

ENVIRONMENTAL MITIGATION

Transportation infrastructure and the people and vehicles that use it impact the natural and built environment. It is important to consider this interaction when planning, designing, constructing and maintaining the transportation system. The purpose of this chapter is to examine environmental and cultural characteristics of the study area in order to identify, mitigate and avoid significant impacts resulting from planned transportation projects. This chapter provides an overview of the natural and cultural resources in southwest Michigan and identifies when planned transportation projects may have an impact on these resources. Lastly, several environmental mitigation strategies are presented that could mitigate or limit the impacts. Mitigation strategies could include avoidance, minimizing impacts by limiting the scope of the proposed project, rehabilitating or restoring the affected environment or compensating for the impact by replacing or providing substitute resources. These strategies include both temporary and permanent measures to minimize impacts during and after project construction. It will be important for SWMPC to encourage road and transit agencies to consult early on with applicable Federal, State, Tribal and non-profit agencies to understand the potential environmental and cultural impacts and implement effective environmental mitigation strategies.

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 include 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 resources in the region.
2. Identify the 2014-2017 transportation projects which are in close proximity and therefore may have an impact on the sensitive resources by mapping the resources and transportation project limits.
3. Consider ways to avoid any possible impacts on environmentally or culturally sensitive areas. However, it is not always possible to avoid impacts, so the goal should be to balance transportation needs with environmental protection by utilizing effective mitigation strategies.

This process is designed to identify possible impacts from planned projects and provide this information to implementing road and transit agencies for use in their transportation decision making. This analysis is

conducted at the regional level and is not effective for planning detailed design alternatives at the project level. There are other complementary processes already in place to do this. The data in this section should be useful in identifying the need for more project level analysis and mitigation activities.

ENVIRONMENTALLY SENSITIVE RESOURCES

SWMPC has included the environmentally sensitive resources listed below in the effort to mitigate impacts in the region. It should be noted that not all resources have been included in the analysis. In general, resources were included if data were readily available in digital format for mapping, data was available for the entire NATS region and data were reasonably up-to-date and expected to remain so in the near future. Just because an environmentally sensitive resource is not included in this analysis does not mean that it should not be considered at the project level.

Environmentally Sensitive Resources:

1. Agricultural lands – Map 25
2. Forested lands – Map 26
3. Potential Conservation Areas – Map 27
4. Endangered Species – Map 28
5. Culturally significant places (parks, trails, cemeteries, schools, boat launches and cultural, historical and archeologically significant sites) – Maps 29-30
6. Watersheds and water features - lakes, rivers, streams, county drains, trout lakes/streams, flood prone areas, wetlands, groundwater recharge areas, drinking wells and wellhead protection areas – Maps 31-38

The next step in the process was to identify the 2014-2017 transportation projects which are in close proximity and therefore may have an impact on the resources by mapping the resources and transportation project limits. The planned transportation projects for the NATS area are listed in Table 18. Each planned project has been assigned a number or “map label” to identify the projects on each resource map. Some of the projects listed in Table 58, that follows, have multiple road segments within map label. For example, Project 9 has three segments that will be mapped, Madron Lake will be displayed on the maps as 9-1, N Main will be displayed at 9-2, and Red Bud Trail will be displayed as 9-3.

The likelihood of possible impacts from the planned projects are represented on a series of resource maps in this section that show a buffer area around the planned projects. A buffer was applied to each transportation project as follows:

- 1,320 feet of road project
- 250 feet of a site project (such as the bridge replacement in Niles)
- 250 feet of projects for “Significant Places”

Potentially impacted resources are highlighted on each map. Following Table 58 is a narrative description of each environmentally sensitive resource.

Table 58 - 2014-2017 Road and Highway Projects

Map 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	Restore and 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. sub grade under drains, 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

Map Label	Fiscal Year	Project Name	Miles	Work Type	Description
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 striping

AGRICULTURAL LANDS

Farming is an important part of southwest Michigan’s history, culture and economic structure. Michigan’s microclimates and soil combination support over 200 commodities on a commercial basis, making Michigan the second most agriculturally diverse state in the nation. Southwest Michigan produces almost one-third of Michigan’s total agriculture sales. According to the 2003 Berrien County Development Plan, in 1997 almost half of the land in Berrien County was farmland. The Berrien County Development Plan states, "now is the time to use sound planning principles to direct urban growth in a way that minimizes the negative impact on agriculture, before it is too late."

Map 25 displays the occurrence of agricultural lands in the planning area. Those lands are defined as being used for farming and agricultural purposes. Projects that would potentially impact agricultural areas are identified when the buffer area has at least ¼ of the acreage in agricultural use. All of the planned transportation projects outside the city/village limits have the potential to impact agricultural areas. Concern should be given to dust control and the ability of farmers to reach their fields (often with large equipment) during the growing season and harvest time.

FORESTED LANDS

Forested areas provide many benefits such as recreational and aesthetic opportunities, providing wildlife habitat, stabilizing stream banks and slopes, reducing erosion and sedimentation, acting as a barrier to reduce noise, filtering water and cleaning the air. Forested areas could be impacted if trees are removed, heavy equipment is utilized nears woodlands or polluted stormwater enters forested areas.

Forested areas in southwest Michigan are fragmented by agriculture and development. The remaining forested lands should be protected as much as possible. Map 26 indicates where planned transportation projects could impact forested areas. Seventeen of the 23 planned projects have at least ¼ of the acreage in the ¼ mile buffer area as forested land and the potential to impact forested areas.

POTENTIAL CONSERVATION AREAS

Natural areas are a fundamental component of a community's long-term environmental and economic health. Natural areas perform important natural functions such as water filtration and they provide recreational opportunities and wildlife habitat that enhance the overall vitality of a community. Abundant natural resources once surrounded population centers in the area. Now, much reduced in size, natural areas are becoming fragmented by agriculture and development. These remaining sites are the foundation of this area's natural heritage; they represent the last remaining remnants of the areas native ecosystems, natural plant communities and scenic qualities. Consequently, it is to a community's advantage that these sites be carefully integrated into the planning for future development.

