Integrating Environmental Issues in the Transportation Planning Process: Guidelines for Road and Transit Agencies

January 2007

SEMCOG . . . Local Governments Advancing Southeast Michigan
Southeast Michigan Council of Governments

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Mission

SEMCOG's mission is solving regional planning problems — improving the efficiency and effectiveness of the region's local governments as well as the quality of life in Southeast Michigan. Essential functions are:

- providing a forum for addressing issues which extend beyond individual governmental boundaries by fostering collaborative regional planning, and
- facilitating intergovernmental relations among local governments and state and federal agencies.

As a regional planning partnership in Southeast Michigan, SEMCOG is accountable to local governments who join as members. Membership is open to all counties, cities, villages, townships, intermediate school districts, community colleges and public universities in Livingston, Macomb, Monroe, Oakland, St. Clair, Washtenaw, and Wayne Counties.

Responsibilities

SEMCOG's primary activities support local planning through use of SEMCOG's technical, data, and intergovernmental resources. In collaboration with local governments, SEMCOG has responsibility for adopting regionwide plans and policies for community and economic development, water and air quality, land use, and transportation, including approval of state and federal transportation projects. Funding for SEMCOG is provided by federal and state grants, contracts, and membership fees.

Policy decision making

All SEMCOG policy decisions are made by local elected officials, ensuring that regional policies reflect the interests of member communities. Participants serve on one or both of the policymaking bodies — the General Assembly and the Executive Committee.

Prior to policy adoption, technical advisory councils provide the structure for gaining input on transportation, environment, community and economic development, data analysis, and education. This deliberative process includes broad-based representation from local governments, the business community, environmental organizations, and other special interest and citizen groups.

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Abstract

By its very nature, the transportation infrastructure (roads, bridges, nonmotorized pathways, transit routes, and facilities) and the people and vehicles that use it impact the environment — both natural and built. It is important to consider this interaction when planning, designing, constructing, and maintaining the transportation system. With that in mind, SEMCOG has developed a regional analysis of impacts of planned transportation projects on the environment and a series of guidelines for mitigating those impacts. It is intended that these guidelines be used by road and transit implementing agencies.

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- Livingston County Planning Department
- Macomb County Department of Planning and Economic Development
- Monroe County Planning Commission
- Oakland County Planning and Economic Development Services
- St. Clair Metropolitan Planning Commission
- Washtenaw County Department of Planning & Environment
- City of Detroit Planning and Development Department
- Road Commission of Macomb County
- Monroe County Road Commission
- Road Commission for Oakland County
- St. Clair County Transportation Study
- Washtenaw Area Transportation Study
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- Environmental Consulting & Technology, Inc.

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Executive Summary

SEMCOG, the Southeast Michigan Council of Governments, is responsible for developing and implementing a long-range vision for transportation in the seven-county Southeast Michigan region (Livingston, Macomb, Monroe, Oakland, St. Clair, Washtenaw, and Wayne Counties). This vision is designed to maintain a transportation system that is safe, accessible, and reliable and also contributes to a high quality of life for the region's citizens. Clearly, environmental considerations are a key component of this vision.

By its very nature, the transportation infrastructure (roads, bridges, nonmotorized pathways, transit routes, and facilities) and the people and vehicles that use it impact the physical landscape. It is important to consider this interaction when planning, designing, constructing, and maintaining the transportation system. With that in mind, SEMCOG has developed a regional analysis of impacts of planned transportation projects on the environment and a series of guidelines for mitigating those impacts.

First, SEMCOG defined and identified environmentally sensitive resources in the region. Next, SEMCOG analyzed the likelihood of planned transportation projects impacting those resources. Ideally, any possible impacts on environmentally sensitive areas would be avoided. Realistically, this is not always possible and the results of the analysis indicate that each of the defined environmentally sensitive resources could potentially be impacted by proximity to planned projects. This is not to say, however, that transportation projects impacting the environment should not be implemented. The goal is to balance transportation needs with environmental protection and construct and maintain a transportation system that minimizes negative impacts and, where possible, actually increases appropriate public access to environmental resources.

Where impacts cannot be avoided, mitigation activities should be considered. To that end, SEMCOG promotes good planning practices via a series of guidelines for consideration by road and transit implementing agencies. First, overall guidelines are presented that should be considered for all types of projects, regardless of the resource impacted. Then, guidelines specific to each type of resource are presented. The resource-specific guidelines present an introduction highlighting the importance of the resource and reasons the resource should be preserved; a summary of how the existence of the resource is identified and the types of activities that would be considered to have an impact; specific mitigation activities that should be considered during the planning and design phases as well as the construction and maintenance phases; and information sources for reference.

This is a work in progress. We will continue refining the process based on experience, additional research, and input from our partner agencies. We will also continue promoting advocacy, outreach, and education when dealing with our transportation planning partners and the public. Finally, we will continue developing the data, technical tools, and planning techniques necessary to facilitate a better understanding of the interaction between transportation and the environment and the possible benefits and drawbacks of current and future transportation plans.

Introduction

Regional transportation planning does not occur in a vacuum. The transportation system is impacted by a number of factors and, vice versa, the transportation system itself impacts other aspects of the community. One such area of interaction is between transportation and the environment. By its very nature, transportation infrastructure (roads, bridges, nonmotorized pathways, transit routes, and facilities) and the people and vehicles that use it impact the physical landscape. It is important to consider this interaction when planning, designing, constructing, and maintaining the transportation system, with the end goal being a safe, accessible, and reliable transportation system that enhances quality of life — a concept dependent on how environmental resources are valued and maintained.

The regional transportation planning process is guided by a long-range vision outlined in the regional transportation plan (RTP) covering a minimum 20-year horizon and the short-range transportation improvement program (TIP) covering four years of project implementation priorities. The RTP and TIP establish policies, initiatives, and projects designed to achieve transportation goals and objectives.

Federal transportation legislation dictates a series of requirements for the RTP and TIP. The current federal legislation — the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) — contains a requirement that the RTP include "a discussion of types of potential environmental mitigation activities and potential areas to carry out these activities, including activities that may have the greatest potential to restore and maintain the environmental functions affected by the plan. This discussion shall be developed in consultation with Federal, State, and tribal wildlife, land management, and regulatory agencies."

Federal water quality legislation provides for the development of a regional plan to improve and protect water quality. SEMCOG's regional water quality plan is geared toward local government practices that are integral to protecting water quality in our communities and the Great Lakes.

SEMCOG has developed a three-step process for addressing the technical aspects of the SAFETEA-LU requirement:

- defining and inventorying environmentally sensitive resources;
- identifying and assessing likely impacts on these areas from transportation projects; and
- addressing possible mitigation at the system-wide level.

In essence, this process is designed to identify possible impacts from planned projects on environmentally sensitive resources and provide this information to implementing agencies and elected officials for use in their transportation decision making. This analysis is conducted at the regional level only. It is not designed to explore detailed design alternatives or impacts at the project level. There are other complementary processes already in place to do this. Nonetheless, the data collected are expected to be useful in those project-level activities.

Ideally, any possible impacts on environmentally sensitive areas would be avoided. Realistically, this is not always possible. This is not to say, however, that transportation projects impacting the environment should not be implemented. The goal is to balance transportation needs with environmental protection and construct and maintain a transportation system that minimizes negative impacts and, where possible, actually increases appropriate public access to environmental resources. Where impacts cannot be avoided, mitigation activities should be considered during all phases of project planning, design, construction, and maintenance.

This document summarizes the results of the three-step environmental mitigation process. It defines and illustrates environmentally sensitive resources included in the analysis. It presents the results of the analysis process, summarizing possible project impacts on each of the defined resources. Finally, it provides a series of guidelines for mitigating impacts on those resources.

This is a work in progress. In preparing this report, SEMCOG consulted with various agencies and officials charged with protecting the environment. We have also worked with state and local road and transit implementing agencies and planning agencies. Together, we have initiated this first round of data collection, analysis, and guidelines. We will continue to refine this process based on experience, additional research, and input from our partner agencies.

We will also continue to promote good transportation planning practice throughout the planning process — not just at the point where projects have been included in the RTP and TIP. Ideally, environmental resources and the possible impacts of transportation projects on them should be considered at the very earliest stages of project development. In an older and highly developed urban area such as Southeast Michigan, the vast majority of transportation planning and investment focuses on maintaining the existing infrastructure, rather than large-scale expansion. But even when maintaining the transportation infrastructure within the existing right-of-way, environmental impacts are still possible and need to be considered. SEMCOG will, therefore, continue to promote advocacy, outreach, and education when dealing with our transportation planning partners and the public. We will continue to develop the data, technical tools, and planning techniques necessary to facilitate a better understanding of the interaction between transportation and the environment and the possible benefits and drawbacks of current and future transportation plans.

Environmentally sensitive resources

Table 1 outlines environmentally sensitive resources as defined by SEMCOG for the purposes of this effort. It should be noted that not all resources have been included in the analysis. In general, resources were included if the following criteria were met:

- data were readily available in digital format suitable for mapping using Geographic Information Systems (GIS) software;
- data were available for all counties in the Southeast Michigan region; and
- data were reasonably up-to-date and expected to remain so in the future.

Appendix A contains more detailed definitions and descriptions of the resources included, as well as a list of suggested resources to be considered in the future if data become available.

