

ENVIRONMENTAL MITIGATION

This chapter will serve as an introduction on the effort by the SWMPC, to place greater emphasis on the environmental impacts of federally funded transportation projects in the region; and to develop and maintain partnerships with private and public state and local governments/agencies and Native American Tribes who can assist in the development of the LRTP and TIP.

MAP-21

Moving Ahead for Progress in the 21st Century (MAP-21) is the current transportation legislation as of October 1, 2013, which replaces the extensions to SAFETEA-LU legislation that were in place during the previous long range plan update. MAP-21 reinforces SAFETEA-LU's provisions for environmental mitigation, and in some ways increases funding avenues for environmental mitigation activities on all types of projects. While streamlining the environmental review process, MAP-21 reiterates the need, for a discussion in the planning process that addresses:

“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.”

A three step process was used to help identify this requirement:

1. Define and inventory the environmentally sensitive species and resources (Floodplains, Wetlands, Potential conservation areas, Parks, trails, and other recreational lands(not including golf courses or camps), Cemeteries, Other conservation easements, Aquifer recharge areas, Other water features (lakes, ponds, rivers, coldwater streams, and county drains), Woodlands, Well heads, Cultural, historical, archeologically significant sites, FEMA-identified flood plain areas).
2. The 2014-2017 Transportation projects are overlaid on each of they resource maps.
3. Identify and assess likely impacts on these species and areas from transportation projects.
4. Address possible mitigation strategies.

DEFINE AND INVENTORY THE ENVIRONMENTALLY SENSITIVE SPECIES AND RESOURCES

Endangered Species Act Overview

When Congress passed the Endangered Species Act (ESA) in 1973, it recognized that our rich natural heritage is of “esthetic, ecological, educational, recreational, and scientific value to our Nation and its people.”¹ It further expressed concern that many of our nation’s native plants and animals were in danger of becoming extinct.

The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend. It is administered by the U.S. Fish and Wildlife Service and the Commerce Department’s National Marine Fisheries Service (NMFS). The FWS has primary responsibility for terrestrial and freshwater organisms, while the responsibilities of NMFS are mainly marine wildlife such as whales and anadromous fish such as salmon.

Under the ESA, species may be listed as either endangered or threatened. “Endangered” means a species is in danger of extinction throughout all or a significant portion of its range. “Threatened” means a species is likely to become endangered within the foreseeable future. All species of plants and animals, except pest insects, are eligible for listing as endangered or threatened. For the purposes of the ESA, Congress defined species to include subspecies, varieties, and, for vertebrates, distinct population segments.

Berrien and Cass County is home to many species that are included in the candidate, endangered or threatened species categories.



- **Endangered Species** - species that are likely to become extinct throughout all or a large portion of their range.
- **Threatened Species** - species that are likely to become endangered in the near future.
- **Candidate species** - Plants and animals that have been studied and the Service has concluded that they should be proposed for addition to the Federal endangered and threatened species list. These species have formerly been referred to as category 1 candidate species. From the February 28, 1996 Federal Register, page 7597: "those species for which the Service has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list but issuance of the proposed rule is precluded."

¹ <http://www.fws.gov/endangered/laws-policies/>

Table 1 - Threatened, Endangered, and Candidate Species

County	Species	Status	Habitat
Berrien	Indiana Bat (<i>Myotis sodalis</i>)	Endangered	Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula.
Berrien	Piping plover (<i>Charadrius melodus</i>)	Endangered	Beaches a long shorelines of the Great Lakes
Berrien	Eastern massasauga (<i>Sistrurus catenatus</i>)	Candidate	
Berrien	Mitchell's satyr butterfly (<i>Neonympha mitchellii mitchellii</i>)	Endangered	Fens; wetlands characterized by calcareous soils which are fed by carbonate - rich water from seeps and springs
Berrien	Pitcher's thistle (<i>Cirsium pitcheri</i>)	Threatened	Stabilized dunes and blowout areas
Berrien	Small whorled pogonia (<i>Isotria medeoloides</i>)	Threatened	Dry woodland; upland sites in mixed forests (second or third growth stage)
Cass	Indiana Bat (<i>Myotis sodalis</i>)	Endangered	Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula.
Cass	Copperbelly Water Snake (<i>Nerodia erythrogaster neglecta</i>)	Threatened	Wooded and permanently wet areas such as oxbows, sloughs, brushy ditches and floodplain woods

Cass	Eastern Massasauga (<i>Sistrurus catenatus</i>)	Candidate	
Cass	Mitchell's satyr butterfly (<i>Neonympha mitchellii mitchellii</i>)	Endangered	Fens; wetlands characterized by calcareous soils which are fed by carbonate - rich water from seeps and springs

Source: <http://www.fws.gov/midwest/Endangered/lists/pdf/MichiganCtyListMarch2013.pdf>

There were ten main areas of significant natural resources that were analyzed, this is a description of each of those resources.

1. Biological Rarity Probability Value

Map 21 reviews the probability of finding the species in Table 48 as indicated above. The probability value is designed to highlight those areas with known occurrences of rare species or high quality natural communities. Probability model - The model is designed to help protect biodiversity and minimize potential regulatory problems by directing development away from those areas with a high likelihood of encountering a sensitive species. Because no specific species information is presented, the model reduces the sensitivity of the underlying MNFI data. A high probability indicates that the area of interest contains the spatial extent of an occurrence, there is potential habitat within the area, and the occurrence has been observed in the recent past. A low probability indicates that the area contains the spatial extent of an historic species occurrence and there is potential habitat within the area. While the low probability indicates that the underlying occurrences are historic, there is still a possibility that the species persists in appropriate habitat. The probability model can be used in the context of both land use planning efforts and conservation planning efforts. By delineating areas with high likelihood of encountering sensitive species or natural communities, the model can be used to direct development away from those areas.

2. Agricultural Lands

Map 22 reviews the occurrence of agricultural lands in the planning area. Those lands are defined as being used for farming and agricultural purposes.

3. Cold Water Streams

Map 23 shows the occurrence of cold water streams in the study area. These are defined as streams are the primary systems within a watershed making their health extremely important to all of the connected streams, rivers and ultimately, lakes throughout the watershed. These vitally important coldwater streams act to control excess sediment and nutrients from entering the lower portions of a watershed, which means better overall water quality, biodiversity and improved recreational opportunities. They are also vital in controlling water levels, whether it is in times of drought or in the event of a flood. A healthy coldwater system will sustain the larger, lower portions through a steady base flow from the headwaters. Their importance also extends to terrestrial wildlife as the native vegetation that binds the riparian zones are effective wildlife corridors.

4. Significant Places

Map 24 indicates where those areas with non-motorized facilities, schools, cemeteries, and boat launches.

5. Floodplains

Map 25 highlights the areas in which you would encounter floodplains in the study area. They are defined as a nearly flat plain along the course of a stream or river that is naturally subject to flooding. ZONE A = Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies.

6. Forested

Map 26 indicates where the forested lands are which are lands covered with woods or trees.

7. Parks, Trails, and Other Recreational Lands

Map 27 shows where all of the community parks are located within the study area, these do not including golf courses or camps.

8. Potential Conservation Areas

Map 28 indicates where the Potential conservation areas (PCA's) are and are defined as places on the landscape dominated by native vegetation that have various levels of potential for harboring high quality natural areas and unique natural features.

9. Water features

Map 29 shows the location of lakes, ponds, rivers, and county drains that can be vulnerable during transportation project developments.