Striking a balance between development and natural resource conservation and preservation is critical if southwest Michigan is to maintain its unique natural heritage. Map 27 indicates where the most significant Potential Conservation Areas (PCA's) are located. PCAs 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. Scoring criteria used to prioritize potential conservation area sites included: total size, size of core area, length of stream corridor, landscape connectivity, restorability of surrounding land, vegetation quality, and biological rarity score (for more information on this see section on endangered species). Twelve projects out of 23 have the potential to impact these important potential conservation areas.

ENDANGERED SPECIES

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."³⁰ 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. The U.S. Fish and Wildlife Service has primary responsibility for terrestrial and freshwater organisms.

Berrien and Cass Counties are home to many species that are included in the candidate, endangered or threatened species categories (see Table 59). **Endangered Species** are likely to become extinct throughout all or a large portion of their range. **Threatened Species** are likely to become endangered in the near future. **Candidate species** are plants and animals for which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened. Candidate species receive no legal protection; however, conservation is encouraged since they may warrant future protection under the Endangered Species Act.

³⁰ <http://www.fws.gov/endangered/laws-policies/>

Table 59 - Threatened, Endangered, and Candidate Species

County	Species	Status	Habitat
Berrien/Cass	Indiana Bat (Myotis sodalis)	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 (Charadrius melodus)	Endangered	Beaches along shorelines of the Great Lakes
Berrien/Cass	Eastern massasauga (Sistrurus catenatus)	Candidate	Wet areas including wet prairies, marshes and low areas along rivers and lakes; also use adjacent uplands during part of the year
Berrien/Cass	Mitchell's satyr butterfly (Neonympha mitchellii)	Endangered	Fens; wetlands characterized by calcareous soils which are fed by carbonate - rich water from seeps and springs
Berrien	Pitcher's thistle (Cirsium pitcheri)	Threatened	Stabilized dunes and blowout areas
Berrien	Small whorled pogonia (Isotria medeoloides)	Threatened	Dry woodland; upland sites in mixed forests (second or third growth stage)
Cass	Copperbelly Water Snake (Nerodia erythrogaster neglecta)	Threatened	Wooded and permanently wet areas such as oxbows, sloughs, brushy ditches and floodplain woods

Sources: <http://www.fws.gov/midwest/Endangered/lists/pdf/MichiganCtyListMarch2013.pdf> and <http://www.fws.gov/midwest/endangered/reptiles/eama/eama-fct-sht.html>

Map 28 displays the probability of finding the species indicated in Table 59. The biological probability value is designed to highlight areas with known occurrences of rare species or high quality natural communities. This map can help protect biodiversity and minimize potential regulatory problems by directing development away from areas with a high likelihood of encountering a sensitive species. 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. All of the planned transportation projects have a high or moderate probability of rare species or high quality natural communities present in the buffer area. The data in this map is coarse, but depending on the intensity of the transportation improvement project, care should be taken to identify species or high quality natural communities that could be impacted in the buffer areas.

Map 29 shows where all of the community parks are located within the study area; these do not include golf courses or camps. SWMPC has identified public parks dedicated to open spaces and recreation areas in the region using county and statewide databases. 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 occupies 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.

Map 30 indicates where those areas with non-motorized facilities, schools, cemeteries, and boat launches. Non-motorized facilities can range from off-road walking/biking trails, to on-road bicycle lanes, to paved shoulders, to sidewalks. Possible impacts on non-motorized facilities should be considered during the planning, design, construction, and maintenance of transportation projects. Non-motorized facilities are considered impacted if they are removed, if travel patterns are changes to the detriment of pedestrian/bicyclist safety, or if existing non-motorized pathways are bisected thereby reducing connectivity along the pathway or between destinations. The only on the ground non-motorized facilities in the region are the McCoy Creek Trail in Buchanan and portion of the IN-MI River Valley Trail in the City of Niles. The four mile extension into Niles Charter Township will not be built until 2014, and therefore special care will need to be taken after this section of trail is completed.

Table 60 identifies projects in the 2014-2017 TIP that are near parks, or water features. These public spaces have a special place in our communities. It is a way for people to come together experience the outdoors and socialize. As mentioned above, special care and consideration should be taken during the planning, design, construction, and maintenance of transportation projects.

Table 60 - Location of Parks Near Transportation Projects

Label	Project Name	Places Within 250 Ft of Buffer	Parks Within 250 Ft of Buffer	Water Features Within 1/4 Mile Buffer
1	M-139, ROW & CON phase Bridge		St. Joseph Riverfront Park	
2	M-139 Bridge		St. Joseph Riverfront Park	
3-1	Red Bud Trl, Third St, Portage Rd.	Boat Launch and School	McCoy Creek Trail	Redbud Park, Niles Township Community Park, Topinee Lake Preserve
4	Redfield St	Cemetery		
5	Seventeenth St			Eastside Park
6	Bertrand Rd			
7	Elkhart Rd			
8	US-31 NB	School		
9	Madron Lake Rd, N Main, Red Bud Trl		Vella Park	
10	Range Line Rd, Lake St, Main St		Fernwood Botanical Garden and Nature Preserve, Williams Field	Vella Park
11	Broadway			Saathoff Park, St Joseph Riverfront Park
12	Adamsville			
13	Galien-Buchanan, Bakertown, Fourth, Terre Coupe		Bakertown Fen	
14	Bertrand, Third, State Line		Madeline Bertrand Park	
15	Adamsville St	Cemetery	Old Mill Natural Area	
16	Red Bud Trl			McCoy Pond
17	Fir Rd			
18	Fir Rd			
20	Niles-Buchanan and Red Bud Trl			Sampson Park, Sampson Terrace Park
21	Dayton, Orange, Third, Fulkerson, Ontario	School	Fulkersons Park	South Fireman Park, Madeline Bertrand Park
22	Sycamore St	School		Eastside Park
23	Redfield St			

WATERSHEDS, WATER FEATURES, GROUNDWATER

Watersheds are a crucial 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 31 outlines the watersheds in the planning area.