Just because an environmentally sensitive resource is not included in the analysis does not mean it should not be considered at the project level. For example, while data conducive to this regional analysis related to endangered/threatened species and archeological sites were not available, these resources are required to be considered at the project level. The guidelines section of this report includes information on how to obtain these data for project-level analysis.

Table 1
Environmentally Sensitive Resources

Resource	Agency Responsible for Data Development/Upkeep
Lakes and Streams	Michigan Center for Geographic Information
Designated Trout Lakes/Streams & Natural Rivers	Michigan Center for Geographic Information – Michigan Geographic Data Library
Wetlands Indicators	SEMCOG
Flood Prone Areas	SEMCOG
Wellhead Protection Areas	Michigan State University and Michigan Department of Environmental Quality
Sinkholes	Monroe County
Woodlands	SEMCOG
Parks and Recreation Areas	SEMCOG
Historic Sites	Michigan Center for Geographic Information
Cemeteries	SEMCOG
Heritage Routes & Natural Beauty Roads	Michigan Department of Transportation and County Road Commissions
Historic Bridges	Michigan Department of Transportation
Nonmotorized Facilities	The Community Foundation

Source: SEMCOG.

Project impacts on environmentally sensitive resources

Once environmentally sensitive resources were defined and located, SEMCOG analyzed the likelihood of possible impacts from planned RTP projects. Using GIS, RTP projects were mapped and buffered, representing a likely area of influence. The size of the buffer depended on the project type and the environmental resource. For example, it was assumed that nonmotorized trail projects would have a smaller area of influence (250 feet) than a capacity project (¼ mile) and that recreational areas would be impacted only by closer proximity of projects (250 feet) whereas water resources could be impacted by projects up to ¼ mile away. (Table 2 defines the buffer sizes used for each project type and environmental resource.)

Next, the specified project buffers were intersected with environmentally sensitive resources. Where a project buffer and an environmentally sensitive resource intersect, an impact is considered possible. It should be noted that no additional analysis of possible impacts was conducted. Simply because a project buffer intersects a woodland, for example, does not mean the woodland would be impacted. Nor does the absence of intersection mean the woodland is definitely not impacted. This screening analysis is simply designed to focus attention on possible areas of concern that should be evaluated in more detail at the project level.

Table 3 quantifies the number of possible impacts for each project type. For example, of the 88 bridge projects analyzed, 57 come within 250 feet of a water resource, such as a stream, while none come within 250 feet of a cemetery.

Figure 1 provides an example of the buffer analysis, showing proposed pavement projects, woodlands, and areas of possible project impacts.

Table 2
Project Buffers by Type

Environmental Resource	Project Type						
	Bridges	Congestion Capacity	Congestion Non-Capacity	Nonmotorized	Pavement	Rail	Study
Lakes and Streams	250’	¼ mile	¼ mile	250’	¼ mile	¼ mile	¼ mile
Designated Trout Lakes/Streams & Natural Rivers	250’	¼ mile	¼ mile	250’	¼ mile	¼ mile	¼ mile
Wetlands Indicators	250’	¼ mile	¼ mile	250’	¼ mile	¼ mile	¼ mile
Flood Prone Areas	250’	¼ mile	¼ mile	250’	¼ mile	¼ mile	¼ mile
Wellhead Protection Areas	250’	¼ mile	¼ mile	250’	¼ mile	¼ mile	¼ mile
Sinkholes	250’	¼ mile	¼ mile	250’	¼ mile	¼ mile	¼ mile
Woodlands	250’	¼ mile	¼ mile	250’	¼ mile	¼ mile	¼ mile
Parks and Recreation Areas	250’	250’	250’	250’	250’	250’	250’
Historic Sites	250’	250’	250’	250’	250’	250’	250’
Cemeteries	250’	250’	250’	250’	250’	250’	250’
Heritage Routes & Natural Beauty Roads	250’	250’	250’	250’	250’	250’	250’
Historic Bridges	250’	250’	250’	250’	250’	250’	250’
Nonmotorized Facilities	250’	250’	250’	250’	250’	250’	250’

Source: SEMCOG.

Table 3
Possible Project Impacts

Project Type (Total Number of Projects Planned)	Number of Projects Possibly Impacting Resource										
	Water Resources	Wetlands	Flood Prone Areas	Groundwater Resources	Woodlands	Parks & Recreation Areas	Historic Sites	Cemeteries	Heritage Routes Natural Beauty Roads	Historic Bridges	Nonmotorized Facilities
Bridges (89 projects)	58	34	47	2	10	26	7	0	2	12	22
Congestion-Capacity (221 projects)	189	176	111	13	122	52	10	18	9	1	19
Congestion-Non-Capacity (41 projects)	40	30	17	3	30	10	0	2	0	0	4
Nonmotorized (34 projects)	16	12	11	4	16	23	5	5	2	0	13
Pavement (244 projects)	205	188	116	29	149	83	30	26	22	5	50
Rail (3 projects)	3	3	3	0	1	0	0	0	0	0	0
Study (34 projects)	33	34	15	13	28	12	3	2	1	1	10

[1]Water resources consist of lakes and streams, designated trout lakes/streams, and Natural Rivers.
[2]Groundwater resources consist of wellhead protection areas and sinkholes.
Source: SEMCOG.

Figure 1
Potentially Impacted Woodlands

Source: SEMCOG.

Guidelines for mitigating impacts

As previously stated, the analysis of possible impacts from planned transportation projects on environmentally sensitive resources should not be used to infer that simply because an impact is possible, the transportation project is not justified. It is simply designed to draw attention to the range of possible impacts and to elevate the consideration of environmental resources in all phases of project planning, design, construction, and maintenance.

The remainder of this document is dedicated to the promotion of good planning practices and presents guidelines for consideration with respect to transportation projects. First, overall guidelines are presented that should be considered for all types of projects, regardless of the resource impacted. Then, guidelines specific to each type of resource are presented. The resource-specific guidelines present an introduction highlighting the importance of the resource and reasons the resource should be preserved; a summary of how the existence of the resource is identified and the types of activities that would be considered to have an impact; specific mitigation activities that should be considered during the planning and design phases as well as the construction and maintenance phases; and information sources for reference.

This is a guidance document only and SEMCOG has no authority to require implementation of the guidelines contained herein. However, these guidelines represent best management practices and can only help to improve the quality of the transportation planning process. Implementing the suggested guidelines may also help jurisdictions comply with other regulatory mandates (e.g., Federal Phase I and Phase II Stormwater Regulations). Therefore, every effort should be made to consider and implement the guidelines where appropriate.

Overall Guidelines

Introduction

Regardless of the type of project or the resources that may be impacted, the following guidelines should be considered during the planning, design, construction, and maintenance of transportation projects. They represent good planning practice and will help ensure a blending of sound construction techniques with desired environmental protection goals.

Planning/design guidelines

- Employ context sensitive solutions (CSS) principles from the earliest point possible in project development. CSS is an approach to transportation design that considers the total context within which a transportation improvement will exist. It is a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic, and environmental resources, while maintaining safety and mobility. Essential to CSS is involvement of the public, community officials, and others affected by the project early and often.
- Identify the area of potential impact related to the transportation project, including the immediate project area, anticipated borrow/fill areas, haul roads, prep sites, and other contractor areas, as well as other related project development areas.
- Conduct an inventory to determine if any environmentally sensitive resources could be impacted by the project. (Note: Data conducive to the regional analysis defined in this report were not available for endangered/threatened species, archeological sites, and contaminated sites. However, additional information on how to obtain these data can be found under the “More information” section below.)
- Determine if a County Hazard Mitigation Plan exists and if impacted resources are addressed in the plan; if so, coordinate with hazard mitigation planners and remain consistent with the plan. (A County Hazard Mitigation Plan is required for a county to be eligible for federal Hazard Mitigation Grant funds. The Michigan State Police Management and Homeland Security Division is working to establish a plan in every Michigan county. The plans are designed to protect communities from hazards and to plan to reduce future hazards, including to the natural environment.)
- Conduct a pre-construction meeting with local community officials, contractors, and subcontractors to discuss environmental protection. Communicate agreed-upon preservation goals to everyone working on the project. Discuss with the local community any special requirements (e.g., ordinances, site plan review).
- If possible, avoid impacts to environmental resources by limiting the project scope or redesigning the project (e.g., alignment, design speed, retaining walls, cross-section narrowing, etc.).
- Where impacts cannot be avoided, mitigate them as much as possible. Where required, coordinate the evaluation of possible impacts, exploration of alternatives, and development of mitigation strategies with appropriate federal, state, and local authorities.
- Integrate stormwater management into the design of the site. If appropriate, utilize low-impact development practices that infiltrate stormwater into the ground (e.g., swales, rain gardens, native plantings).