10. Wetlands

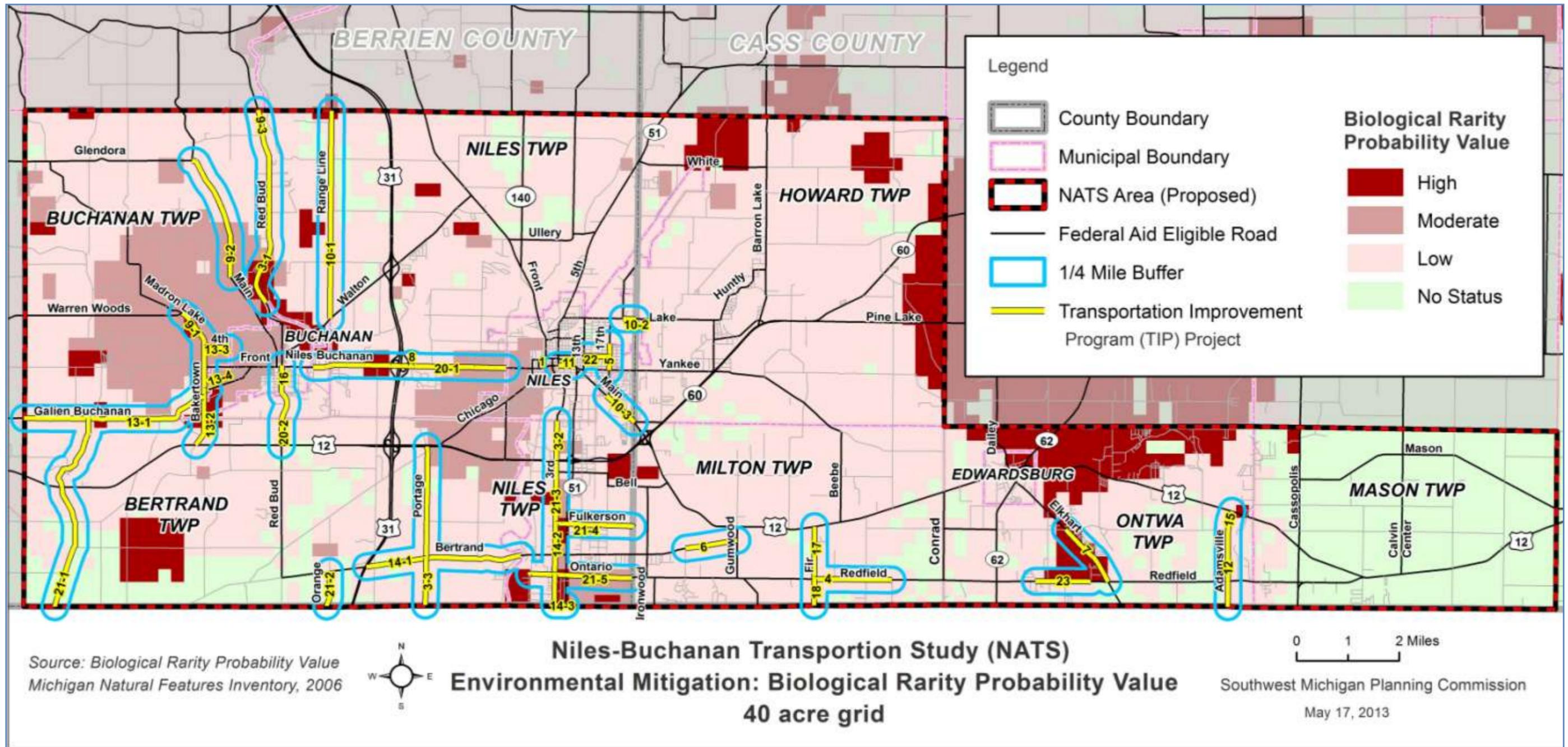
Map 30 indicates where areas of land that has a wet and spongy soil, as a marsh, swamp, or bog are located in the study area.

Table 54 shows that each project has their own unique identifier that is matched on each of the following maps, Maps 21-30. Analysis was done following the completion of these maps to assess any impacts to the resources discussed above.

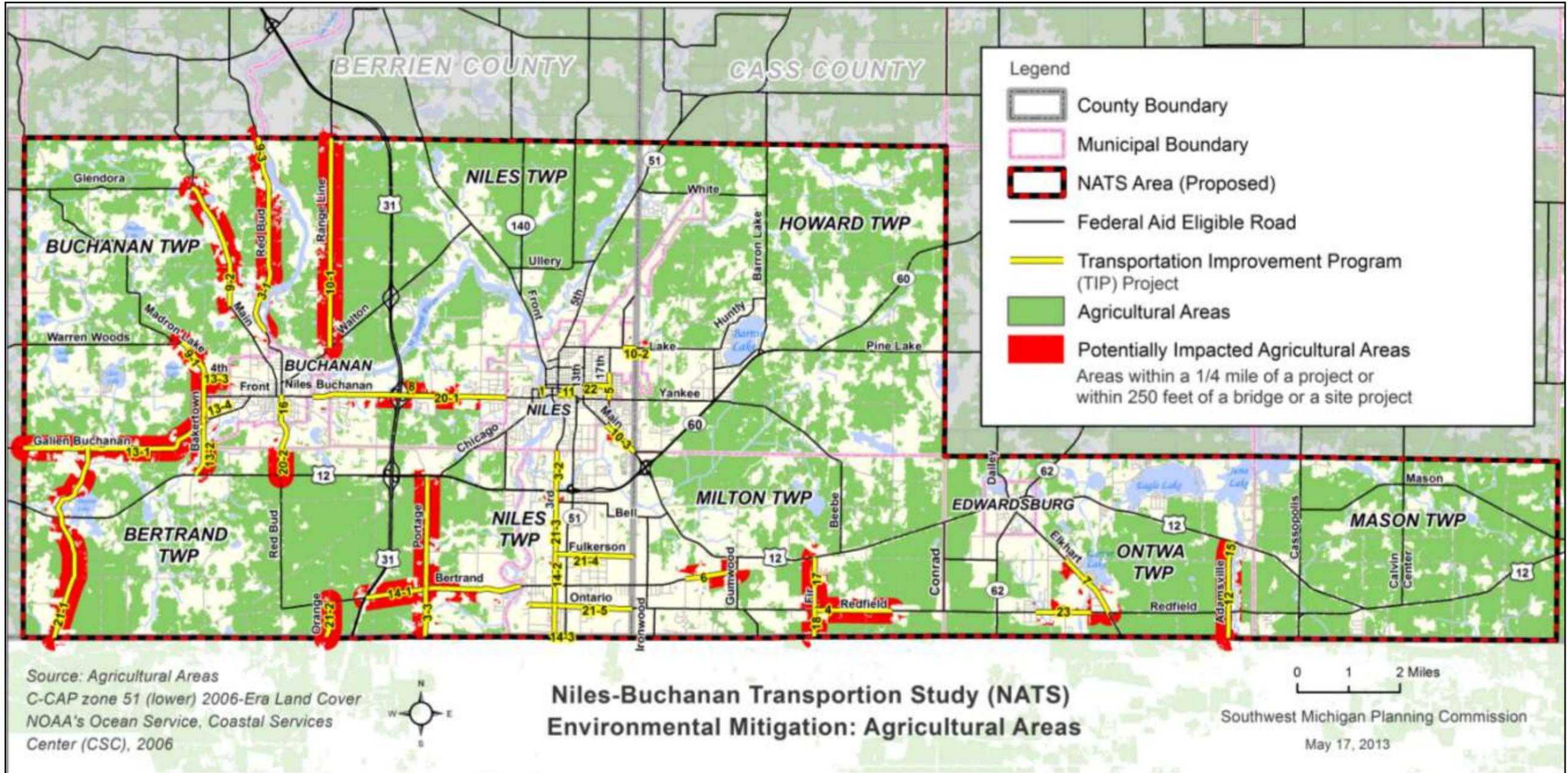
Table 2 - 2014-2017 Road and Highway Projects

Label	Fiscal Year	Project Name	Miles	Work Type	Description
1	2014	M-139, ROW & CON phase	0.1	Bridge replacement	Bridge replacement
2	2014	M-139	0.14	Bridge replacement	Bridge replacement
3	2014	Red Bud Trl-1, Third St-2, Portage Rd-3	6.2	Resurface	Hot mix patching and single seal coat
4	2014	Redfield St	1.27	Restore & rehabilitate	Structural HMA overlay with shoulders and striping
5	2014	Seventeenth St	0.51	Resurface	Resurface
6	2014	Bertrand Rd	1.04	Resurface	Resurface
7	2014	Elkhart Rd	1.33	Resurface	Partial milling and total resurface
8	2015, 2016	US-31 NB	0	Roadside facility	Expand existing lot to add capacity and mill and resurface existing portion of lot
9	2015	Madron Lake-1, N Main-2, Red Bud Trl-3	5.7	Resurface	Hot mix patching and seal coat
10	2015	Range Line Rd-1, Lake St-2, Main St-3	5.1	Resurface	Hot mix patching and seal coat
11	2015	Broadway	0.3	Resurface	Cold Mill and resurface
12	2015	Adamsville	1.5	Restore & Rehabilitate	
13	2016	Galien-Buchanan-1, Bakertown-2, Fourth-3, Terre Coupe-4	5.5	Resurface	Hot mix patching and seal coat
14	2016	Bertrand-1, Third-2, State Line-3	5.1	Resurface	Hot mix patching and seal coat
15	2016	Adamsville St	0.4	Restore & rehabilitate	Crush and shape
16	2016	Red Bud Trail	0.5	Resurface	Cold milling and resurfacing of Red Bud Trail a distance of 2,700', including miscellaneous curb and gutter replacement, ADA sidewalk ramps, misc. subgrade underdrains, sections of full depth pavement replacement and pavement markings. The roadway through this area is experiencing moderate transverse and edge cracking.
17	2016	Fir Rd	1	Resurface	HMA overlay with Shoulders and Striping
18	2016	Fir Rd	0.5	Resurface	HMA Overlay with shoulders and striping
20	2017	Niles-Buchanan-1, Red Bud 2	4.9	Resurface	Hot mix asphalt and seal coat
21	2017	Dayton-1, Orange-2, Third-3, Fulkerson-4, Ontario-5	5.9	Resurface	Hot mix patching and seal coat
22	2016	Sycamore St	0.5	Resurface	Thirteenth Street to Seventeenth Street. Cold mill and resurface
23	2017	Redfield St	1.1	Restore & rehabilitate	Mill and structural overlay with shoulders and stripng

