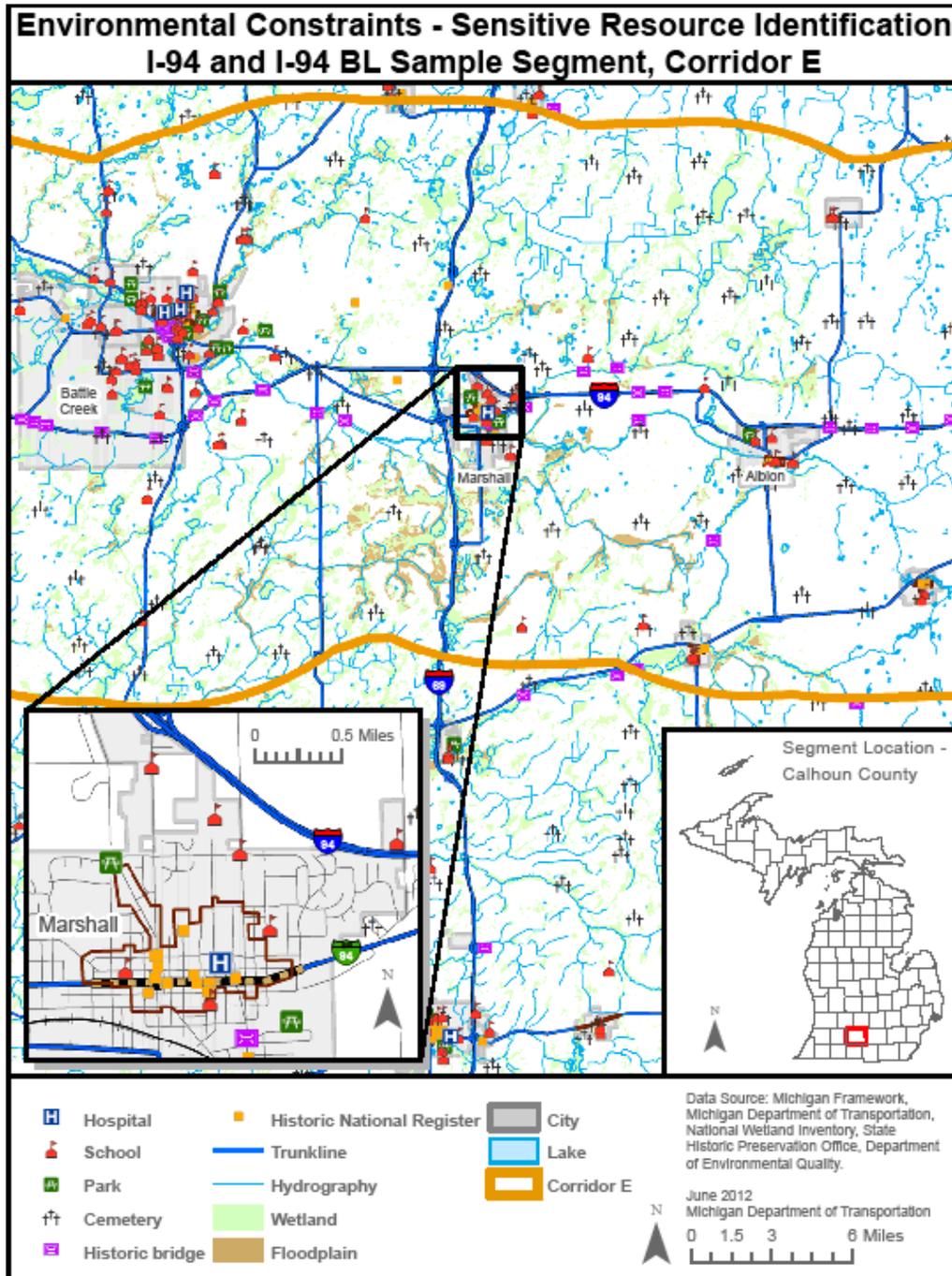


Table 1. Environmental Constraints - Sensitive Resource Identification

National/International Corridors of Significance	Corridor A - Mackinaw	Corridor B - Sault Ste. Marie/Bay City	Corridor C - Bay City/ Midland-Saginaw/ Flint/Detroit	Corridor D - Muskegon/ Grand Rapids/Lansing/ Detroit	Corridor E - Detroit/Chicago	Corridor F - Grand Rapids/Chicago
	City-St. Ignace/ Wisconsin					
<b>Resources within the 10 mile corridor buffer</b>						
Cemeteries	85	214	311	474	509	186
Hospitals	3	16	49	52	49	13
Schools	50	268	1,511	1,803	1,479	495
Parks	27	56	318	406	345	65
Historic bridges (Eligible/NR Listed)	13	46	78	106	104	16
Historic National Register	28	75	372	381	434	58
Historic districts	12	40	202	232	222	42
Heritage Routes	2	3	4	2	4	1
<b>Acres of wetlands within 500 ft of Trunkline</b>	~ 1,130,879.25	~ 691,461.352	~ 39,065.847	~ 49,319.485	~ 114,808.882	~ 81,970.365

National/International Corridors of Significance	Corridor G - PortHuron/ Detroit/Toledo	Corridor H - Port Huron/Lansing/ Indianapolis	Corridor J - Port Huron/ Chicago	Corridor K - I-696	Corridor L - I-275
	<b>Resources within the 10 mile corridor buffer</b>				
Cemeteries	259	407	509	138	166
Hospitals	41	19	25	40	13
Schools	1,204	597	819	1,126	635
Parks	268	142	187	243	87
Historic bridges (Eligible/NR Listed)	158	113	145	121	72
Historic National Register	280	202	249	203	51
Historic districts	160	100	126	120	28
Heritage Routes	3	4	4	2	2
<b>Acres of wetlands within 500 ft of Trunkline</b>	~ 45,528.804	~ 39,923.806	~ 116,763.355	~ 9,336.843	~ 7,139.078

Notes: Approximately 75 data layers are commonly utilized for environmental review; only a subset of those layers are shown here. The 10 mile corridor buffers overlap so that some sensitive resources are included in more than one buffer.