Construction/maintenance guidelines

- Insert special requirements addressing sensitivity of environmental resources into plans, specifications, and estimates provided to construction contractors. Note the kinds of activities that are not allowed in sensitive areas (e.g., stockpiling, clearing, construction equipment, etc.).
- Confine construction and staging areas to the smallest necessary and clearly mark area boundaries. Confine all construction activity and storage of materials to designated areas.
- Use the least obtrusive construction techniques and materials.
- Install construction flagging or fencing around environmental resources to prevent encroachment.
- Minimize and, where possible, avoid site disturbance. As appropriate:
  - protect existing vegetation and sensitive habitat;
  - implement erosion and sediment control;
  - protect water quality;
  - protect cultural resources;
  - minimize noise and vibrations; and
  - provide for solid waste disposal and worksite sanitation.
- Sequence construction activities to minimize land disturbance at all times, but especially during the rainy or winter season for natural resource protection and during the high-use season for resources open to the public.
- When utilizing heavy equipment, pay close attention to the potential of uncovering archeological remains.
- Before site disturbance occurs, implement erosion control best management practices to capture sediments and control runoff.
  - Minimize the extent and duration of exposed bare ground to prevent erosion.
  - Establish permanent vegetative cover immediately after grading is complete.
  - Do not stockpile materials within sensitive areas.
  - Employ erosion control techniques.
  - Prevent tracking of sediment onto paved surfaces.
- Incorporate stormwater management into the construction phase.
  - Prevent the direct runoff of water containing sediment into waterways. All runoff from the work area should drain through sedimentation control devices prior to entering a water body.
  - During and after construction activities, sweep the streets to reduce sediment entering the storm drainage system.
  - Block or add best management practices to storm drains in areas where construction debris, sediment, or runoff could pollute waterways.
- Do not dispose of spoil material in or near natural or cultural resources.

- Properly handle, store, and dispose of hazardous materials (e.g., paint, solvents, epoxy) and utilize less hazardous materials when possible. Implement spill control and clean up practices for leaks and spills of fuel, oil, or hazardous materials. Utilize dry clean up methods (e.g., absorbents) if possible. Never allow a spill to enter the storm drain system or waterways.
- Keep equipment in good working condition and free of leaks. Avoid equipment maintenance or fueling near sensitive areas. If mobile fueling is required, keep a spill kit on the fueling truck. Avoid hosing down construction equipment at the site, unless the water is contained and does not get into the storm drain system or waterways.
- Identify and implement salt management techniques to reduce the impacts of salt on area waterways.
- Utilize integrated pest management techniques if using pesticides during maintenance operations.
- Conduct on-site monitoring during and immediately after construction to ensure environmental resources are protected as planned.

Sources

AASHTO Center for Environmental Excellence. *Environmental Stewardship Practices, Procedures, and Policies for Highway Construction and Maintenance*.
www.environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/.

SEMCOG. *Land Use Tools and Techniques*. 2003.

More information

Michigan Department of Natural Resources Endangered Species Assessment
http://www.mcgi.state.mi.us/esa/
(This website provides a preliminary evaluation of whether endangered, threatened, or special concern species, high quality natural communities, or other unique natural features have been known to occur at or near a site of interest. The purpose of this site is to provide a simplified and efficient assessment of rare species and other unique natural features at user-identified locations.)
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Wildlife Division
Endangered Species Specialist
P.O. Box 30444
Lansing, MI 48909
517-373-9418
sargenl2@michigan.gov

Michigan Office of the State Archeologist
Michigan Historical Center
Department of History, Arts and Libraries
P. O. Box 30740
702 West Kalamazoo St.
Lansing, Michigan 48909-8240
517-373-6358
www.michigan.gov/hal

Michigan Department of Environmental Quality
Remediation and Redevelopment Division
(The Remediation and Redevelopment Division administers programs that facilitate the cleanup and redevelopment of contaminated sites statewide.)
Southeast Michigan District Office
27700 Donald Court
Warren, MI 48092
586-753-3700
www.michigan.gov/deq (click on “Inside DEQ” then “Remediation and Redevelopment Division”)

Water Resources

Introduction

Michigan is home to over 11,000 inland lakes and 35,000 miles of streams. These resources provide the 4.9 million people in Southeast Michigan with water to sustain our everyday lives and numerous recreational opportunities. Surface waters are a vital component of all communities — contributing to agriculture and industry, recreation and tourism, and overall quality of life — and their preservation should, therefore, be a priority.

Identification of resources and possible impacts

In addition to inland lakes and streams, designated trout lakes and streams and Natural Rivers are also considered important hydrological resources. Trout lakes and streams are those designated by the State of Michigan as containing a significant population of trout or salmon. The Natural Rivers Program was developed to preserve, protect, and enhance our state's finest river systems for the use and enjoyment of current and future generations by allowing property owners their right to reasonable development, while protecting Michigan's unique river resources. The Huron River is a designated Natural River.

Possible impacts on water resources should be considered during the planning, design, construction, and maintenance of transportation projects. Water resources are considered impacted if polluted stormwater runoff reaches rivers and lakes, area vegetation is removed, damage to the stream beds or banks is caused by heavy equipment, or accidental spills (e.g., paint, solvent, fuel, salt) run directly into water bodies.

Planning/design guidelines

- Identify the area of potential impact related to the transportation project. Conduct an inventory to determine if any water resources could be impacted by the project.
- If possible, avoid impacts to water resources. Where impacts cannot be avoided, mitigate them as much as possible.
- Determine if a watershed management plan exists and, if so, coordinate with watershed planners and remain consistent with the plan.
- Conduct a pre-construction meeting with local community officials, contractors, and subcontractors to discuss water resource protection. Communicate agreed-upon water resource preservation goals to everyone working on the project. Discuss with the local community any requirements for stormwater management (e.g., ordinances, site plan review process).
- Integrate stormwater management into the design of the site. If appropriate, utilize low-impact development practices that infiltrate stormwater into the ground (e.g., swales, rain gardens, native plantings). Avoid diverting stormwater directly into area waterways.

- Minimize the use of culverts, where possible. (Culvert crossings tend to provide very little or no habitat within the culvert.) If culverts are used, consider utilizing a design that reduces impacts to fish and wildlife (e.g., open-bottom culverts).
- If the proposed project is within the Huron River Natural River District, ensure it meets the natural river zoning requirements developed and administered by the Michigan Department of Natural Resources.

Construction/maintenance guidelines

- Insert special requirements addressing sensitivity of water resources into plans, specifications, and estimates provided to construction contractors. Note the kinds of activities that are not allowed in sensitive areas.
- Confine construction and staging areas to the smallest necessary and clearly mark these areas. Confine all construction activity and storage of materials to these areas.
- Install construction flagging or fencing around water bodies to prevent encroachment.
- Avoid having heavy equipment in streams. If in-stream work is necessary, plan it to occur as a single event and limit machinery access to a single point on one bank. Utilize bioengineering techniques, where possible, to stabilize stream banks.
- Maintain as much riparian vegetation as possible. If riparian vegetation is damaged or removed during construction, replace with native species as soon as possible.
- Before site disturbance occurs, implement erosion control best management practices to capture sediments and control runoff.
  - Minimize the extent and duration of exposed bare ground to prevent erosion.
  - Establish permanent vegetative cover immediately after grading is complete.
  - Do not stockpile materials within sensitive areas.
  - Employ erosion control techniques.
  - Prevent tracking of sediment onto paved surfaces.
- Incorporate stormwater management into the construction phase.
  - Prevent the direct runoff of water containing sediment into streams. All runoff from the work area should drain through sedimentation control devices prior to entering a water body.
  - During and after construction activities, sweep the streets to reduce sediment entering the storm drainage system.
  - Block or add best management practices to storm drains in areas where construction debris, sediment, or runoff could pollute waterways.
- Properly dispose of solid waste and trash to prevent them from ending up in lakes and streams.
- Properly handle, store, and dispose of hazardous materials (e.g., paint, solvents, epoxy) and utilize less hazardous materials when possible. Implement spill control and clean up practices for leaks and spills of fuel, oil, or hazardous materials. Utilize dry clean up methods (e.g., absorbents) if possible. Never allow a spill to enter the storm drain system or waterway.
- Keep equipment in good working condition and free of leaks. Avoid equipment maintenance or fueling near water bodies. If mobile fueling is required, keep a spill kit on the fueling truck. Avoid hosing down construction equipment at the site, unless the water is contained and does not get into the storm drain system or waterway.

- Identify and implement salt management techniques to reduce the impacts of salt on area waterways.
- Utilize integrated pest management techniques if using pesticides during maintenance operations.
- Conduct on-site monitoring during construction to ensure water resources are protected as planned.

Sources

AASHTO Center for Environmental Excellence. *Environmental Stewardship Practices, Procedures, and Policies for Highway Construction and Maintenance*. www.environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/.

Michigan Department of Natural Resources. Natural River District. www.michigan.gov/dnr (click on "Forests, Land & Water" then "Water Management" then "Natural Rivers").

Michigan Department of Natural Resources. *Riparian Zone Management and Trout Streams: 21st Century and Beyond.*

More information

Michigan Department of Natural Resources
Fisheries Division
Natural Rivers Program
Mason Building, Eighth Floor
P.O. Box 30446
Lansing MI 48909
517-241-9049

Wetlands

Introduction

Wetlands play a vital role in water resource protection, recreation, tourism, and the economy in Southeast Michigan. Specifically, wetlands provide:

- flood and storm control via hydrologic absorption and storage capacity;
- wildlife habitat for breeding, nesting, feeding grounds, and cover for many forms of wildlife, specifically waterfowl (including migratory waterfowl) and rare, threatened, or endangered species;
- protection of subsurface water resources, valuable watersheds, and recharge for groundwater supplies;
- pollution treatment by serving as a biological and chemical oxidation basin; and
- erosion control by serving as a sedimentation area and filtering basin, absorbing silt and organic matter.

Identification of resources and possible impacts

Wetlands are defined by Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994, PA451 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."