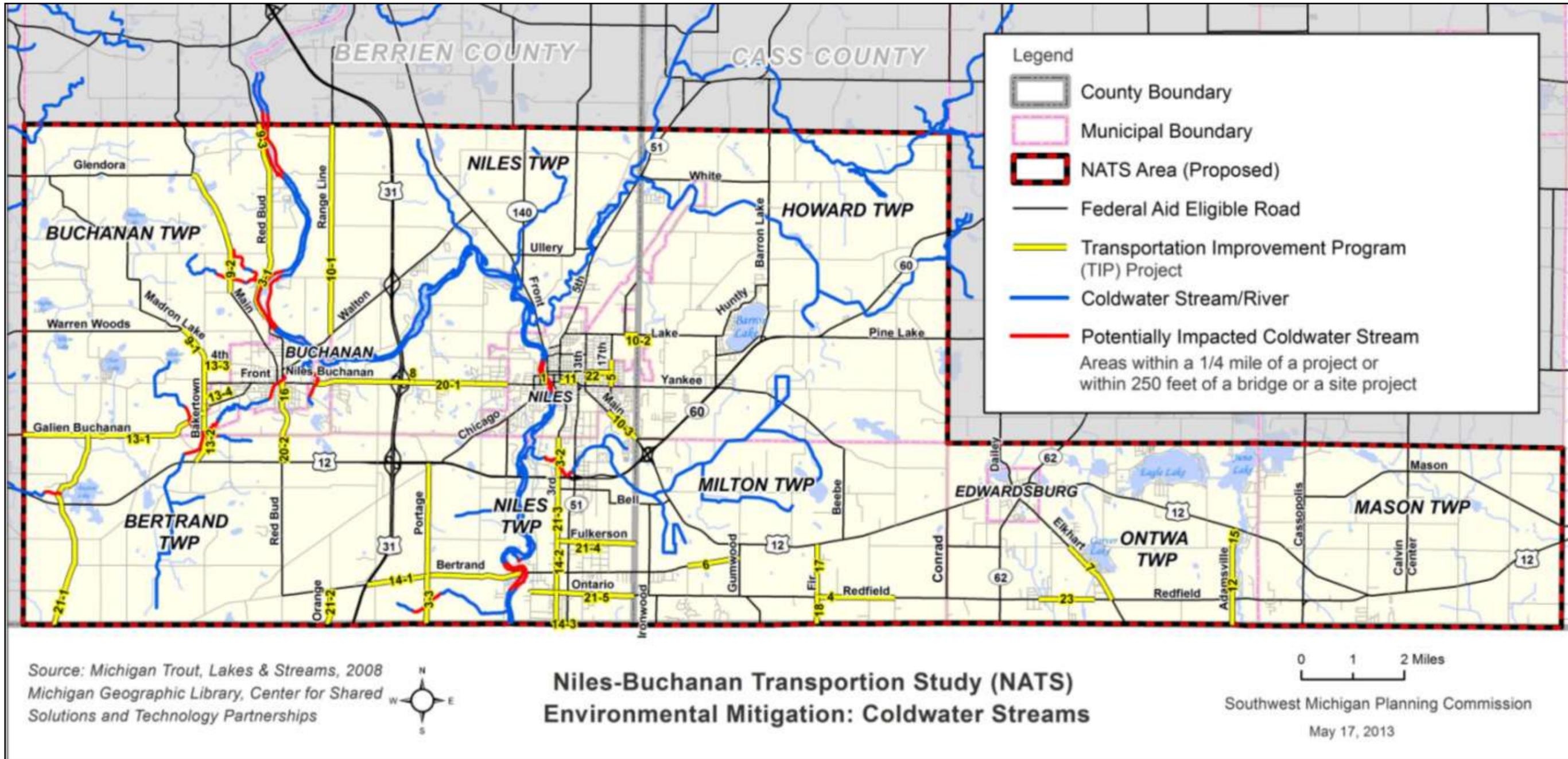
Map 1 - Environmental Mitigation: Biological Rarity Probability Value



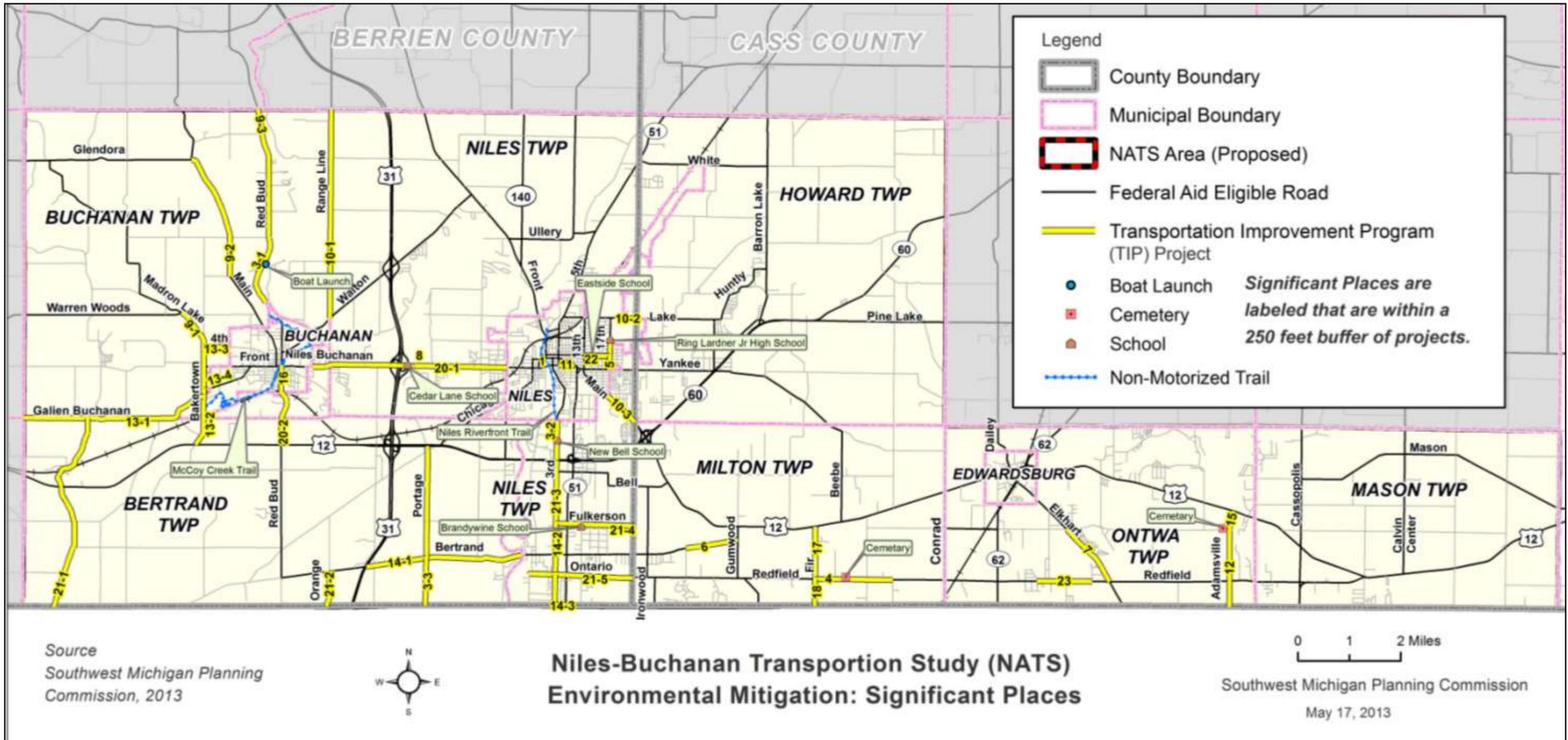
Map 2 - Environmental Mitigation: Agricultural Areas