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 comprised 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 percent 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.

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.

ST. JOSEPH RIVER WATERSHED

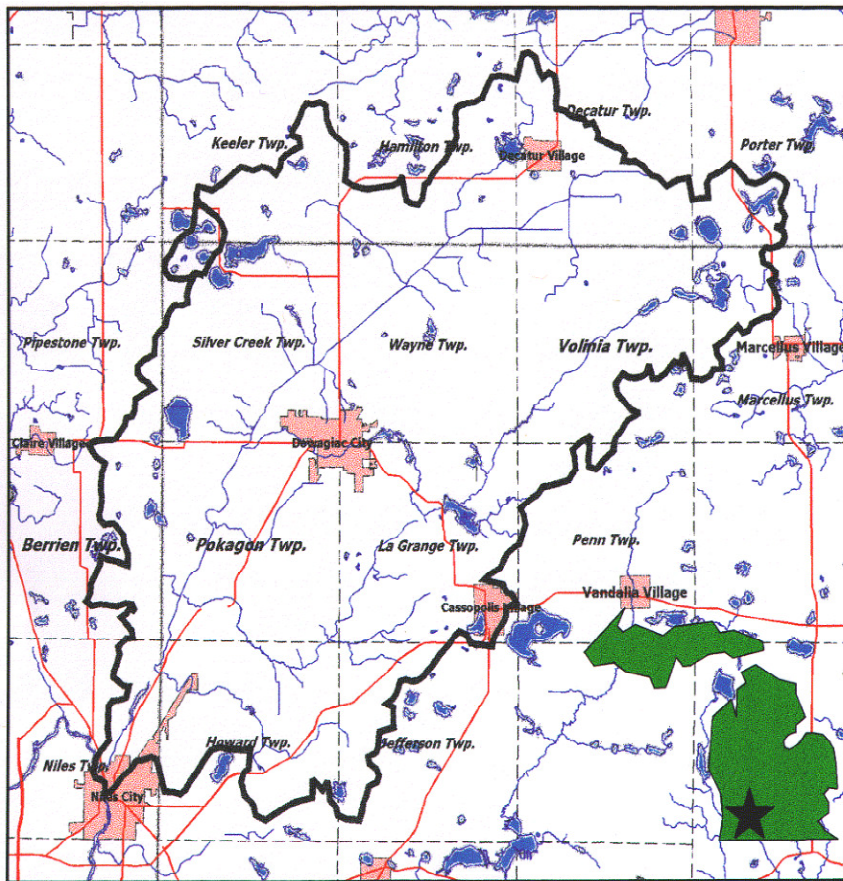
The St. Joseph River Watershed is located in the southwest portion of the Lower Peninsula of Michigan and northwestern portion of Indiana. It spans the Michigan-Indiana border and empties into Lake Michigan at St. Joseph, Michigan. The watershed drains 4,685 square miles from 15 counties (Berrien, Branch, 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 percent living in Michigan. The most populated county is St. Joseph, IN. The watershed is largely agricultural. More than 50 percent of the riparian habitat is agricultural/urban, while 25-50 percent 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 percent rural land, 23 percent forest land, and 5 percent 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 24 - 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>.

Culverts and Water Resources 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.

Water Features

Map 32 shows the location of lakes, ponds, rivers, and county drains that can be vulnerable during transportation project developments.

Table 61 highlights those projects within the TIP years that are close to water features and should therefore take extra care when the project is being constructed.

Table 61 - Water Features Within 1/4 Mile Buffer

Label	Project Name (projects that have water features)	Water Features Within ¼ Mile Buffer
1	M-139, ROW & CON phase Bridge	St. Joseph River (over river)
2	M-139 Bridge	St. Joseph River (over river)
3-1	Red Bud Trl	St. Joseph River (over river)
3-2	Third St	Brandywine Creek
3-3	Portage Rd	unnamed stream
4	Redfield St	unnamed ponds
6	Bertrand Rd	unnamed ponds,
7	Elkhart Rd	Cobus Creek, Garver Lake
9	N Main and Red Bud Trail	Unnamed ponds & streams and St. Joseph River
10	Range Line Rd, Lake St. and Main St.	Unnamed
12	Adamsville	Christina Creek
13	Galien-Buchanan, Bakertown	Branch Creek, and Bakertown Drain, unnamed streams, McCoy Creek, Weaver Lake Creek
14-1	Bertrand	St. Joseph River
15	Adamsville St	Christina Creek
16	Red Bud Trl	Alexander Street, McCoy Creek,
17	Fir Rd	unnamed pond
18	Fir Rd	unnamed pond
20	Niles-Buchanan, Red Bud Trl	Unnamed ponds and streams
21	Dayton, Orange, Ontario	Dayton Lake, unnamed stream
23	Redfield St	Cobus Creek, Gast Ditch

Trout/Lake Stream

Map 33 outlines trout lakes and streams are those designated by the State of Michigan as containing a significant population of trout or salmon. 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, and fuel, salt) run directly into water bodies.

Floodplains

Map 34 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.

Wetlands

Map 35 indicates where areas of land that has a wet and spongy soil, as a marsh, swamp, or bog are located in the study area.