SEMCOG has used a set of wetlands indicators to identify areas where wetlands may be present — hydric soils, the National Wetlands Inventory, and SEMCOG's 2000 land use/land cover map. Where two or more of these indicators overlap, wetland conditions may be present. Aerial photography was also used to confirm SEMCOG's classification.

Transportation projects that impact a wetland may need a wetland permit from the state or local government. However, there are some projects that are exempt from needing a state permit. Section 324.30305 (k) of Part 303, as amended, states:

> "The following uses are allowed in a wetland without a permit subject to other laws of this state and the owner's regulation:
>
> (k) Maintenance or improvement of public streets, highways, or roads, within the right-of-way and in such a manner as to assure that any adverse effect on the wetland will be otherwise minimized. Maintenance or improvement does not include adding extra lanes, increasing the right-of-way, or deviating from the existing location of the street, highway, or road."

However, the Michigan Department of Environmental Quality's interpretation of this exemption is that any filling of wetlands beyond the road footprint would require a permit.

Possible impacts on wetlands should be considered during the planning, design, construction, and maintenance of transportation projects. Wetlands are considered impacted if fill is added to the wetland, soil or minerals are dredged or removed from the wetland, polluted stormwater runoff enters a wetland, surface water is drained from the wetland, vegetation is removed, or heavy equipment is placed in the wetland.

Planning/design guidelines

- Identify the area of potential impact related to the transportation project. Conduct an inventory to determine if any wetlands could be impacted by the project.
- If possible, avoid impacts to wetlands. Where impacts cannot be avoided, mitigate them as much as possible, with the goal of replacing as fully as possible the functions and public benefits of lost wetlands.
- Determine if a watershed management plan exists and, if so, coordinate with watershed planners and remain consistent with the plan.
- Conduct a pre-construction meeting with local community officials, contractors, and subcontractors to discuss wetlands protection. Communicate agreed-upon wetlands preservation goals to everyone working on the project. Discuss with the local community any requirements for wetlands protection (e.g., ordinances, site plan review process).
- Integrate stormwater management into the design of the site. If appropriate, utilize low- impact development practices that infiltrate stormwater into the ground (e.g., swales, rain gardens, native plantings). Avoid diverting stormwater directly into nearby wetlands.

Construction/maintenance guidelines

- Insert special requirements addressing sensitivity of wetlands into plans, specifications, and estimates provided to construction contractors. Note the kinds of activities that are not allowed in wetlands.
- Confine construction and staging areas to the smallest necessary and clearly mark area boundaries. Confine all construction activity and storage of materials to designated areas.
- Install construction flagging or fencing around wetlands to prevent encroachment.
- Avoid having heavy equipment in wetlands. Avoid traversing wetlands. Access roads should avoid wetlands whenever possible. If a crossing is necessary, confine it to a single location at the edge of the wetlands.
- Time construction activities to coincide with frozen conditions.
- Before site disturbance occurs, implement erosion control best management practices to capture sediments and control runoff.
  - Minimize the extent and duration of exposed bare ground to prevent erosion.
  - Establish permanent vegetative cover immediately after grading is complete.
  - Do not stockpile materials within sensitive areas.
  - Employ erosion control techniques.
  - Prevent tracking of sediment onto paved surfaces.
- Excavate only what is absolutely necessary to meet engineering requirements. Do not put excavated material in wetlands. (Excavated material could be used in other areas of the site to improve seeding success).
- Properly handle, store, and dispose of hazardous materials (e.g., paint, solvents, epoxy) and utilize less hazardous materials when possible. Implement spill control and clean up practices for leaks and spills of fuel, oil, or hazardous materials. Utilize dry clean up methods (e.g., absorbents) if possible. Never allow a spill to enter area wetlands.

- Keep equipment in good working condition and free of leaks. Avoid equipment maintenance or fueling near wetlands. If mobile fueling is required, keep a spill kit on the fueling truck. Avoid hosing down construction equipment at the site, unless the water is contained.
- Identify and implement salt management techniques to reduce the impacts of salt on groundwater.
- Utilize integrated pest management techniques if using pesticides during maintenance operations.
- Conduct on-site monitoring during construction to ensure wetlands are protected as planned.

Sources

AASHTO Center for Environmental Excellence. *Environmental Stewardship Practices, Procedures, and Policies for Highway Construction and Maintenance*. www.environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/.

SEMCOG. Land Use Tools and Techniques. 2003.

More information

Michigan Department of Environmental Quality
Land and Water Management Division
www.michigan.gov/deqwetlands

Floodplains

Introduction

Use of the land adjacent to a stream has a major impact on protecting water quality, avoiding flood damage, maintaining fish and wildlife habitat, and accessing water-related recreation. Also known as the floodplain, this area adjacent to the stream channel serves as a natural reservoir for storing excess water during a flood. When the main stream channel cannot accommodate the level of runoff from precipitation, the spreading of floodwaters into the floodplain helps reduce the amount of damage incurred by flooding.

Identification of resources and possible impacts

Up-to-date floodplain data are not currently available for the entire region. (Many individual communities have floodplain maps developed by the Federal Emergency Management Agency (FEMA), and FEMA is in the process of updating these maps, which may be used by SEMCOG in the future.) As a substitute, SEMCOG has mapped flood prone areas provided by the U.S. Geological Survey (USGS) Maps of Flood Prone Areas (depicting the 100-year flood) and supplemented by local master plans, FEMA flood boundaries, and topographic maps. It should also be noted that all rivers have a floodplain, even if not officially mapped.

Possible impacts to floodplains should be considered in the planning, design, construction, and maintenance of transportation projects. Floodplains are considered impacted if fill is added, vegetation is removed, or heavy equipment is placed in the floodplain.

Planning/design guidelines

- Identify the area of potential impact related to the transportation project. Conduct an inventory to determine if any floodplains could be impacted by the project.
- If possible, avoid impacts to floodplains. Where impacts cannot be avoided, mitigate them as much as possible.
- Determine if a watershed management plan exists and, if so, coordinate with watershed planners and remain consistent with the plan.
- Conduct a pre-construction meeting with local community officials, contractors, and subcontractors to discuss floodplain protection. Communicate agreed-upon floodplain preservation goals to everyone working on the project. Discuss with the local community any requirements for floodplain/flood prone areas (e.g. ordinances, site plan review process).
- Design the project to maintain natural drainage patterns and runoff rates if possible.

Construction/maintenance guidelines

- Insert special requirements addressing sensitivity of floodplains into plans, specifications, and estimates provided to construction contractors. Note the kinds of activities that are not allowed in floodplains.
- Confine construction and staging areas to the smallest necessary and clearly mark area boundaries. Confine all construction activity and storage of materials to designated areas.
- Install construction flagging or fencing around floodplains to prevent encroachment.

- Before site disturbance occurs, implement erosion control best management practices to capture sediments and control runoff.
  - Minimize the extent and duration of exposed bare ground to prevent erosion.
  - Establish permanent vegetative cover immediately after grading is complete.
  - Do not stockpile materials within sensitive areas.
  - Employ erosion control techniques.
  - Prevent tracking of sediment onto paved surfaces.
- Maintain as much riparian vegetation as possible. If riparian vegetation is damaged or removed during construction, replace with native species as soon as possible.
- Utilize bioengineering techniques, where possible, to stabilize stream banks.
- Where possible, keep construction activities away from wildlife crossings and corridors.
- When utilizing heavy equipment in the floodplain, pay close attention to the potential of uncovering archeological remains.
- Before site disturbance occurs, implement erosion control best management practices to capture sediments and control runoff.
  - Minimize the extent and duration of exposed bare ground to prevent erosion.
  - Establish permanent vegetative cover immediately after grading is complete.
  - Do not stockpile materials within sensitive areas.
  - Employ erosion control techniques.
  - Prevent tracking of sediment onto paved surfaces.
- Properly handle, store, and dispose of hazardous materials (e.g., paint, solvents, epoxy) and utilize less hazardous materials when possible. Implement spill control and clean up practices for leaks and spills of fuel, oil, or hazardous materials. Utilize dry clean up methods (e.g., absorbents) if possible. Never allow a spill to enter the storm drain system or waterways.
- Keep equipment in good working condition and free of leaks. Avoid equipment maintenance or fueling near sensitive areas. If mobile fueling is required, keep a spill kit on the fueling truck. Avoid hosing down construction equipment at the site, unless the water is contained and does not get into the storm drain system or waterways.
- Identify and implement salt management techniques to reduce the impacts of salt on area waterways.
- Utilize integrated pest management techniques if using pesticides during maintenance operations.
- Conduct on-site monitoring during construction to ensure floodplains are protected as planned.

Sources

AASHTO Center for Environmental Excellence. *Environmental Stewardship Practices, Procedures, and Policies for Highway Construction and Maintenance*. www.environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/.

Michigan Department of Environmental Quality. *Floodplain Management in Michigan: Quick Guide*. 2004.

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Groundwater Resources

Introduction

Over one million people in Southeast Michigan depend on groundwater for their drinking water. However, increased development and transportation projects in areas dependent on groundwater result in an increased possibility of contamination, so special care should be taken when planning and constructing projects in groundwater protection areas.

Identification of resources and possible impacts

Groundwater areas are defined to include wellhead protection areas and karst areas. Wellhead protection areas contribute water to the municipal water supply in the community. Karst areas are geologic formations that lead to sinkholes and provide direct lines of potential groundwater contamination in a community. Wellhead protection areas and sinkhole locations were used to map groundwater resources.