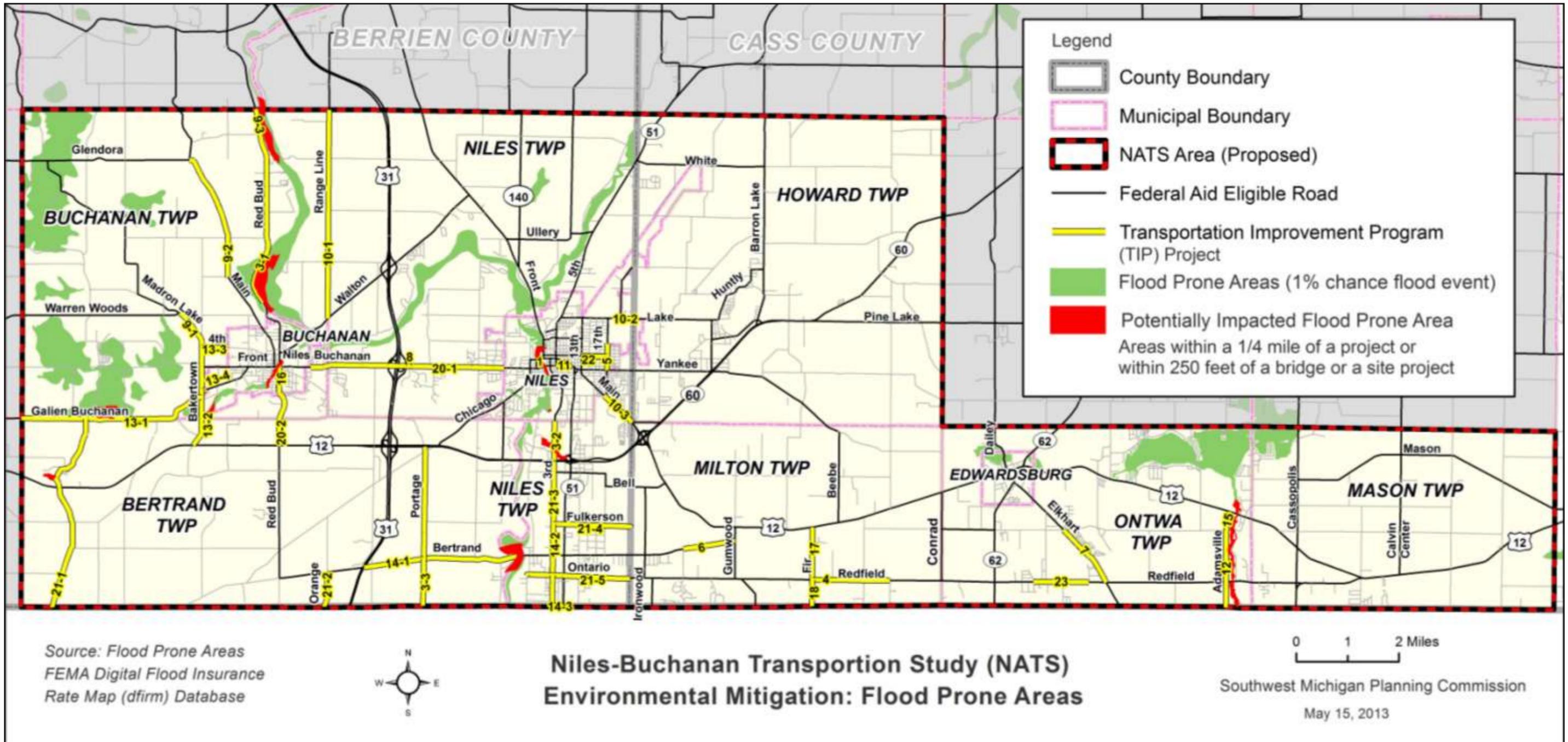
Map 3 - Environmental Mitigation: Coldwater Streams



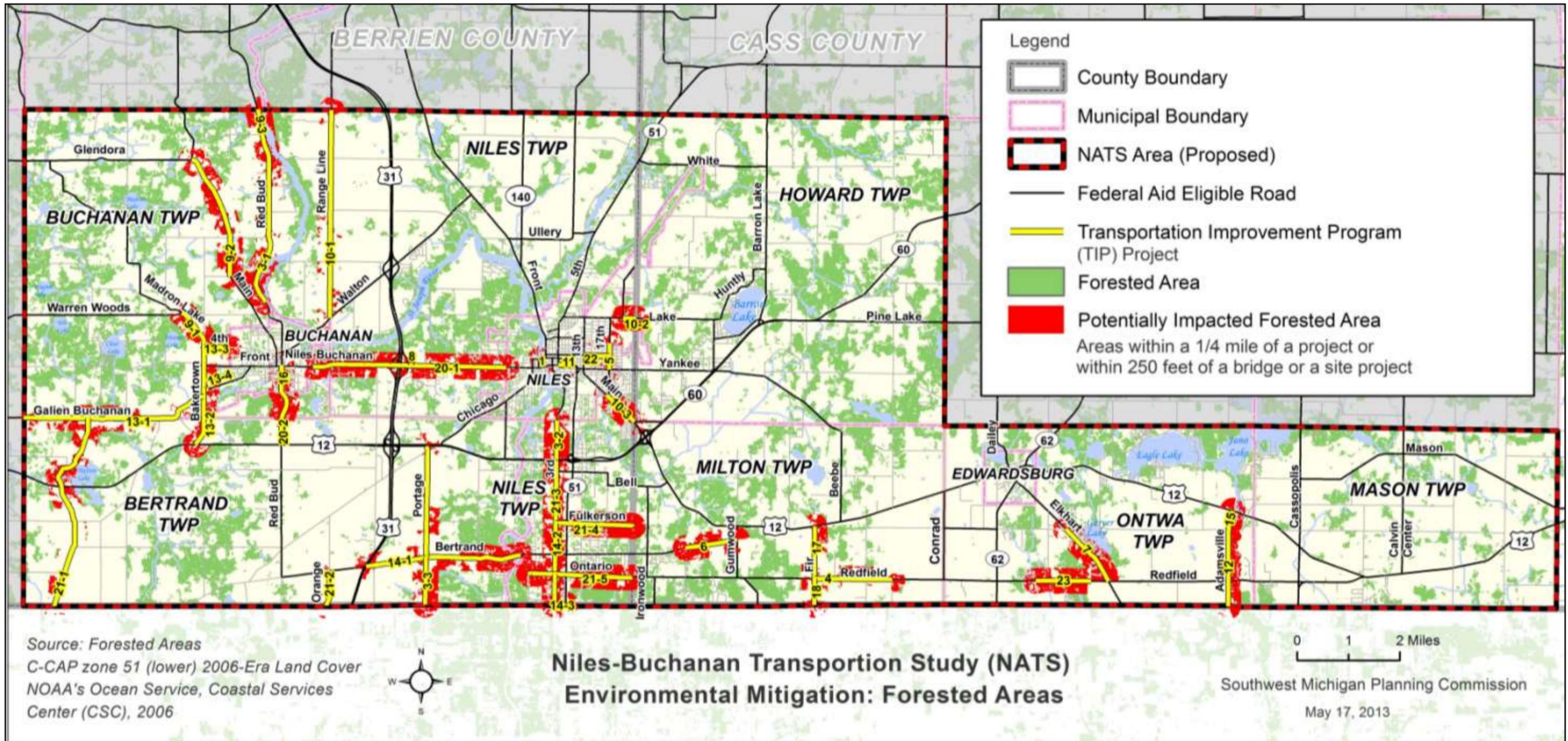
Map 4 - Environmental Mitigation: Significant Places



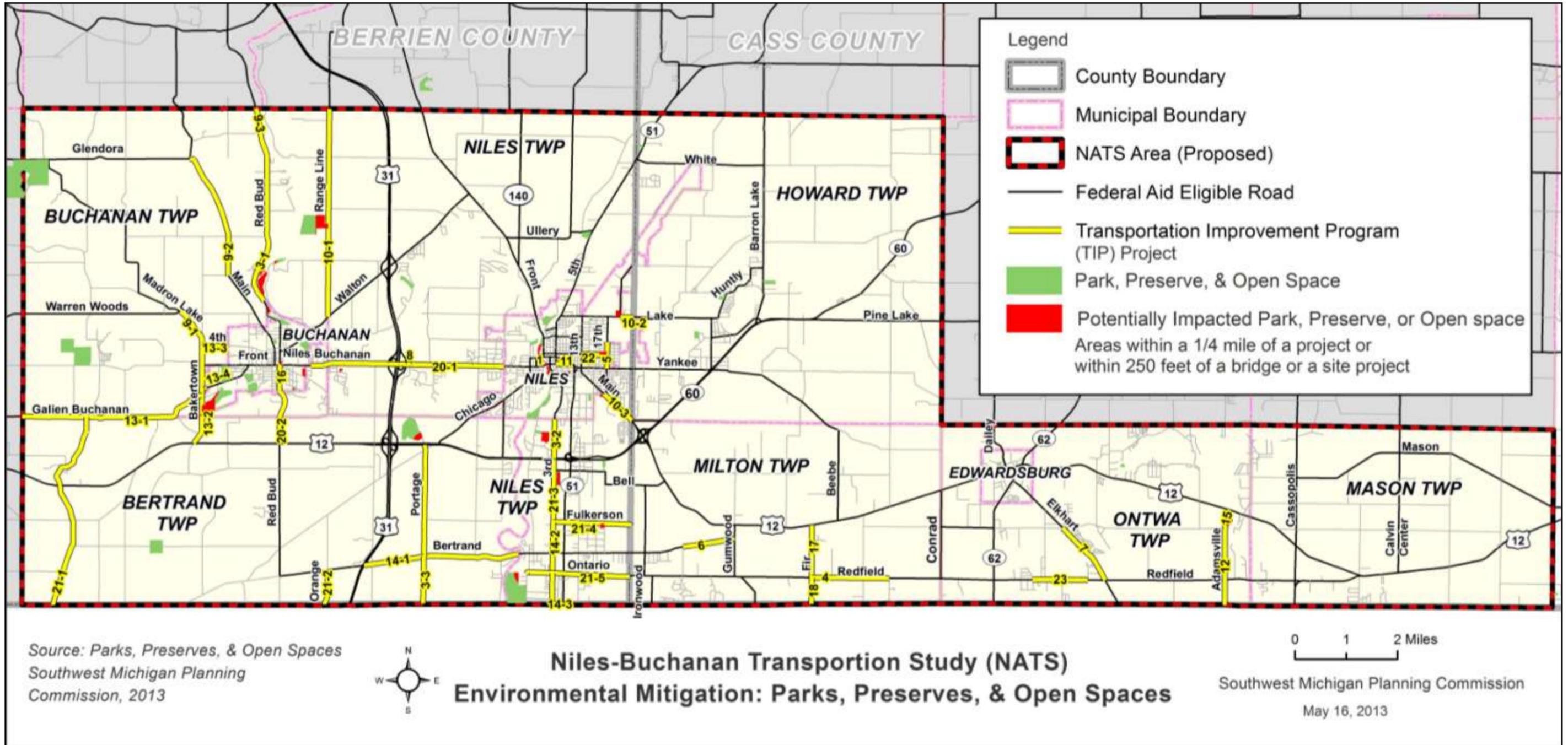
Map 5 - Environmental Mitigation: Flood Prone Areas