Ground Water

Ground water is important to ecosystems in the Great Lakes Region because it is, in effect, a large, subsurface reservoir from which water is released slowly to provide a reliable minimum level of water flow to streams, lakes, and wetlands. Ground-water discharge to streams generally provides good quality water that, in turn, promotes habitat for aquatic animals and sustains aquatic plants during periods of low precipitation. Because of the slow movement of ground water, the effects of surface activities on ground-water flow and quality can take years to manifest themselves. As a result, issues relative to ground water are often seemingly less dire than issues related to surface water alone. Recharge typically refers to the amount of precipitation, either rainfall or snowmelt, that infiltrates through the ground and reaches the water table aquifer. Deeper aquifers generally are recharged with water from shallower systems. Groundwater discharge is water that leaves an aquifer through boundaries including rivers, wetlands, and lakes.³¹

All of the communities in the NATS study area depend on groundwater for their drinking water source. Groundwater resources in southwest Michigan are very vulnerable to contamination because of the soils, high recharge rates and the close proximity of groundwater to the surface in most areas. Map 36 highlights those areas that aid in the recharging of our ground water supply. The areas that have high capacity for recharge also are very vulnerable to contamination. Map 37 indicates those areas where the local community receives their water from and the location of a TIP project near that area.

Wellhead Protection Areas

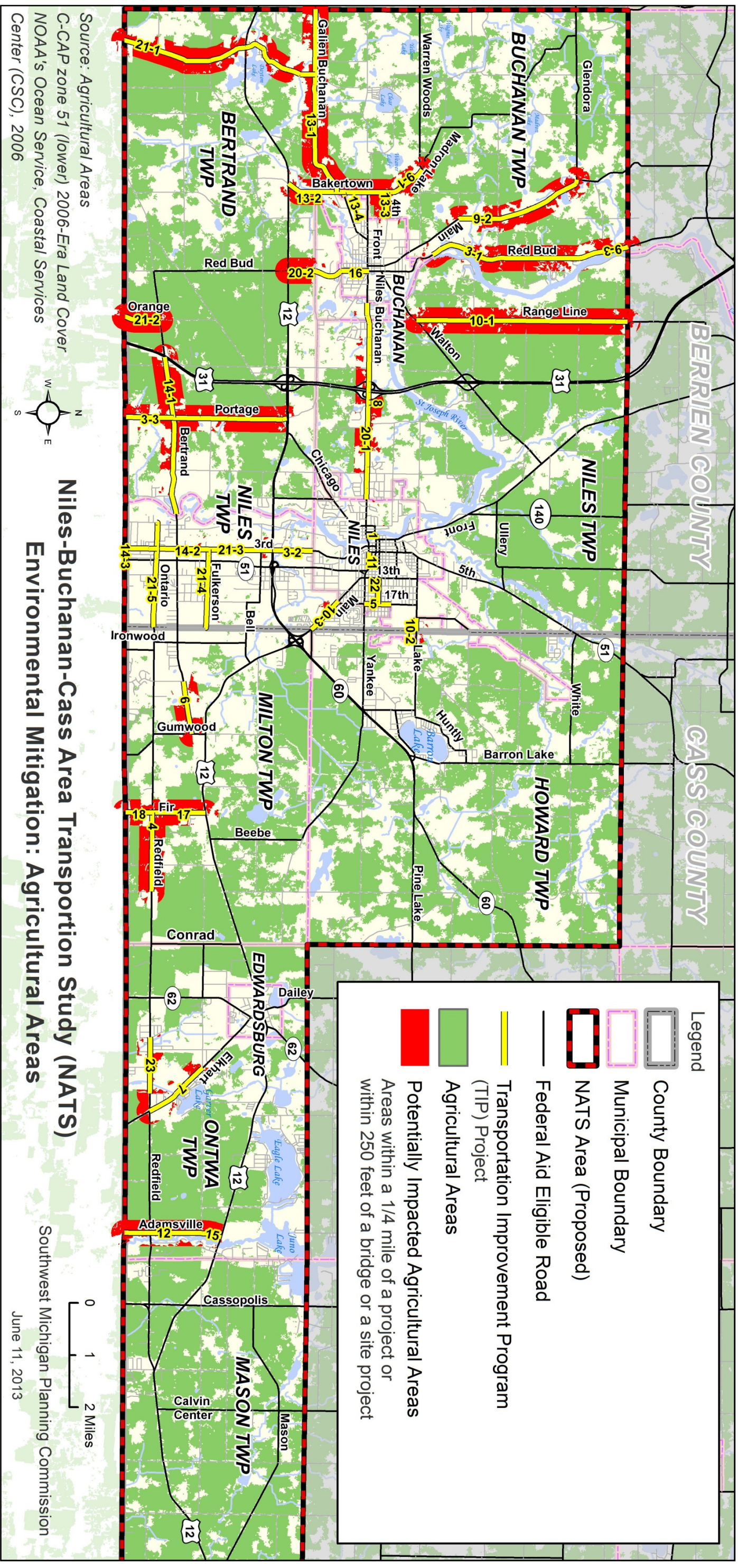
Michigan's WHPP was developed in response to 1986 amendments to the federal Safe Drinking Water Act (SDWA). Unlike many programs throughout the country, wellhead protection is a voluntary program which is implemented on a local level through the coordination of activities by local, county, regional, and state agencies. Guidelines for the program were developed by the Michigan Department of Environmental Quality (MDEQ). Although the program is voluntary, PWSSs who choose to participate in wellhead protection must develop a local WHPP consistent with the guidelines established by the state. Local WHPPs must specifically address seven elements which include the establishment of roles and duties, wellhead protection area (WHPA) delineation, identification of potential sources of contamination within the WHPA, development of