Possible impacts on groundwater should be considered in the planning, design, construction, and maintenance of transportation projects. Transportation projects can impact groundwater when materials (e.g., paint, solvent, fuel, salt) enter wellhead protection or karst areas.

Planning/design guidelines

- Identify the area of potential impact related to the transportation project. Conduct an inventory of potential areas of groundwater contamination.
- Determine if a watershed management plan exists and, if so, coordinate with watershed planners and remain consistent with the plan.
- Conduct a pre-construction meeting with local community officials, contractors, and subcontractors to discuss groundwater protection. Communicate agreed-upon groundwater preservation goals to everyone working on the project. Discuss with the local community any requirements for groundwater protection (e.g. ordinances, site plan review process).
- Integrate stormwater management into the design of the site. Stormwater management systems should be designed to protect area groundwater supplies (i.e., draining away from critical groundwater recharge or karst areas).

Construction/maintenance guidelines

- Insert special requirements addressing sensitivity of groundwater areas into plans, specifications, and estimates provided to construction contractors. Note the kinds of activities that are not allowed in groundwater areas.

- Confine construction and staging areas to the smallest necessary and clearly mark area boundaries. Confine all construction activity and storage of materials to designated areas.
- Install construction flagging or fencing around areas of potential groundwater contamination to prevent encroachment.
- Avoid parking or storing equipment near areas of potential groundwater contamination.
- Properly handle, store, and dispose of hazardous materials (e.g., paint, solvents, epoxy) and utilize less hazardous materials when possible. Implement spill control and clean up practices for leaks and spills of fuel, oil, or hazardous materials. Utilize dry clean up methods (e.g., absorbents) if possible. Never allow a spill to enter the storm drain system.
- Keep equipment in good working condition and free of leaks. Avoid equipment maintenance or fueling near water bodies. If mobile fueling is required, keep a spill kit on the fueling truck. Avoid hosing down construction equipment at the site, particularly in areas prone to groundwater contamination.
- Identify and implement salt management techniques to reduce the impacts of salt on groundwater.
- Utilize integrated pest management techniques if using pesticides during maintenance operations.
- Conduct on-site monitoring during construction to ensure groundwater areas are protected as planned.

Sources

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Nevela, Amy. *Groundwater Stewardship in Michigan: A Manual for Community Action.*

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U.S. Environmental Protection Agency. *Managing Highway Deicing to Prevent Contamination of Drinking Water*. Source Water Protection Practices Bulletin. 2002.

Woodlands

Introduction

Woodlands are an important natural resource providing an enriched environment for people, animals, and plants. Benefits include:

- providing recreational and aesthetic opportunities;
- providing habitat for wildlife;
- stabilizing slopes and stream banks;
- reducing erosion and sedimentation;
- acting as a barrier to reduce noise; and
- filtering water percolating through the ground.

Identification of resources and possible impacts

SEMCOG has identified regional woodlands greater than two-and-a-half acres in size and consisting of northern hardwood, central hardwood/oak, aspen/white birch, pine, and other upland conifer species.

Possible impacts on woodlands should be considered in the planning, design, construction, and maintenance of transportation projects. Woodlands are considered impacted if trees are removed, heavy equipment is utilized near woodlands, or polluted stormwater enters woodlands.

Planning/design guidelines

- Identify the area of potential impact related to the transportation project. Conduct an inventory of woodlands directly impacted by the project. Map the presence of any unique ecosystems and the location of large “landmark” trees.
- If possible, avoid impacts to woodlands. Where impacts cannot be avoided, mitigate them as much as possible. Preserve as many trees and undisturbed woodlands as possible, paying particular attention to:
  - protecting trees on sites with severe design limitations, such as steep slopes and highly erodible soils;
  - preserving trees along watercourses to prevent bank erosion, decrease stream temperature, and protect aquatic life; and
  - preserving stands of trees instead of individual trees because groups of trees often tolerate construction disturbance better than individual trees.
- Determine if a watershed management plan exists and, if so, coordinate with watershed planners and remain consistent with the plan.
- Conduct a pre-construction meeting with local community officials, contractors, and subcontractors to discuss woodlands protection. Communicate agreed-upon tree preservation goals to everyone working on the project. Discuss with the local community any requirements for woodlands protection (e.g., ordinances, site plan review process).

- Integrate stormwater management into the design of the site. If appropriate, utilize low-impact development practices that infiltrate stormwater into the ground (e.g., swales, rain gardens, native plantings).

Construction/maintenance guidelines

- Insert special requirements addressing sensitivity of woodlands into plans, specifications, and estimates provided to construction contractors. Note the kinds of activities that are not allowed in woodlands.
- Confine construction and staging areas to the smallest necessary and clearly mark area boundaries. Confine all construction activity and storage of materials to designated areas.
- Protect the tree and drip zone during construction. Typically, the drip zone is the area around the base of the tree that lies within the circumference of the crown and contains the majority of the tree's root system. Ideally, there should be no disturbance within the drip zone (e.g., no grading, digging, trenching, paving, or operating/parking heavy equipment and vehicles). In order to protect trees during construction, consider fencing or flagging around the drip zone at a minimum (the root zone is often much large than the drip zone).
- Avoid trenching utilities through the tree's root zone.
- Where possible, apply a two-to-four-inch layer of organic mulch, such as wood chips, over the root system. The mulch helps moderate soil temperatures, maintain moisture, and reduce competition from weeds.
- Avoid piling excavated soil around any tree.
- Based on the current condition of the tree and how much grading is going to occur around it, consider deep watering the tree prior to site activities.
- Limit paving within the root protection zone to pervious surfaces that allow air, water, and nutrients to reach the root zone.
- Replace trees removed during construction, utilizing native trees.
- Conduct on-site monitoring during construction to ensure existing trees are protected as planned. Conduct post-construction monitoring to ensure trees impacted by construction receive appropriate care.

Sources

Greeley, Kay J., PE, ASLA. *Before, During, and After the Bulldozers — Sustaining Trees*. California Urban Forest Council. 2001.

National Arbor Day Foundation. *7 Tips for Successfully Building with Trees.* www.arborday.org.

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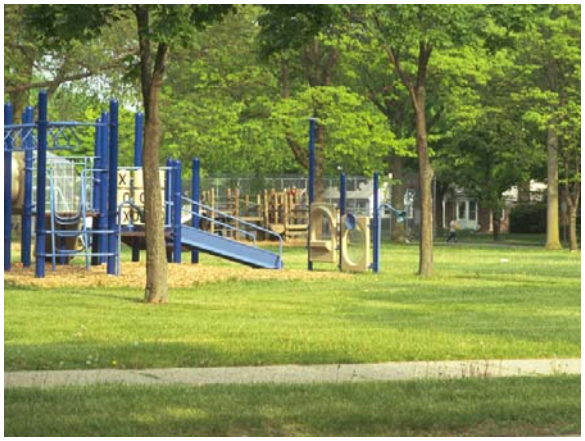
Parks and Recreation Areas



Introduction

Preservation of parks and recreation areas is key to maintaining community vitality and meeting the recreational needs of citizens. Parks and recreation areas can range from state-owned facilities to municipal parks to school playgrounds, and can encompass a variety of public uses. Many communities have recreation plans for acquiring, maintaining, and improving parks and recreation areas consistent with identified community recreation goals.

Identification of resources and possible impacts

SEMCOG has identified public parks (state, metropolitan, county, municipal, and subdivision), dedicated open spaces, federal lands, nature preserves, and state game and recreation areas in the region using county parcel data and aerial photography.

Possible impacts on parks and recreation areas should be considered during the planning, design, construction, and maintenance of transportation projects. Parks and recreation areas are considered impacted if land is acquired for a project, if land is otherwise occupied (e.g., by a retention basin) in a manner that is adverse to the recreational purpose of the land, or if a project in the proximity of the land substantially impacts its purpose.

Section 4(f) of the U.S. Department of Transportation Act of 1966 (subsequently codified into 49 U.S.C. Section 303) stipulates that federally-funded transportation projects cannot use publicly owned public parks or recreation areas unless there is no feasible and prudent alternative to the use of the land and the action includes all possible planning to minimize harm resulting from the use. Where Section 4(f) resources are impacted, all associated federal requirements must be met during project planning and implementation.

Planning/design guidelines

- Identify the area of potential impact related to the transportation project. Conduct an inventory to determine if any parks or recreation areas could be impacted by the project.
- Determine if impacted parks and recreation areas are included in a community recreation plan; if so, coordinate with responsible community officials and remain consistent with the plan. If 4(f) resources are impacted, determine possible impacts, explore alternatives to avoid or reduce impacts, and reach mitigation agreements with the appropriate agencies. Conduct a pre-construction meeting with local community officials, contractors, and subcontractors to communicate agreed-upon preservation goals to everyone working on the project.
- If possible, avoid impacts to parks and recreation areas. Where impacts cannot be avoided, mitigate them as much as possible. For example:

– Acquire the impacted property and compensate for its loss either monetarily or by acquiring replacement land.

– Acquire scenic easements and construct appropriate visual screening consistent with the context of the recreational use.

– Relocate, rehabilitate, or restore impacted features and context, including natural areas, such as vegetation, and facilities, such as sidewalks, lighting, park benches, playground equipment, park structures, etc.

– Preserve, to the extent possible, the resource and site features, including circulation systems, vegetation, and land forms.

– Avoid and mitigate new visual, atmospheric, and/or audible elements that detract from the character of the resource.