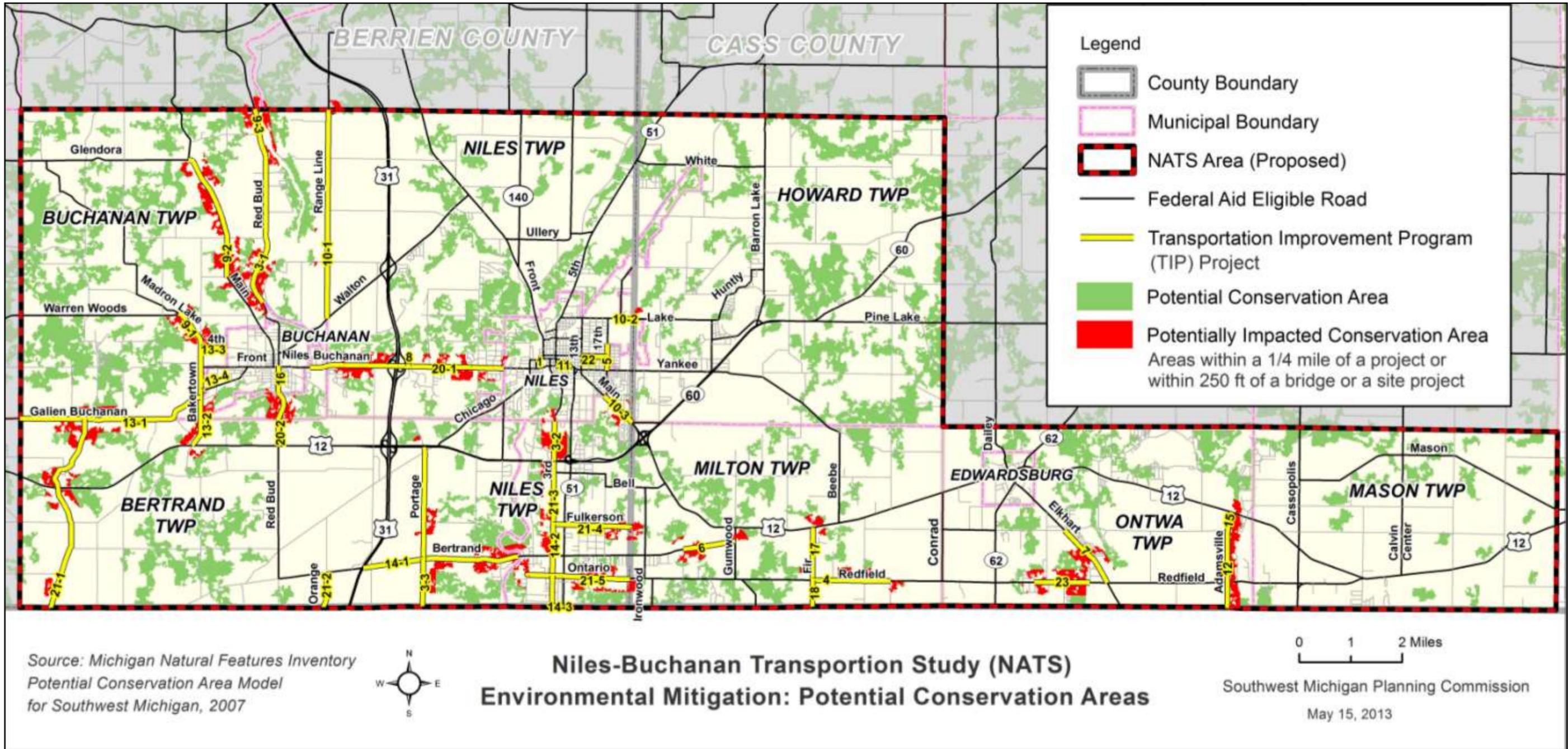


Map 6 - Environmental Mitigation: Forested Areas

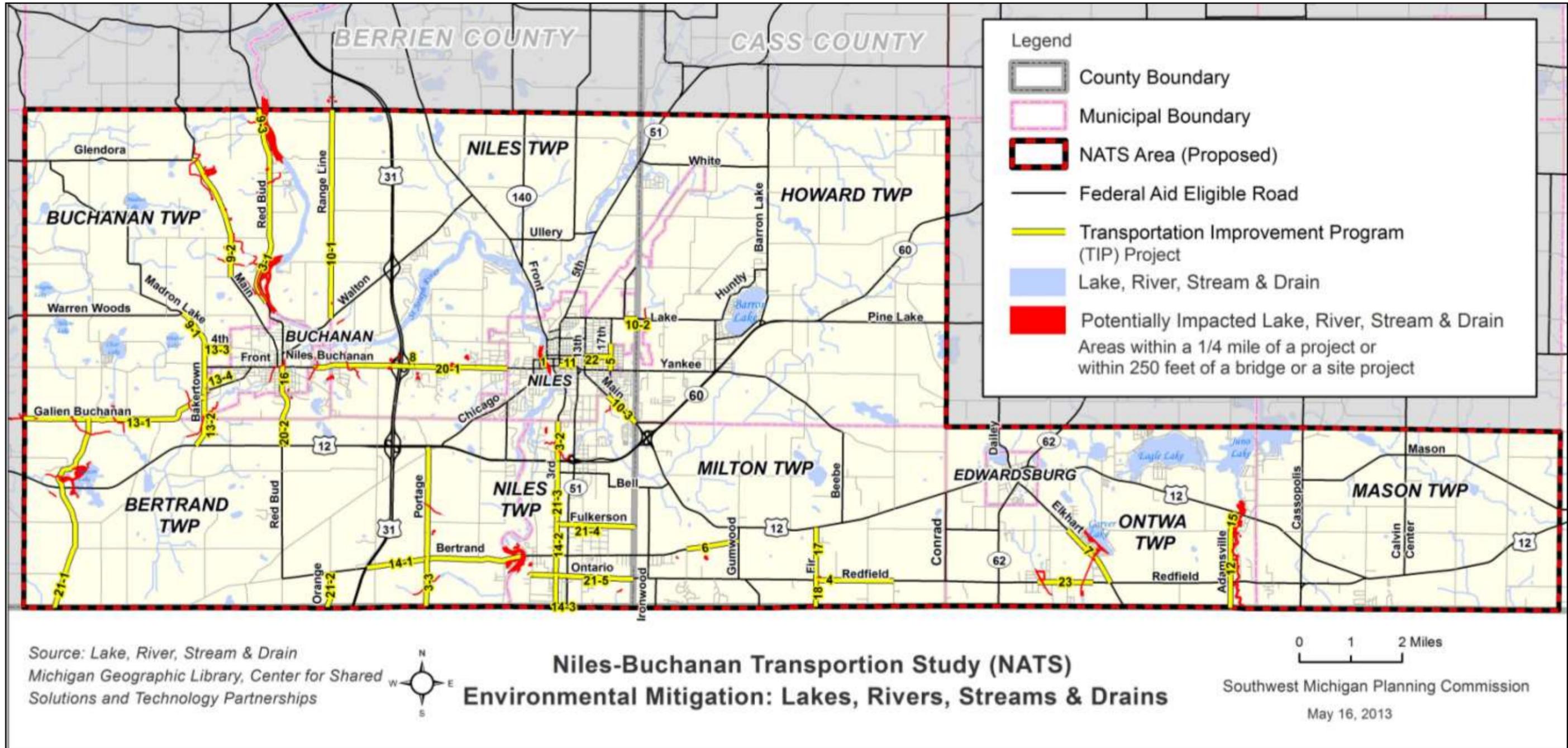


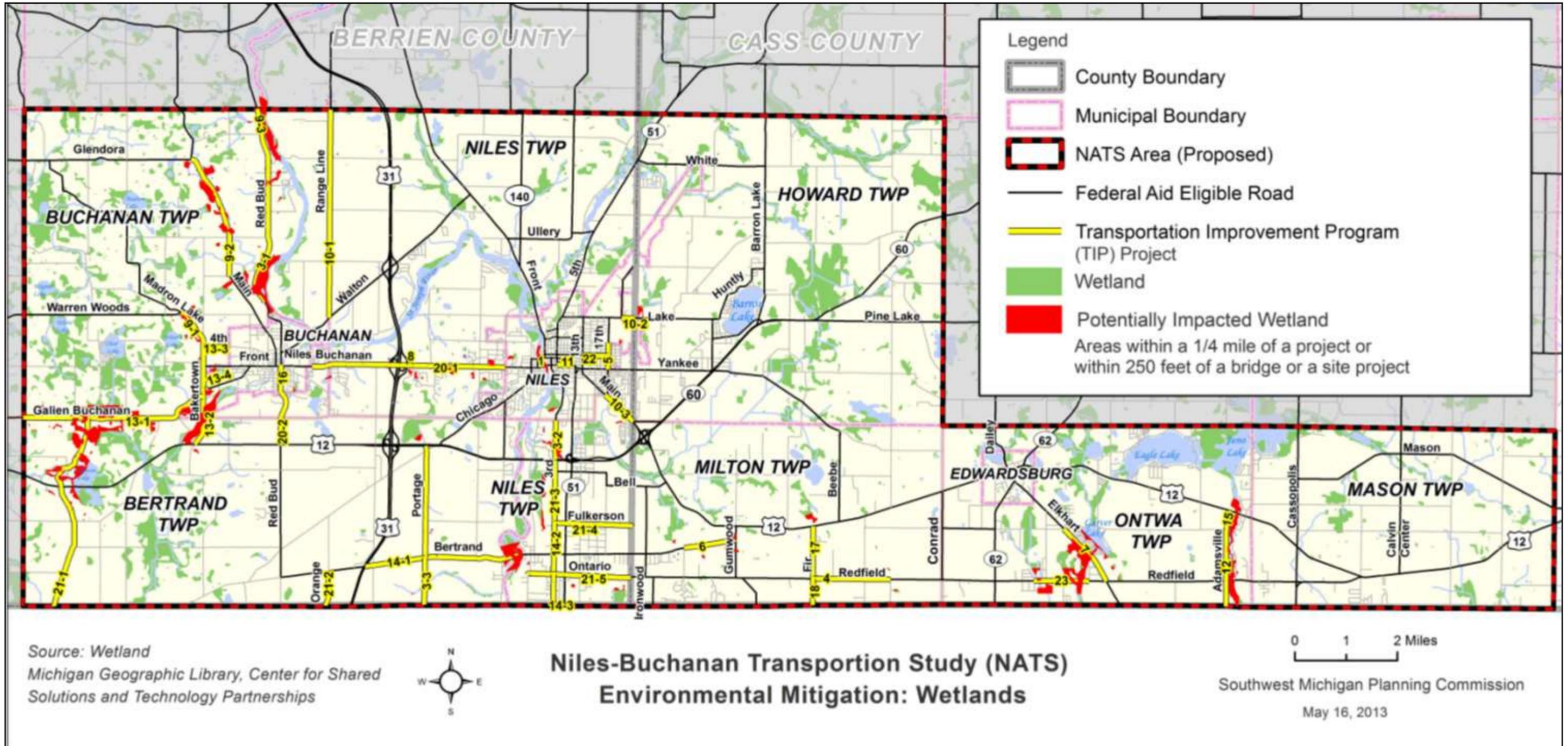
Map 7 - Environmental Mitigation: Parks, Preserves, & Open Spaces





Map 9 - Environmental Mitigation: Lakes, Rivers, Streams & Drains





ENVIRONMENTAL MITIGATION CONSIDERATIONS

It is important to note that in order to develop this chapter, and assess potential environmental impacts of NATS LRTP projects, the SWMPC used a consultation process to enlist the assistance of many partners and complete the following steps:

1. SWMPC consulted with submitting agencies and reviewed projects based on their location to sensitive areas and if they were adding capacity, building outside of the existing right of way, or dramatically changing the traffic pattern on the roadway.
2. SWMPC also worked to develop the environmental mitigation maps, agencies such as the Southwest Michigan Land Conservancy, the Nature Conservancy, and the Berrien County Planning Department, shared data files with SWMPC. SWMPC environmental planners assisted in identifying important environmental features, in developing buffer sizes, and in reviewing the plan.
3. SWMPC staff utilized GIS software to map the species and sensitive areas along with the identified LRTP projects. Each project was mapped with a buffer, depending on the type of environmental resource², to show the potential area that could be affected. SWMPC staff also utilized the information presented in Table 50 to review the specific areas that needed to be most focused on during the project's construction.

There are numerous projects that demonstrate a potential impact on many different natural resources that are being evaluated in this plan. Table 55 Environmental Mitigation Inventory highlights those specific projects that will need to utilize different mitigation strategies to not negatively impact these sensitive areas.

² Project type was not considered to be a substantial factor in determining buffer size because projects listed in the LRTP, with the exception of US-31, are rehabilitation, resurface, or reconstruction projects.

Table 3 - Environmental Mitigation Inventory

Label	Project Name	PCA	Potential Wetland	Wetland	Coldwater Streams/Rivers	Water Features	Flood Zone	Forested*	Agriculture*	Parks and Preserves	Non-Motorized Trail
1	M-139, ROW & CON Phase Bridge			X	X	X	X		X	X	X
2	M-139 Bridge				X	X			X	X	X
3-1	Red Bud Trl	X	X	X	X	X	X	X	X	X	X
3-2	Third St	X	X	X	X	X	X	X		X	
3-3	Portage Rd	X	X	X	X	X		X	X	X	
4	Redfield St	X		X		X		X	X		
5	Seventeenth St									X	
6	Bertrand Rd	X		X		X		X	X		
7	Elkhart Rd	X	X	X		X		X	X		
8	US-31 NB							X	X		
9-1	Madron Lake Rd	X	X	X				X	X		
9-2	N Main	X	X	X	X	X		X	X	X	
9-3	Red Bud Trl	X	X	X	X	X	X	X	X		
10-1	Range Line Rd	X	X			X			X	X	
10-2	Lake St	X		X		X		X		X	
10-3	Main St	X	X	X		X		X		X	
11	Broadway		X	X						X	
12	Adamsville	X	X	X		X	X	X	X	X	
13-1	Galien-Buchanan	X	X	X	X	X	X	X	X		
13-2	Bakertown	X	X	X	X	X		X	X	X	X
13-3	Fourth		X	X				X	X		
13-4	Terre Coupe		X	X				X			
14-1	Bertrand	X	X	X	X	X	X	X	X		
14-2	Third St	X	X	X				X			
14-3	State Line		X					X		X	
15	Adamsville St	X	X	X		X	X	X	X	X	
16	Red Bud Trl		X	X	X	X	X	X		X	X
17	Fir Rd	X		X				X	X		
18	Fir Rd							X	X		
20-1	Niles-Buchanan	X	X	X	X	X		X	X		