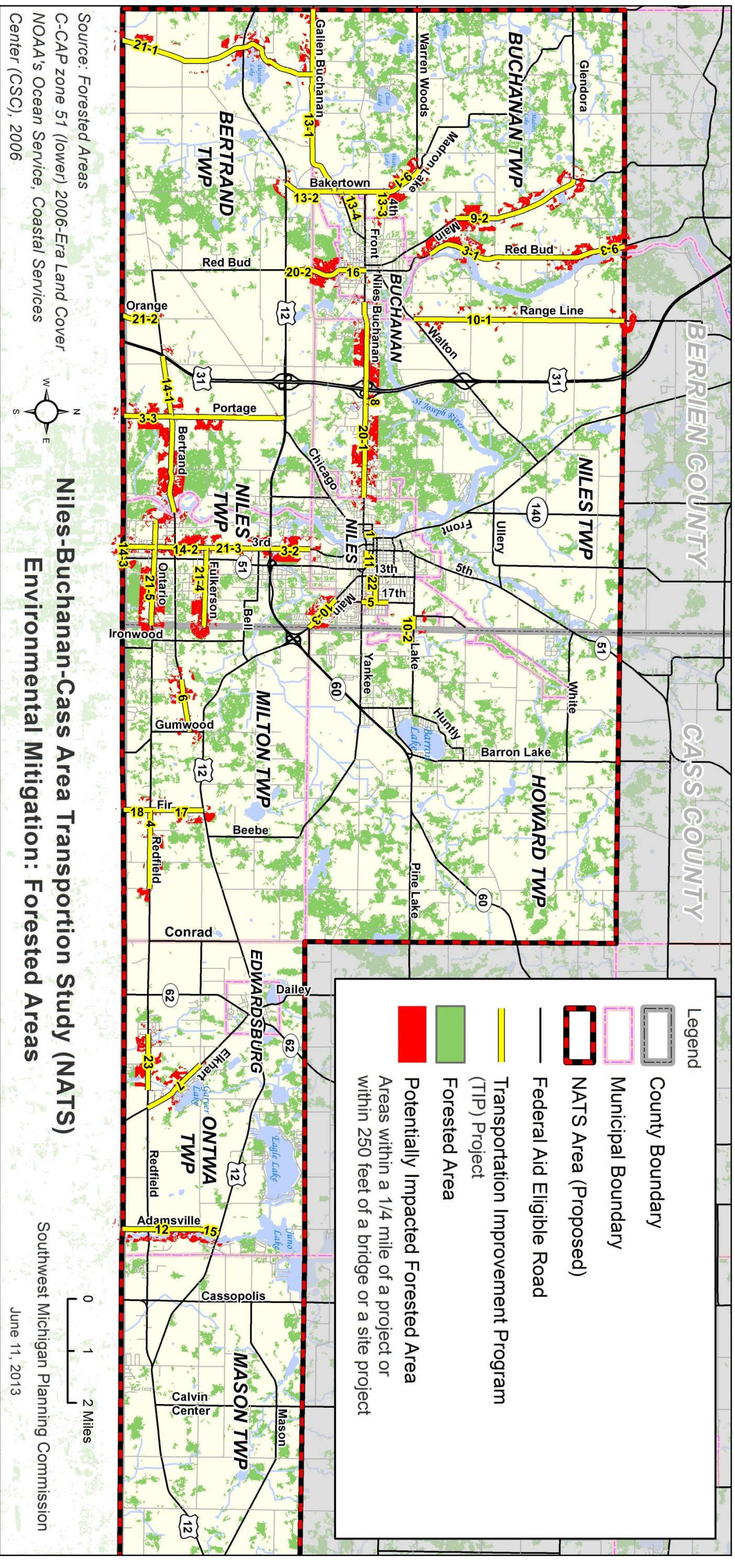
³¹ The Importance of Ground Water in the Great Lakes Region By N.G. Grannemann, R.J. Hunt, J.R. Nicholas, T.E. Reilly, and T.C. Winter. U.S. GEOLOGICAL SURVEY Water-Resources Investigations Report 00-4008

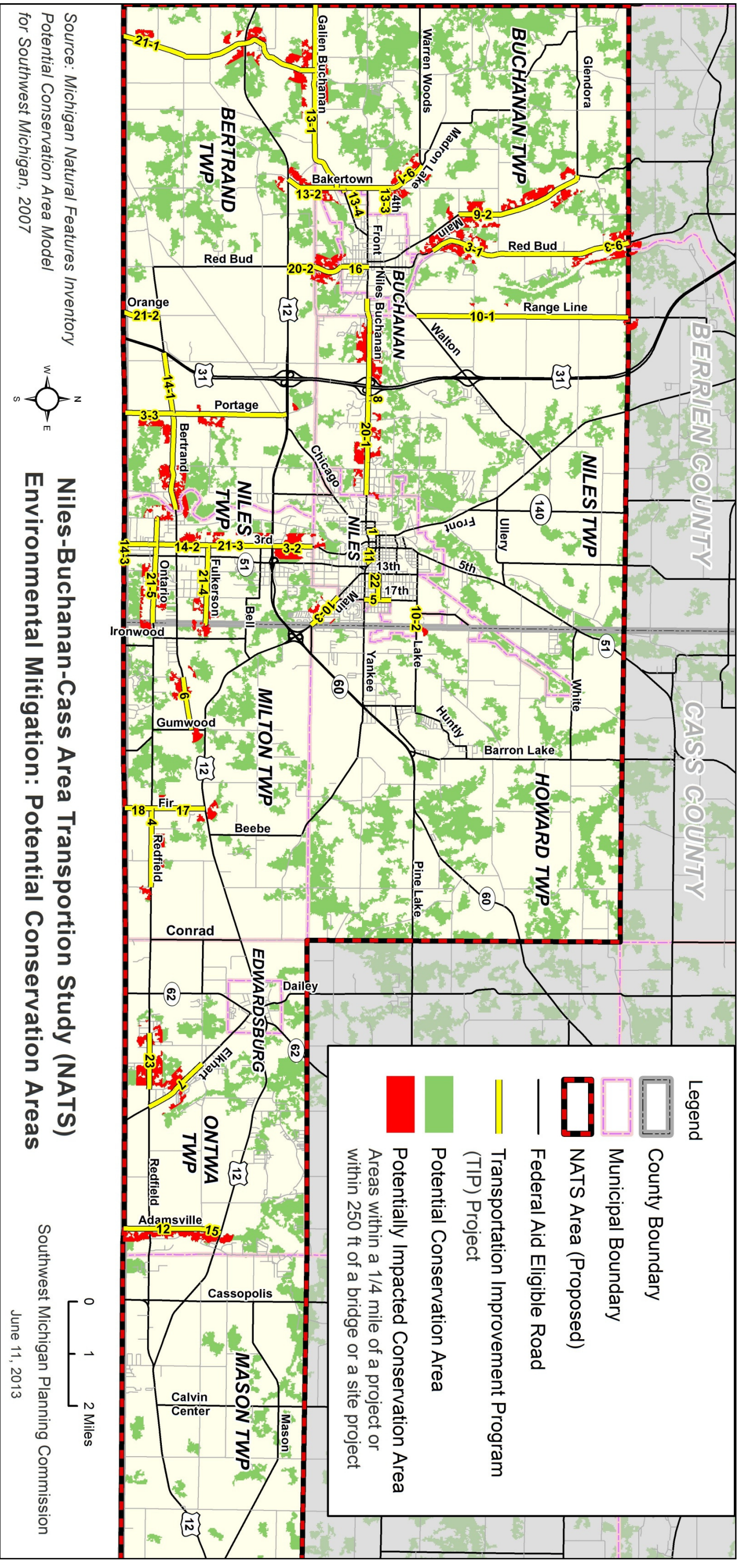
strategies to manage potential sources and minimize threats to the PWSS, development of contingency plans for water supply emergencies, identification of procedures for the development of new well sites and incorporate them into the local WHPP, and provide opportunities for public participation.