Construction/maintenance guidelines

- Insert special requirements addressing sensitivity of parks and recreation areas into plans, specifications, and estimates provided to construction contractors.
- Confine construction and staging areas to the smallest necessary and clearly mark area boundaries. Confine all construction activity and storage of materials to designated areas.
- Install construction flagging or fencing around sensitive areas to prevent encroachment.
- Limit construction and maintenance activities to the off-season when public usage is minimized.
- Limit noise and vibrations, maintain proper drainage, and minimize disturbance of terrain and amenities by construction equipment. Replace disturbed terrain and amenities in-kind.
- Conduct on-site monitoring during construction to ensure parks and recreation areas are protected as planned.

Sources

Maryland State Highway Administration. Section 4(f) Interactive Training. www.section4f.com.

U.S. Department of Transportation, Federal Highway Administration. *FHWA Section 4(f) Policy Paper*. March 2005.

Historic and Archeological Resources

Introduction

Preservation of key historic resources contributes to stronger communities, economic development and tourism, and an overall higher quality of life for citizens. Understanding and developing a future consistent with the past is essential. The ultimate goal is integrating historic preservation into all aspects of current and future community and transportation planning, so that, ultimately, there is a balance.

Identification of resources and possible impacts

Historic resources are generally considered to be any building, district, archeological site, structure, or object that is at least fifty years of age and is either listed or eligible for listing in the National Register of Historic Places (NRHP). National Historic Landmarks (NHL) are a special category of NRHP historic resources with exceptional significance. In addition, resources listed in the State Register of Historic Sites (SRHS) and those resources associated with the green and gold Michigan historical markers should also be considered among historic resources.

SEMCOG has identified historic resources on the NRHP, NHL, and SRHS provided by the State Historic Preservation Office (also available for search online at www.michigan.gov/shpo). However, a thorough search should be conducted to include the following:

- consultation with local governments, tribal leaders, property owners, historical societies/organizations, historic district commissions, State Historic Preservation Office, and Office of the State Archeologist (OSA);
- background research at local and regional libraries, archives, and government offices (e.g. registrar of deeds); and
- the services of a qualified historian, archeologist, or historic preservation professional to conduct research, develop reports, and make recommendations.

While there is no comprehensive inventory of archeological resources in the state, according to Michigan law, the police must be notified immediately upon the discovery of human remains at any stage of a project. If a police investigation rules out the possibility of a crime scene, OSA shall be consulted to address the remains as an archeological resource. If materials are discovered that indicate the presence of an archeological site (pottery, bones, coins, arrowheads, stone tools, etc.), construction activity should cease in the area of the discovery until OSA is consulted.

Possible impacts on historic resources should be considered during the planning, design, construction, and maintenance of transportation projects. An historic resource is considered impacted if the resource and/or its site features are damaged, relocated or destroyed; altered inconsistent with preservation standards; exposed to incompatible visual, atmospheric, or audible elements; or neglected.

Planning/design guidelines

- Identify the area of potential impact related to the transportation project. Conduct an inventory to determine if any historic or archeological resources could be impacted by the project. Coordinate with SHPO and the Michigan Department of Transportation to determine possible impacts, explore alternatives to avoid or reduce impacts, and reach mitigation agreements as appropriate.
- Determine if preservation plans exist and, if so, coordinate with preservation planners and remain consistent with the plan. Conduct a pre-construction meeting with local community officials, contractors, and subcontractors to communicate agreed-upon preservation goals to everyone working on the project.
- If possible, avoid impacts to historic and archeological resources. Where impacts cannot be avoided, mitigate them as much as possible. For example:
  - Preserve the relationship between the resource and adjacent historic buildings/features.
  - Acquire scenic easements and construct appropriate scenic buffers consistent with the historic context of the resource.
  - For sites open to the public, develop an appropriate adaptive use of historic buildings and sites, maintain nonmotorized access to the resource, and provide appropriate interpretive signage.
  - Rehabilitate or restore impacted resources and context.
  - Preserve to the extent possible the resource and site features, including circulation systems, vegetation, land forms, furnishings, decorative elements, and water features.
  - Avoid or mitigate new visual, atmospheric, and/or audible elements that detract from the historic character.
- If necessary, move the resource while maintaining structural integrity and historic qualities.
- If the resource must be demolished:
  - Record and document all aspects of the resource and site according to applicable guidelines. Provide copies of documentation to the SHPO, Archives of Michigan, and/or appropriate local/regional repository.
  - Utilize partial recovery or salvage of materials to the extent possible.
  - Compensate for destruction, either monetarily or by replacing or substituting for the resource (e.g., arrange to sponsor an exhibit or program with a local historical society or historic district commission, provide funding for historic preservation activities in a community, or assist in Web site development for a non-profit historic preservation organization or program).

Construction/maintenance guidelines

- Insert special requirements addressing sensitivity of historic and archeological resources into plans, specifications, and estimates provided to construction contractors.
- Confine construction and staging areas to the smallest necessary and clearly mark area boundaries. Confine all construction activity and storage of materials to designated areas.
- Install construction flagging or fencing around sensitive areas, including the historic resource itself and related features (e.g., landscaping), to prevent encroachment.
- Limit construction and maintenance activities to the off-season when public usage is minimized (for resources open to the public).

- Limit noise and vibrations, maintain proper drainage, and minimize disturbance of terrain and amenities by construction equipment. Replace disturbed terrain and amenities in-kind.
- Conduct on-site monitoring during construction to ensure resources are protected as planned.

Sources

Michigan State Historic Preservation Office. *EZ106: Separating the Monkey from the Wrench (A Complete Guide to Section 106)*.

U.S. Department of the Interior. *Archaeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines*. www.cr.nps.gov/local-law/arch_stnds_10.htm.

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U.S. Department of Transportation, Federal Highway Administration. *FHWA Guidance: Transportation Enhancement Activities.* www.fhwa.dot.gov/environment/te/guidance.htm.

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State Historic Preservation Office. *Michigan's State Historic Preservation Plan, 2001-2006*.

Advisory Council on Historic Preservation. *Protecting Historic Properties: A Citizen's Guide to Section 106 Review*.

Oregon Department of Transportation. *Archaeology Manual*. http://www.oregon.gov/ODOT/HWY/GEOENVIRONMENTAL/archaeology_manual.shtml.

Advisory Council on Historic Preservation. www.achp.gov.

The Historical Society of Michigan. *Michigan Directory of Historical Societies, Museums, Archives, Agencies and Commissions, 2006-2007*.

More information

Michigan Office of the State Archeologist
Michigan Historical Center
Department of History, Arts and Libraries
P. O. Box 30740, 702 West Kalamazoo St.
Lansing, Michigan 48909-8240
517-373-6358
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Michigan State Historic Preservation Office
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Cemeteries and Burial Grounds

Introduction

Preservation of cemeteries and burial grounds, whether contemporary or historical, demonstrates societal respect for their sacred, artistic, historical, and genealogical significance. Cemeteries face dramatic pressures from many fronts, including development (residential, commercial, and transportation related), abandonment, and neglect. While the establishment and maintenance of cemeteries are governed by state law and local ordinances, many historic burial grounds have already been lost. This includes burial grounds that have been disinterred and moved, but also those that have been inadvertently destroyed or covered over by development and those that remain intact but undocumented and, therefore, unknown.

Identification of resources and possible impacts

SEMCOG has identified visible cemeteries of at least one acre using local land use plans and aerial photography. Clearly, there are many other smaller and less identifiable cemeteries throughout the region, as well as unidentified/unpublicized Native American burial grounds. Every effort should be made to identify cemeteries and burial grounds prior to commencement of a transportation project. Michigan law requires that the police be notified immediately upon the inadvertent discovery of human remains. If a police investigation rules out the possibility of a crime scene, the Office of the State Archeologist (OSA) and the local health department shall be consulted to address the remains as appropriate before construction work continues.

Possible impacts on cemeteries and burial grounds should be considered during the planning/design, construction, and maintenance of transportation projects. A cemetery or burial ground is considered impacted if any of the cemetery proper (if defined) is disturbed, if any human remains or other evidence of interments (e.g., headstones or markers) are uncovered, or if the context of the cemetery (e.g., landscaping or ingress/egress points) are damaged, relocated, or destroyed.

Planning/design guidelines

- Identify the area of potential impact related to the transportation project. Conduct an inventory to determine if any cemeteries or burial grounds could be impacted by the project. Coordinate with the Office of the State Archeologist, local health department, and/or resource owners to determine possible impacts, explore alternatives to avoid or reduce impacts, and reach mitigation agreements as appropriate.
- Determine if cemetery preservation plans exist and, if so, coordinate with preservation planners and remain consistent with the plan. Conduct a pre-construction meeting with local community officials, contractors, and subcontractors to communicate agreed-upon preservation goals to everyone working on the project.
- If possible, avoid impacts to cemeteries and burial grounds. Where impacts cannot be avoided, mitigate them as much as possible. For example:
  - Acquire scenic easements and construct appropriate scenic buffers consistent with the context of the cemetery/burial ground.
  - Rehabilitate or restore impacted features and context.
  - Preserve to the extent possible the resource and site features, including circulation systems, vegetation, and land forms.

  - Avoid or mitigate new visual, atmospheric, and/or audible elements that detract from the character of the resource.
  - Where necessary, compensate for impacts.
- If disinterment is required, applicable state laws and local ordinances must be adhered to with respect to proper reinterment, as must requirements for recordation and documentation of the cemetery.