20-2	Red Bud Trl	X	X			X		X	X	X	

21-1	Dayton	X	X	X	X		X	X	X		
21-2	Orange					X			X		
21-3	Third St	X	X	X				X		X	
21-4	Fulkerson	X	X					X		X	
21-5	Ontario	X	X	X		X		X		X	
22	Sycamore St			X						X	
23	Redfield St	X	X	X		X		X	X		

*Over 1/4 Forested within buffer

Areas within a 1/4 mile of a project or within 250ft of a bridge or a site project

*Over 1/4 specified land cover within buffer

Table 4 - Location of Parks Near Transportation Projects

Label	Project Name	Places Within 250 Ft Buffer	Parks Within 250 Ft Buffer	Parks Within ¼ Mile Buffer	Water Features Within ¼ Mile Buffer
1	M-139, ROW & CON phase Bridge		St. Joseph Riverfront Park		St. Joseph River
2	M-139 Bridge		St. Joseph Riverfront Park		St. Joseph River
3-1	Red Bud Trl	Boat Launch		Redbud Park	St. Joseph River
3-2	Third St	School	McCoy Creek Trail	Niles Township Community Park	Brandywine Creek
3-3	Portage Rd			Topinee Lake Preserve	unnamed
4	Redfield St	Cemetery			Unnamed ponds,
5	Seventeenth St			Eastside Park	
6	Bertrand Rd				Unnamed ponds,
7	Elkhart Rd				Cobus Creek, Garver Lake
8	US-31 NB	School			
9-1	Madron Lake Rd				
9-2	N Main		Vella Park		Unnameed ponds & streams
9-3	Red Bud Trl				St. Joseph River
10-1	Range Line Rd		Fernwood Botanical Garden and Nature Preserve		Unnameed
10-2	Lake St			Vella Park	Unnameed
10-3	Main St		Williams Field		Unnameed
11	Broadway			Saathoff Park, St Joseph Riverfront Park	
12	Adamsville				Christina Creek
13-1	Galien-Buchanan				Branch Creek
13-2	Bakertown		Bakertown Fen		Bakertown Drain, unnamed streams, McCoy Creek, Weaver Lake Creek
13-3	Fourth				
13-4	Terre Coupe				
14-1	Bertrand				St. Joseph River
14-2	Third St				
14-3	State Line		Madeline Bertrand Park		
15	Adamsville St	Cemetery	Old Mill Natural Area		Christina Creek
16	Red Bud Trl			McCoy Pond	Alexander Street, McCoy Creek,

17	Fir Rd				unnamed pond
18	Fir Rd				unnamed pond
20-1	Niles-Buchanan				unnamed
20-2	Red Bud Trl			Sampson Park, Sampson Terrace Park	unnamed ponds & streams
21-1	Dayton				Dayton Lake
21-2	Orange				unnamed
21-3	Third St			South Fireman Park	
21-4	Fulkerson	School	Fulkersons Park		
21-5	Ontario			Madeline Bertrand Park	unnamed
22	Sycamore St	School		Eastside Park	
23	Redfield St				Cobus Creek, Gast Ditch

MITIGATION GUIDELINES

Each project, of any type, proposed in the LRTP should be examined for potential environmental impacts prior to being programmed into the TIP. This is particularly important in an area like the study area where natural features are abundant and important to residents. Because each NATS project was adjacent to at least one environmental feature, it is important to implement planning and construction practices that will protect the natural environment and cultural resources. The following are general guidelines that, if implemented, will help to ensure solid planning practices and enhance the general quality of life within the NATS boundaries. These mitigation activities should be considered during the planning and design phases as well as during the construction and maintenance phases. This section does not imply that negative impacts from the projects will definitely occur. It suggests that negative impacts may at times occur, but that many steps can be taken to avoid or mitigate those potential negative impacts.