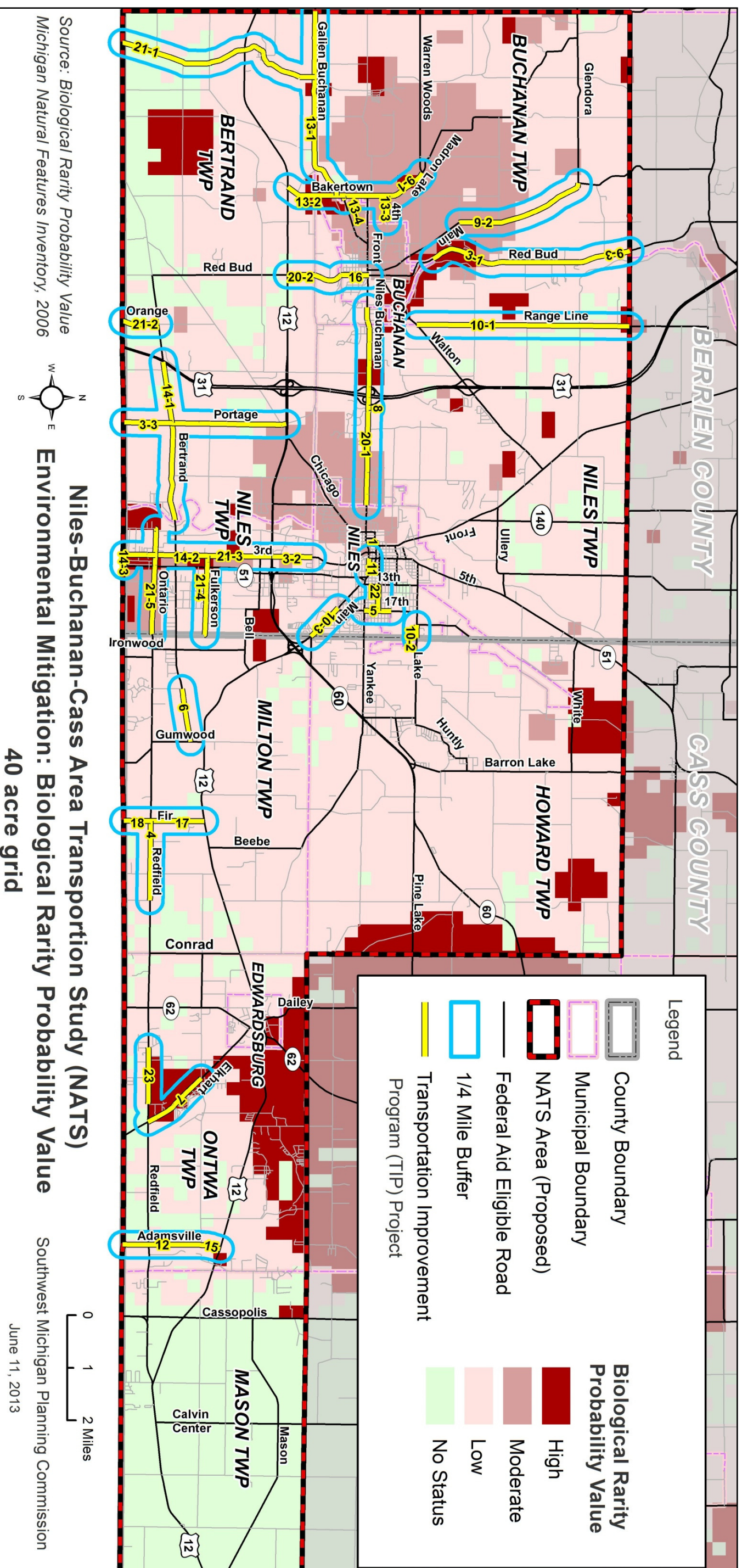
Delineation - The federal SDWA defines a WHPA as "... the surface and subsurface area surrounding a water well or well field, supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or well field." In simpler terms, it is that area which contributes ground water to a PWSS well. Michigan's WHPP requires a hydrogeologic study to identify the contributing area. The area contributing ground water to a well may extend for miles therefore, Michigan's WHPP is based upon a ground water time-of-travel (TOT) of 10 years. The 10 year TOT provides a reasonable length of time for responding to environmental problems within the WHPA while concurrently providing a smaller area which can be reasonably managed.³² Map 38 indicates where the particularly sensitive wellhead protection areas are located.