Construction/maintenance guidelines

- Insert special requirements addressing sensitivity of cemeteries and burial grounds into plans, specifications, and estimates provided to construction contractors.
- Confine construction and staging areas to the smallest necessary and clearly mark area boundaries. Confine all construction activity and storage of materials to designated areas.
- Where the cemetery/burial ground is not clearly demarcated, install construction flagging or fencing around burial plots and related features (e.g., landscaping) to prevent encroachment.
- Limit noise and vibrations, maintain proper drainage, and minimize disturbance of terrain and amenities by construction equipment. Replace disturbed terrain and amenities in-kind.
- Conduct on-site monitoring to ensure cemeteries and burial grounds are protected as planned.

Sources

Monroe County. *Cemeteries of Monroe County, Michigan, 1795-2003*.

Chicora Foundation. *Cemetery Preservation*. www.chicora.org.

Heritage Routes and Natural Beauty Roads

Introduction

The Michigan Heritage Route Program is designed to identify and preserve routes with significant scenic, historic, cultural, or recreational characteristics. Similarly, the Natural Beauty Roads program is designed to identify and preserve routes in a natural condition for aesthetic enjoyment. In so doing, communities promote a greater appreciation for these resources; contribute to a unique sense of place that enhances community viability and attractiveness; and improve overall quality of life for residents, visitors, and the business community. Designation as a Heritage Route or Natural Beauty Road takes into account not only the roadway itself, but its entire context. This can include natural landscapes, historic buildings, and adjacent activities and recreational attractions, all of which lend themselves to the overall context and quality of the route.

Identification of resources and possible impacts

US-12, M-125, Woodward Avenue, and M-15 are designated Heritage Routes in Southeast Michigan. Woodward Avenue is also a designated National Byway. Various county and local roads are designated Natural Beauty Roads.

Possible impacts on Heritage Routes and Natural Beauty Roads should be considered during the planning, design, construction, and maintenance of transportation projects. This includes projects related to the designated roads themselves (e.g., routine maintenance, rehabilitation, or reconstruction), as well as other types of projects in the vicinity of the designated roads. A Heritage Route or Natural Beauty Road is considered impacted if the roadway, right-of-way, or setting is altered in such a way as to degrade the characteristics that led to the designation. This can include physical realignment or reconstruction of the roadway, destruction or reconfiguration of significant structures or habitat in the roadway viewshed, and significant deviation from the original use of the roadway.

Planning/design guidelines

- Identify the area of potential impact related to the transportation project. Conduct an inventory to determine if any Heritage Routes or Natural Beauty Roads could be impacted by the project.
- Designated Heritage Routes are required to have a corridor management plan. Consult these plans, along with any existing preservation/planning organizations associated with the designated routes, before and during the planning and design process to ensure that transportation activities are in keeping with the nature of the designation.
- Conduct a pre-construction meeting with local community officials, contractors, and subcontractors to communicate agreed-upon corridor management goals to everyone working on the project.
- Consider all aspects of the roadway environment in the design process, including adjacent viewsheds, structures, habitat, and activity centers.

- If possible, avoid impacts to Heritage Routes and Natural Beauty Roads. Where impacts to significant roadway or context features cannot be avoided, mitigate them as much as possible. For example:
  - Rehabilitate or restore impacted elements while retaining the original design, materials, and workmanship.
  - Replace in-kind any damaged plant life or other aesthetic elements within the construction impact area.
  - Maintain the integrity of historic structures within the construction impact area (see historic resource and historic bridge guidelines for additional information).

Construction/maintenance guidelines

- Insert special requirements addressing coordination with the corridor management plan into specifications and estimates provided to construction contractors.
- Confine construction and staging areas to the smallest necessary and clearly mark area boundaries. Confine all construction activity and storage of materials to designated areas.
- Limit noise and vibrations, maintain proper drainage, and minimize disturbance of terrain and amenities by construction equipment. Replace disturbed terrain and amenities in-kind.
- For Natural Beauty Roads, continue routine road maintenance while not disturbing the natural character of the roadway and adjacent areas. For example:
  - Limit mowing to a maximum of five feet from the road surface.
  - Minimize grading width.
  - Do not use herbicides to control or eliminate roadside vegetation.
  - Minimize dust laying.
  - Limit tree/shrub trimming and removal to the extent needed for safety.
  - Continue routine pavement maintenance but without deviating from the original design of the roadway.
- Conduct on-site monitoring during construction to ensure the corridor management plan is being adhered to properly.

Sources

Michigan Department of Transportation. Heritage Routes. www.michigan.gov/mdot (click on “Projects & Programs” then “Highway Programs” then “Heritage Routes”).

Michigan Highways. Heritage Routes. www.michiganhighways.org/other/heritage.html.

Historic Roads. www.historicroads.org.

U.S. Department of Transportation, Federal Highway Administration. Historic Roads. www.environment.fhwa.dot.gov/histpres/roads.asp.

U.S. Department of Transportation, Federal Highway Administration. The National Byways Program. www.byways.org.

Historic Bridges

Introduction

Historically, bridges contributed significantly to the development and growth of the country and its economy. Bridges made it possible to tie together communities and markets by allowing for the crossing of natural features, such as rivers, and man-made transportation infrastructure, such as canals, roads, and rail lines,. Bridge design and construction also marked the evolution of important developments in structural engineering and materials technology, making historic bridges an icon in the history of civil engineering and highway design.

Identification of resources and possible impacts

Historic bridges are often associated with significant events or people; distinctive artistic values and craftsmanship; or representative building materials/ techniques. Preservation of historic bridges retains these aspects of our history and contributes to a unique sense of place. If properly maintained for active use, historic bridges can also continue contributing to a functioning roadway network.

Possible impacts on historic bridges should be considered during the planning, design, construction, and maintenance of transportation projects. This includes projects related to the bridges themselves (e.g., routine maintenance, rehabilitation, or reconstruction), as well as other types of projects in the vicinity of historic bridges. An historic bridge is considered impacted if historic material or distinctive engineering/architectural elements are concealed, removed, damaged, or altered inconsistent with preservation standards; if the structure is neglected, closed, or relocated; or if significant archeological, cultural, or environmental resources adjacent to the bridge are damaged or altered.

Planning/design guidelines

- Identify the area of potential impact related to the transportation project. Conduct an inventory of bridges and their adjacent features to identify the location/condition of historic bridges that could be impacted by the project. Consult appropriate data inventories to determine properties on or eligible for the National Register of Historic Places. Coordinate with the State Historic Preservation Office and Michigan Department of Transportation to determine possible impacts, explore alternatives to avoid or reduce impacts, and reach mitigation agreements.
- Determine if a bridge preservation plan exists and, if so, coordinate with preservation planners and remain consistent with the plan. Conduct a pre-construction meeting with local community officials, contractors, and subcontractors to communicate agreed-upon preservation goals to everyone working on the project.
- If possible, avoid impacts to historic bridges. Where impacts cannot be avoided, mitigate them as much as possible. For example:
  - Maintain the bridge in its original location and use, i.e., carrying vehicular travel.
  - Maintain the bridge in its original location but impose necessary weight or use restrictions to ensure structural integrity and safety for vehicular travel.
  - Maintain the bridge in its original location with the addition of a parallel bypass span that is consistent with the historic context of the existing bridge.
  - Selectively rehabilitate the bridge while protecting historic design, materials, and workmanship.

  - If necessary, undertake major reconstruction while retaining consistency with original design, color, texture, and visual qualities.
  - Preserve significant archeological, cultural, and environmental resources adjacent to the bridge.
- If the bridge cannot be maintained in its original location:
  - Retain the physical structure of the bridge at an alternate location where vehicular travel can be more appropriately maintained.
  - Close the bridge to vehicular traffic and convert to an alternate use (either onsite or at an alternate location), such as a nonmotorized facility, historical monument, architectural adaptation, fishing pier, or recreational viewing platform.
  - Consider transfer of ownership to a preservation/adaptive use program. Conduct a public education and awareness campaign to solicit appropriate entities for receipt of the bridge.
- If demolition is unavoidable:
  - Adequately record and document the bridge and its site context; dismantle and salvage as much material as possible for display, research, and/or reuse.
  - Replace the bridge with another compatible in size, scale, visual quality, and character. This is particularly important in historic districts where other related historic elements are present.

Construction/maintenance guidelines

- Insert special requirements addressing sensitivity of historic bridges and adjacent features into plans, specifications, and estimates provided to construction contractors
- Confine construction and staging areas to the smallest necessary and clearly mark area boundaries. Confine all construction activity and storage of materials to designated areas.
- Avoid maintenance techniques, e.g., sandblasting and salting, that can damage historic materials.
- Limit noise and vibrations, maintain proper drainage, and minimize disturbance of adjacent terrain and amenities by construction equipment. Replace disturbed terrain and amenities in-kind.
- Conduct on-site monitoring to ensure historic bridges are being properly protected.
- Conduct routine post-construction monitoring of cumulative/residual impacts on historic bridges (e.g., monitor traffic flow and usage to ensure the structural integrity of the bridge is maintained).

Sources

SRI Foundation. *Historic Bridges: A Heritage at Risk, A Report on a Workshop on the Preservation and Management of Historic Bridges.* December 2003.