SWMPC staff will work with all necessary agencies to minimize any impacts to environmentally sensitive areas discussed previously. The information presented next discusses many strategies that can be utilized by road agencies and construction crews during the development and maintenance of the facilities that will be developed throughout the long range plan life.

PLANNING AND DESIGN GUIDELINES

- Use Context Sensitive Solutions (CSS) throughout the planning and project development process, beginning as early as possible. CSS is a collaborative process that is designed to solicit public and stakeholder input when developing transportation projects.
- Identify the area of potential impact connected to each transportation project, including the immediate area as well as related project development areas.
- Regularly update the environmental features inventory to determine if any environmentally sensitive resources could be impacted by the project.
- Coordinate the LRTP with the County Hazard Mitigation Plan.
- Coordinate transportation projects with local plans, such as comprehensive plans, watershed management plans, recreation plans, etc.
- Regularly collaborate and meet with local community officials and other relevant stakeholders to discuss environmental issues and goals.
- Where impacts are unavoidable, mitigate them to the fullest extent possible.
- Incorporate stormwater management into design using a “green streets concept” that takes into account landscaping needs and existing runoff issues.
- Promote public education on protecting sensitive features in land use planning.

CONSTRUCTION AND MAINTENANCE GUIDELINES

- Include all special requirements that address environmentally sensitive resources into plans and estimates used by contractors and subcontractors.
- Distribute information regarding activities prohibited in environmentally sensitive areas.
- Minimize construction and staging areas with clearly marked boundaries.
- Utilize the least intrusive construction techniques and materials.
- Avoid wetlands.
- Avoid disturbing the site as much as possible.
 - Protect established vegetation (especially tree and drip zones, where tree roots are located) and habitat. If disruption is unavoidable, replace with native species as soon as possible.
 - Implement sediment and erosion control techniques.
 - Do not stockpile materials in sensitive areas.
 - Protect water quality by controlling runoff, regularly sweeping streets, protecting storm drains from construction debris, and implementing salt management techniques.
 - Protect cultural and historic resources, including surrounding soils and materials.
 - Minimize noise and vibrations.
 - Provide for solid waste disposal
 - Use the least hazardous substances possible, and ensure that such substances are properly handled, stored, and disposed.
- Keep construction activities away from wildlife crossings and corridors.
- Reduce land disturbances through efficient organization of construction activities
- Avoid equipment maintenance, fueling, leaks, spraying, etc. near sensitive areas.
- Incorporate Integrated Pest Management techniques if pesticides are used during maintenance.
- Properly size and place culverts to ensure fish passage and reduce erosion.
- Conduct on-site monitoring during and immediately following construction to ensure that environmental resources are protected as planned.
- Utilize buffer strips to protect sensitive features, especially wetlands.
- Where possible, realign/design routes or interchanges to protect sensitive features, especially wetlands.
- Consider alternatives to capacity expansion.
- Promote proactively restoring sites/building corridors and wildlife during road projects.

It is important to note that these guidelines are suggested as steps to mitigate potentially harmful effects of transportation projects on the natural environment. The SWMPC has no authority to require implementation of these guidelines. However, this information is intended to inform the construction process, from planning to implementation, and to ensure better coordination with general land use planning practices.³

³ AASHTO Center for Environmental Excellence. Environmental Stewardship Practices, Procedures, and Policies for Highway Construction and Maintenance. http://environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/

FINDINGS

The environmental assessment included in this document is intended to serve as an initial screening of each transportation project's proximity to sensitive environmental features and is to be used to prevent potential negative impacts to the environment. The spreadsheet and maps found in this section demonstrate the results of the feature identification and draw attention to areas to be examined further at the project level. The spreadsheet and maps indicate which projects are adjacent to various environmental features, but do not identify the level of potential impacts. Project-level environmental impact assessments go into far greater depth when these impacts may be more pronounced.

All of the proposed transportation projects listed in the spreadsheet are adjacent to at least one environmental feature. Depending on the project, environmental features may need to be studied further, in order to develop project-level mitigation strategies to minimize any possible negative effects on the environment. Environmental features also may influence transportation project timing and costs.

It is important to note that the features identified are not an all-inclusive list, nor is this environmental assessment considered completed. Mapped features included are those for which data were readily available. Environmental assessment will be an ongoing process, and future long range planning will reflect a continued effort to expand the scope of this effort.

ADDITIONAL ENVIRONMENTAL CONSIDERATIONS

Assessment of Culverts and Stream Species Protection

With any road or bridge project, it is critical to pay special attention to the impact of culverts and other potential barriers to species movement in streams and creeks, particularly native fish. The movement of these species happens as part of their lifecycle and in response to varying environmental conditions of certain sections of the watershed. Impediments to movement can potentially reduce fish populations and impact the entire river ecosystem. A 2011 study by the Potawatomi Resource Conservation and Development Council conducted an inventory of culverts and dams in the St. Joseph River watershed to determine the extent of adverse impacts of infrastructure on native fish species in high priority water streams.

Christiana Creek was the only stream or stream section included in the study that is directly within the NATS area. However, fish species movement may be impacted by obstructions on creeks in Northern Indiana. In addition, culverts and dams downstream in Berrien Springs and St. Joseph may alter the composition of the fish and plant life in creeks within the NATS area by keeping species from migrating.

The main potential barriers to species movement within the NATS area appear to be culverts, which are drains that allow water to flow under a road or railroad. According to the 2011 study, the culverts

observed in the NATS area on Christiana Creek do not completely stop fish movement. Still, numerous barriers further south in Elkhart, which stop most species of fish from moving, do affect species composition within the NATS region.

The study was designed to be an inventory that would serve as a starting point for federal, state, regional, local, and tribal governments to work in cooperation with one another and with environmental organizations in the area to identify problematic culverts and allow better fish movement throughout the creek. While many of the suggested actions focus on removal of dams, the study suggests that installing culverts in the proper position on a streambed, and making sure that they are the right size, will both promote better movement of species throughout the watershed.

Low Impact Development

Proper planning of new developments and major reconstructions can help to minimize the negative impacts, and in some cases effect create positive impacts, of these developments on water quality. The Low Impact Development (LID) Manual for Michigan promotes development that:

- Preserves open space and minimizes land disturbance
- Protects natural systems and processes (drainage ways, vegetation, soils, and wetlands)
- Reexamines the use and sizing of traditional infrastructure (lots, streets, curbs, gutters, and sidewalks) and customize site design.
- Incorporates natural site elements (wetlands, stream corridors, mature forests) as design elements

WATERSHEDS IN THE NATS REGION

Watersheds are an important environmental consideration and planning component within the MPO study area. A brief review of the three watersheds will be conducted here as to ensure that as projects in the LRP move forward these watersheds will be consulted. All of the three watersheds in the NATS planning area (St. Joseph, Galien, and Dowagiac) have some type of guidance documents or resources to ensure that pollutants stay out of the water and the watershed.