## Outreach Efforts with Resource Agencies, Tribal Governments, and Stakeholders

MDOT held two webinars in November 2015 to engage stakeholders and the public. The webinars provided a brief overview of the existing 2010-2035 State Long-Range Plan (SLRP) and the proposed updates to the plan. Participants also learned how to provide input into the development of the new 2040 MI Transportation Plan by completing an online survey.

Stakeholders and the public were given the opportunity to complete an online survey that asked questions about organizational changes, including new legislation, goals and objectives, outreach efforts between MDOT and their organization, and other interests, such as CSS, stewardship, environmental justice (minority and low-income populations), people with disabilities, and the elderly, to name a few topics. For more information on the webinars and survey results, refer to the [Resource Agency Consultation Report](#) and [Tribal Government Consultation Report](#).

## Environmental Mitigation

The [Environmental Mitigation Technical Report \(May 2007\)](#) provided an overview of mitigation measures, which are necessary to mitigate any potential adverse impacts that may occur as a result of proposed projects. Mitigation measures may include avoidance, minimizing impacts by limiting the scope of the proposed project, rehabilitating or restoring the affected environment, and compensating for the impact by replacing or providing substitute resources. They also include both temporary and permanent measures to minimize impacts during and after project construction. The purpose of this white paper is to provide an update on projects that have gone through the NEPA process since the publication of the *Environmental Mitigation Technical Report (2007)*.

In 2012-2013, FHWA reviewed MDOT's mitigation follow-up process for environmental commitments on four major action projects. Based on the process review, FHWA requested MDOT develop a mitigation sign-off procedure for major action projects that would follow the project from the Finding of No Significant Impact (FONSI)/Record of Decision (ROD) signing through the design, ROW, construction, and maintenance phases. In 2014/2015 MDOT developed a sign-off process that will be used on new major action projects and sections of previous Major Action projects not yet built. The documentation for the project mitigation will be stored in MDOT's ProjectWise database where the MDOT project manager, MDOT engineer, MDOT Environmental Services Section mitigation specialist, and other MDOT specialists will provide the mitigation sign-offs during the various project phases.

## Environmental Clearance

MDOT continues to work closely with federal, state and local agencies, and with the 12 federally recognized Native American tribes throughout the NEPA process. Coordination with these agencies is vital in order to properly assess the impacts and to determine mitigation measures that are needed. Since the publication of the Environmental Mitigation Technical Report (2007), several studies have received an ROD or a FONSI. An ROD was issued to the initial Woodward Avenue Light Rail Transit Project traveling to near 8 Mile Road in Detroit, then amended to

shorten the scope of the project to its current end point (Amended Record of Decision, April, 5, 2013). Studies that received a FONSI include US-23 improvements from the M-14/US-23 west interchange to Silver Lake Road in Washtenaw and Livingston counties (June 30, 2015) and I-75 (Dixie Highway) north to I-675 in Saginaw County (Oct. 2, 2013). MDOT continues to pursue implementation of mitigation commitments established in all of these environmental decision documents.

In fiscal year (FY) 2015, MDOT classified 546 highway and rail projects. This means the projects received a Class I (Environmental Impact Statement), Class II (Categorical Exclusion), or Class III (Environmental Assessment) designation under NEPA procedures established by FHWA, the Federal Rail Administration, and the Federal Transit Administration. MDOT also certified 519 categorical exclusion project plans and specifications to ensure these documents contained appropriate environmental mitigation measures prior to being advertised for construction. During the same time period, 129 airport projects were classified as categorical exclusions.

MDOT participates in the Planning and Environmental Linkages (PEL) decision-making approach. FHWA promotes the PEL concept as an Every Day Counts Initiative to shorten the time to complete environmental clearance. PEL is intended to link the analysis and decisions made at the system level during transportation planning and the project-level decisions made during the environmental review process of the NEPA. Linking planning and NEPA can eliminate potential duplication of planning and NEPA processes, creating one cohesive flow and overall cost reduction.

## **Climate Change**

MDOT conducted a climate-based vulnerability assessment of primarily MDOT owned and operated transportation infrastructure in 2014. The assessment overlaid projected climate data onto MDOT's existing asset management database to help identify locations and infrastructure that may be at risk. The assessment found the most at-risk transportation assets were situated in the southern third of the state, where the state's larger urban areas are located. The assessment was a first step to help MDOT protect the transportation infrastructure investments in Michigan. The full report can be found [here](#). Appendix A: Transportation Data Gaps can be found [here](#). Appendix B: Climate Data, Models, and Analysis can be found [here](#).