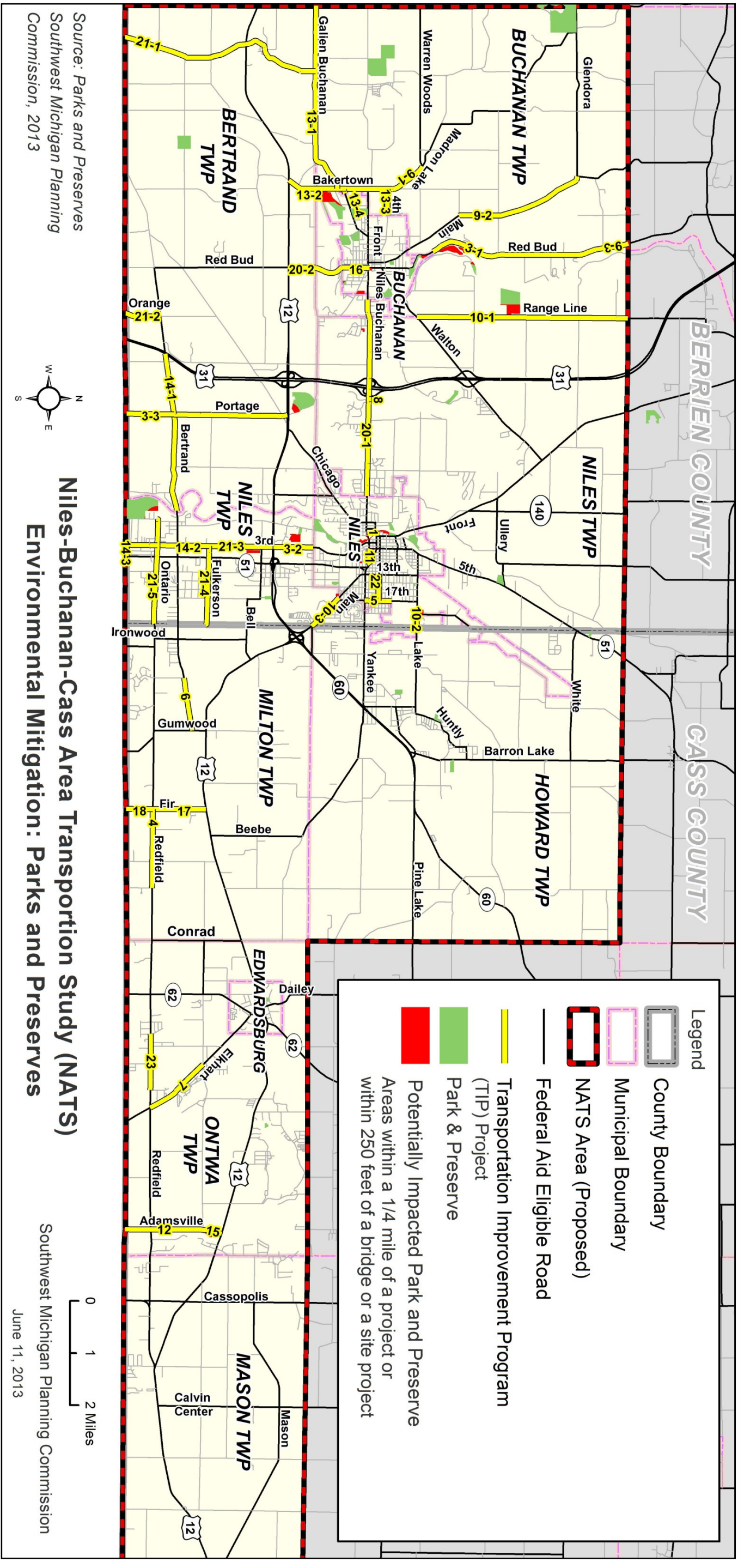
³² The Importance of Ground Water in the Great Lakes Region By N.G. Grannemann, R.J. Hunt, J.R. Nicholas, T.E. Reilly, and T.C. Winter. U.S. GEOLOGICAL SURVEY Water-Resources Investigations Report 00-4008