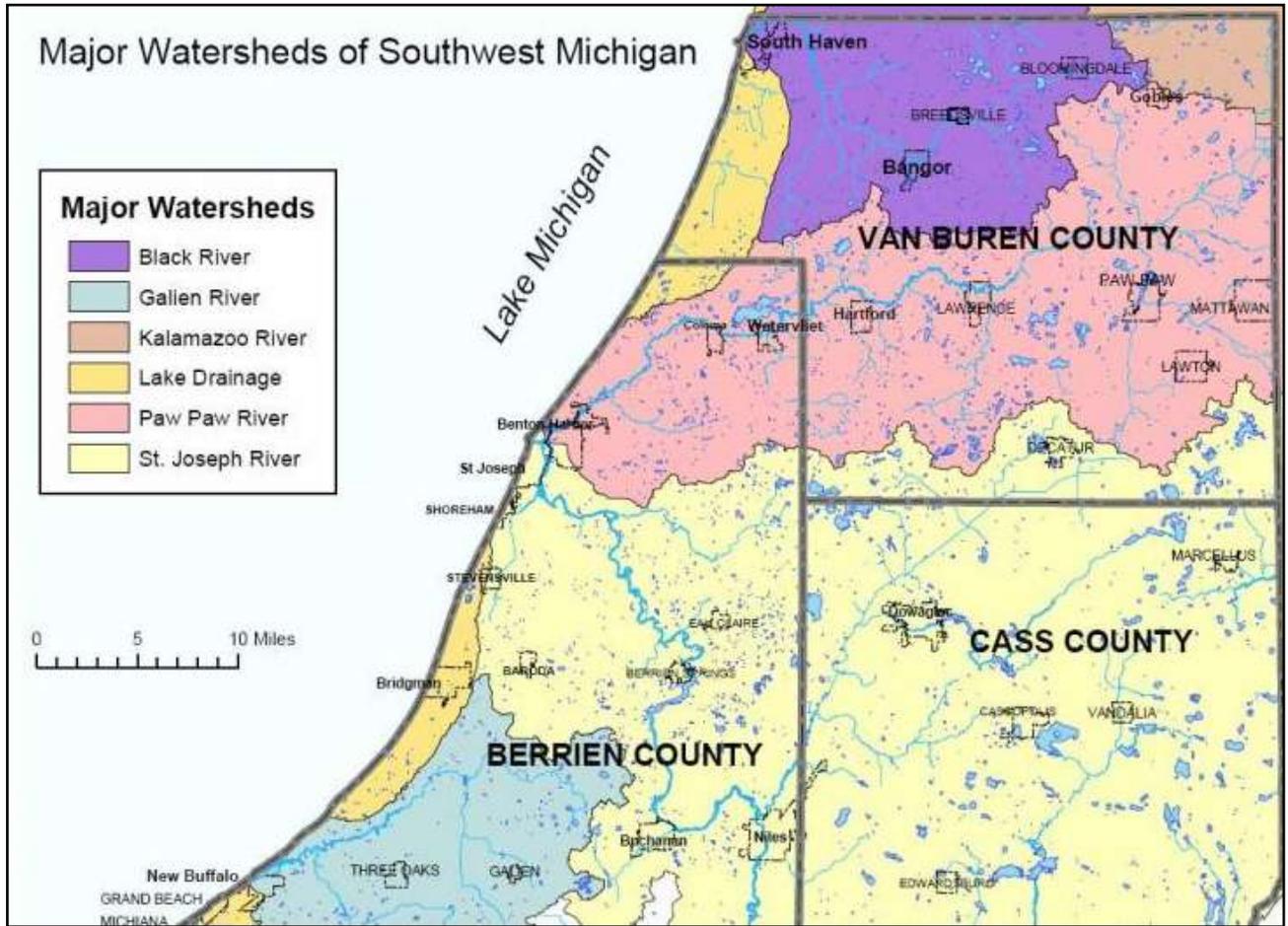
Map 11 - Major Watersheds of Southwest Michigan

Major Watersheds of Southwest Michigan

Major Watersheds

- Black River
- Gallen River
- Kalamazoo River
- Lake Drainage
- Paw Paw River
- St. Joseph River

0 5 10 Miles



The St. Joseph and Dowagiac River Watersheds have a Watershed Management Plan. A Watershed Management Plan is a comprehensive plan to protect water quality and natural resources in the watershed. Each management plan can be accessed for the specific watershed. The SWMPC has a website that houses all watershed information and links to the management plans at www.swmpc.org/watersheds.asp.

What is a Watershed?

A watershed is the area of land that catches rain and snow and drains or seeps into a marsh, stream, river, lake or groundwater. You are sitting in a watershed now. Homes, farms, ranches, forests, small towns, big cities and more can make up watersheds. Some watersheds cross county, state, and even international borders such as the Great Lakes Basin. Watersheds come in all shapes and sizes. Some are millions of square miles, others are just a few acres. Just as creeks drain into rivers, watersheds are nearly always part of a larger watershed or basin. For example the St. Joseph River Watershed is part of the Lake Michigan Watershed which is part of the Great Lakes Basin. Every stream, tributary or river has an associated watershed.

Most watersheds are composed of a mixture of uplands, wetlands, riparian areas, streams and lakes. The most common component of almost all watersheds is the upland area, covering in many cases over 99% of the total watershed area. The rain and snow that falls onto a watershed, and that does not evaporate, is stored in the soil, and over a period of time is released down slope through groundwater, wetlands and streams. This water then moves through a network of drainage pathways, both underground and on the surface.

ST. JOSEPH RIVER WATERSHED

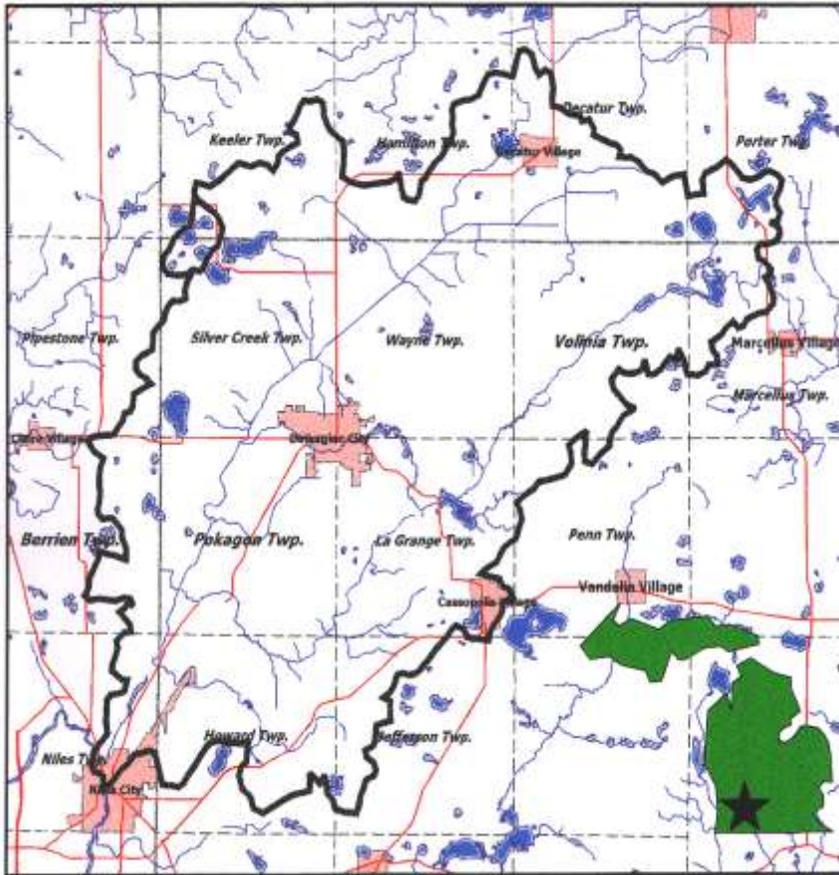
The St. Joseph River Watershed is located in the southwest portion of the Lower Peninsula of Michigan and northwestern portion of Indiana. It spans the Michigan-Indiana border and empties into Lake Michigan at St. Joseph, Michigan. The watershed drains 4,685 square miles from 15 counties (Berrien, Branch, Calhoun, Cass, Hillsdale, Kalamazoo, St. Joseph and Van Buren in Michigan and De Kalb, Elkhart, Kosciusko, Lagrange, Noble, St. Joseph and Steuben in Indiana). The watershed includes 3,742 river miles and flows through and near the Kalamazoo-Portage, the Elkhart-Goshen, the South Bend and the St. Joseph/Benton Harbor metropolitan areas. According to the 2000 U.S. Census, 1,524,941 people live in the 15 counties of the watershed, with 53.6% living in Michigan. The most populated county is St. Joseph, IN. The watershed is largely agricultural. More than 50% of the riparian habitat is agricultural/urban, while 25-50% remains forested. Learn more about this watershed and the management plan at <http://www.stjoeriver.net/>.

GALIEN RIVER WATERSHED

The Galien River Watershed is located in Southwest Michigan and is approximately 82,200 acres located in Berrien County and emptying into Lake Michigan in New Buffalo. In Michigan, this watershed contains 62% rural land, 23% forest land, and 5% urban land, with the remainder being streams and lakes. Within the MPO the eastern townships of Buchanan and Bertrand fall within this watershed. The Galien River Watershed encompasses areas of prime farmland, Warren Woods Preserve, and a portion of the City of New Buffalo where the Galien River flows into Lake Michigan. If you would like to learn more about this watershed please visit <http://www.swmpc.org/grw.asp>.

DOWAGIAC RIVER WATERSHED

Map 12 - Dowagiac River Watershed



The Dowagiac River Watershed is about 287 square miles in size with an estimated population of 38,600. The Dowagiac River Watershed includes all or part of 20 municipalities (16 townships, 2 cities and 2 villages). The headwaters of the Dowagiac River are located in southern Van Buren County. The Dowagiac River flows through Cass County and joins the St. Joseph River in Berrien County near Niles. The largest tributary is the Dowagiac Creek. Other significant tributaries include McKinzie Creek, Pokagon Creek, Peavine Creek, Silver Creek and Lake of the Woods Drain. Within the MPO the

communities of Niles, Niles Charter Township, and Howard Township fall within the watershed. To learn more about this watershed please visit <http://www.swmpc.org/drw.asp>.