The Journal of the National Trust for Historic Preservation. *Historic Preservation and Transportation*. Summer 2000.

U.S. Department of the Interior. *Secretary of the Interior's Standards for Rehabilitation*.

AASHTO Center for Environmental Excellence. Historic Bridges. www.environment.transportation.org/environmental_issues/historic_cultural/historic_bridges.aspx.

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Nonmotorized Facilities

Introduction

Walkable and bikeable communities offer a high quality of life and positively impact mobility, safety, and recreational opportunities. The desire for efficient motorized travel must be balanced with community development patterns as well as the needs of pedestrians and bicyclists. Preserving a well-planned and well-maintained nonmotorized system, which provides recreational opportunities and connects community activity centers, is key to overall transportation goals.

Identification of resources and possible impacts

Nonmotorized facilities can range from off-road walking/biking trails, to on-road bicycle lanes, to paved shoulders, to sidewalks. SEMCOG has identified current and planned off-road facilities based on work conducted by the Community Foundation for Southeast Michigan to update the region's Greenways Vision. However, we are all pedestrians at some point in time, so anywhere we walk (or bike) should be considered part of the nonmotorized system.

Possible impacts on nonmotorized facilities should be considered during the planning, design, construction, and maintenance of transportation projects. Nonmotorized facilities are considered impacted if they are removed, if travel patterns are changed to the detriment of pedestrian/bicyclist safety, or if existing nonmotorized pathways are bisected (e.g., by a bridge not accessible to non-vehicular traffic) thereby reducing connectivity along the pathway or between destinations.

Planning/design guidelines

- Determine if the local community has a community master plan or recreation plan addressing nonmotorized activities; if so, coordinate with community officials and remain consistent with the plan, including any plans to develop nonmotorized facilities in the future. Conduct a pre-construction meeting with local community officials, contractors, and subcontractors to communicate agreed-upon nonmotorized goals to everyone working on the project.
- Coordinate nonmotorized planning activities with the transit system to ensure adequate connectivity between transit and nonmotorized systems and facilities (e.g., continuous sidewalks leading to ADA compliant bus pads).
- If possible, avoid impacts to nonmotorized facilities. Where impacts cannot be avoided, mitigate them as much as possible. For example:
  - Acquire scenic easements and construct appropriate visual screening consistent with the context of the facility.
  - Relocate, rehabilitate, or restore impacted features and context, including natural areas such as vegetation and amenities such as lighting and benches.
  - Realign or replace facilities as necessary to retain system connectivity.
  - Avoid or mitigate new visual, atmospheric, and/or audible elements that detract from the character of the facility.
- Incorporate on-road pedestrian and bicyclist friendly design elements into the project. For example:

– Construct and/or maintain sidewalks, paved roadway shoulders, and/or bicycle lanes as appropriate based on the intended roadway usage and adjacent development patterns.

– Use traffic calming and access management techniques to limit conflicts between travel modes.

– Design traffic signal control features based on expected pedestrian/bicycle volumes. Consider pedestrian/bicyclist-actuated signals and ensure adequate pedestrian crossing time.

– Design convenient and safe mid-block crossings for pedestrians at regular intervals. Clearly mark pedestrian crosswalks.

– Incorporate ADA approved curb ramps into all new construction and as part of repair/improvement projects.

– Provide bicycle-safe drainage grates and railroad crossings.

– Utilize industry standards for nonmotorized facility design based on state and federal recommendations for safety.

– Install pedestrian and bicyclist amenities wherever possible, e.g., benches, shade trees, lighting, and bicycle stands.

– Consider adding medians to narrow wide streets, thereby calming traffic and providing refuge for crossing pedestrians and bicyclists.

– Use buffering between streets and nonmotorized facilities.

– Provide way-finding signage to maximize the use and benefit of the system.

Construction/maintenance guidelines

- Insert special requirements addressing sensitivity of nonmotorized facilities into plans, specifications, and estimates provided to construction contractors.
- Particularly where off-road nonmotorized facilities are present, confine construction and staging areas to the smallest areas possible and clearly mark area boundaries. Confine all construction activity and storage of materials to designated areas.
- Limit construction and maintenance activities to the off-season when public usage is minimized.
- Limit noise and vibrations, maintain proper drainage, and minimize disturbance of terrain and amenities by construction equipment. Replace disturbed terrain and amenities in-kind.
- Maintain proper signage during construction, particularly if pedestrian crosswalks are impacted. Provide alternative walkways and crossings as necessary.
- Properly maintain pavement markings during and after construction.
- Conduct on-site monitoring to ensure nonmotorized facilities are protected as planned.

Sources

SEMCOG. *Land Use Tools and Techniques*. 2003.

Smart Growth Network. *Getting to Smart Growth: 100 Policies for Implementation*.

Smart Growth Network. *Getting to Smart Growth II: 100 More Policies for Implementation*.

Maryland State Highway Administration. Section 4(f) Interactive Training. www.section4f.com.

Appendix A – Resource Details

Table 4 details the environmentally sensitive resources included in the analysis described in this report. It should be noted that, just because a resource is not included in the analysis, does not mean it is not environmentally sensitive and should not be considered at the project level. Table 5 identifies those resources that may be included in future analyses if and when sufficient data are available.

Table 4
Data Resources Currently Included in Analysis

Resource	Agency Responsible for Data Development/Upkeep	Last Updated	Notes
Lakes and Streams	Michigan Center for Geographic Information	2004	
Designated Trout Lakes/Streams & Natural Rivers	Michigan Center for Geographic Information - Michigan Geographic Data Library	2000	
Wetlands Indicators	SEMCOG	2003	Based on SEMCOG wetlands indicator map, which was created using: • hydric soils, • National Wetlands Inventory, and • 2000 land use/land cover map. Where two of the three overlap, wetland conditions may be present. Aerial photography was also used to confirm classification.
Flood Prone Areas	SEMCOG	1995	Based on U.S. Geological Survey Maps of Flood Prone Areas (depicting 100-year flood) and augmented using township master plans, county maps and publications, Federal Emergency Management Agency flood-boundary maps, and topographic maps.
Wellhead Protection Areas	Michigan State University and Michigan Department of Environmental Quality	2006	
Karst	Monroe County	2006	Based on sinkhole maps.

Resource	Agency Responsible for Data Development/Upkeep	Last Updated	Notes
Woodlands	SEMCOG	2000	Based on SEMCOG 2000 land use/land cover map. Includes following categories: • Northern Hardwood, • Central Hardwood/Oak, • Aspen/White Birch Association, • Pine, and • Other Upland Conifer.
Parks and Recreation Areas	SEMCOG	2001	Based on SEMCOG recreation map. Includes following categories: • county park, • dedicated open space, • federal land, • metro park, • municipal park, • nature preserve, • state game area, • state park, • state recreation area, and • subdivision park.
Historic Sites	Michigan Center for Geographic Information	2002	Based on Michigan State Historic Preservation Office listings of: • National Register of Historic Places, • Michigan Historical Markers, and • State Register of Historic Sites.
Cemeteries	SEMCOG	2000	Based on SEMCOG 2000 land use/land cover map. Parcels over one acre included.
Heritage Routes & Natural Beauty Roads	Michigan Department of Transportation and County Road Commissions	2006	
Historic Bridges	Michigan Department of Transportation	2006	
Nonmotorized Facilities	The Community Foundation	2006	

Source: SEMCOG.

Table 5
Data Resources Not Included in Analysis

Resource	Agency Responsible for Data Development/Upkeep	Notes
Greenways	The Community Foundation	The Community Foundation is currently updating their map of potential and existing open space and greenways. Data may be used in the future if available.
Floodplains	Federal Emergency Management Agency	FEMA is in the process of updating county floodplain maps. Data may be used in the future if available.
Endangered/Threatened Species	Michigan Natural Features Inventory	A determination was made that, due to the incompleteness/unreliability of the data, this was not a resource that could be used in this analysis.
Unique Habitat	Michigan Natural Features Inventory	A determination was made that, due to the incompleteness/unreliability of the data, this was not a resource that could be used in this analysis.
Archeological Sites	State Historic Preservation Office	There is no comprehensive dataset available to the public.
Protected Farmland		Protection of prime agricultural land and farms (under Public Act 116 – State of Michigan Farmland and Open Space Preservation Program) is temporary. Protected parcels are not currently mapped regionwide.

Source: SEMCOG.

Appendix B – Agency Consultation

The agencies in Table 6 were requested to participate at various stages in development of this process. They will continue to be contacted to review new/revised materials and provide data as needed.

Table 6
Agency Consultation

Invited	Invited
County Drain Commissioners	No
County/City of Detroit Planning/Environmental Departments	Yes
County/City of Detroit Road and Transit Agencies	Yes
Federal Highway Administration	Yes
Federal Transit Administration	No
Governor's Office	No
Huron-Clinton Metropolitan Authority	No
Michigan Center for Geographic Information	Yes
Michigan Department of Environmental Quality	Yes
Michigan Department of Natural Resources	Yes
Michigan Department of Transportation	Yes
Michigan State Historical Preservation Office/State Archeologist	Yes
Michigan Watershed Council	No
Native American Tribes	Yes
Natural Resources Conservation Service	No
Toledo Metropolitan Area Council of Governments	Yes
U.S. Army Corps of Engineers	No
U.S. Environmental Protection Agency	No
U.S. Fish and Wildlife	No
U.S. Geological Survey	Yes

Source: SEMCOG.

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