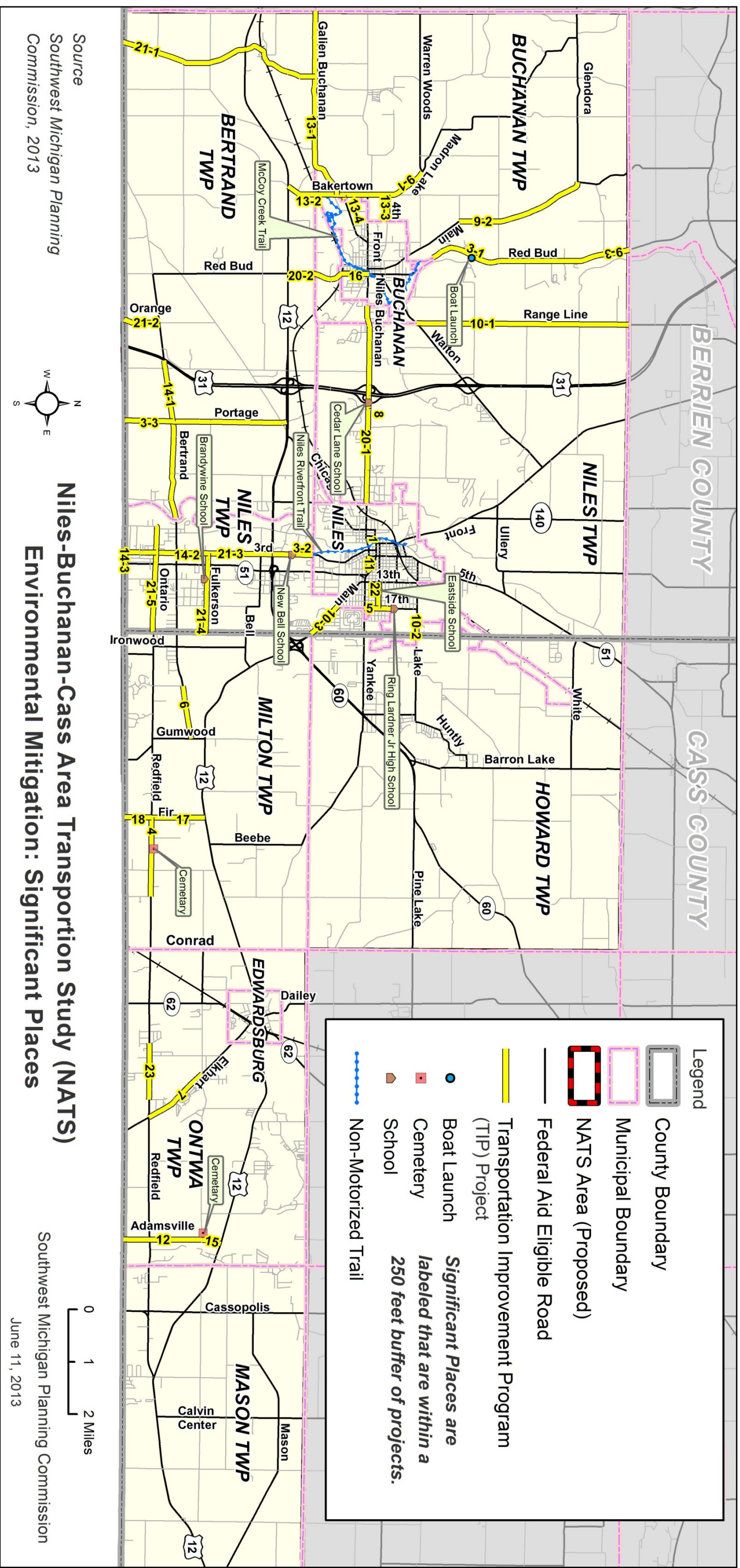




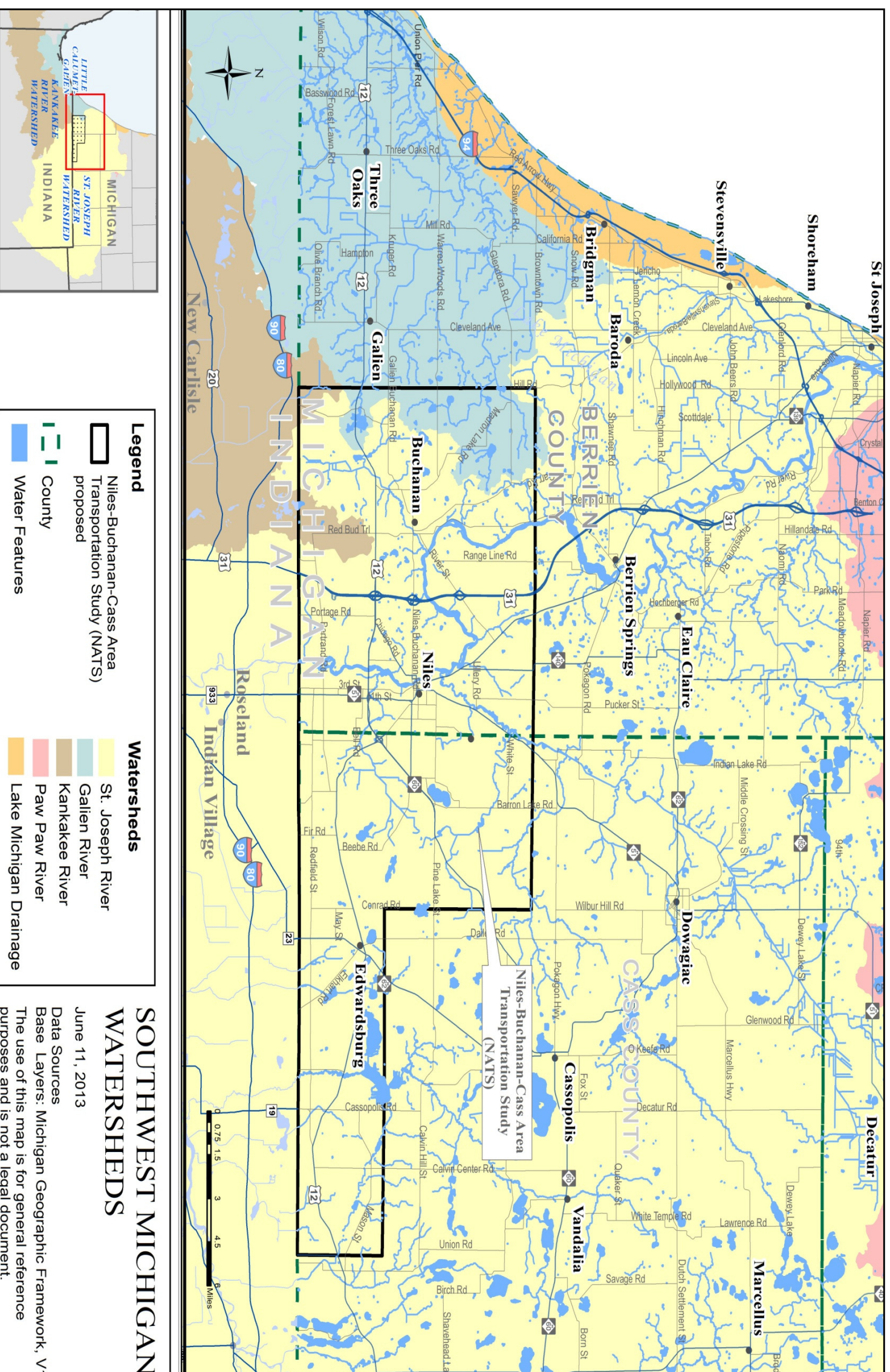


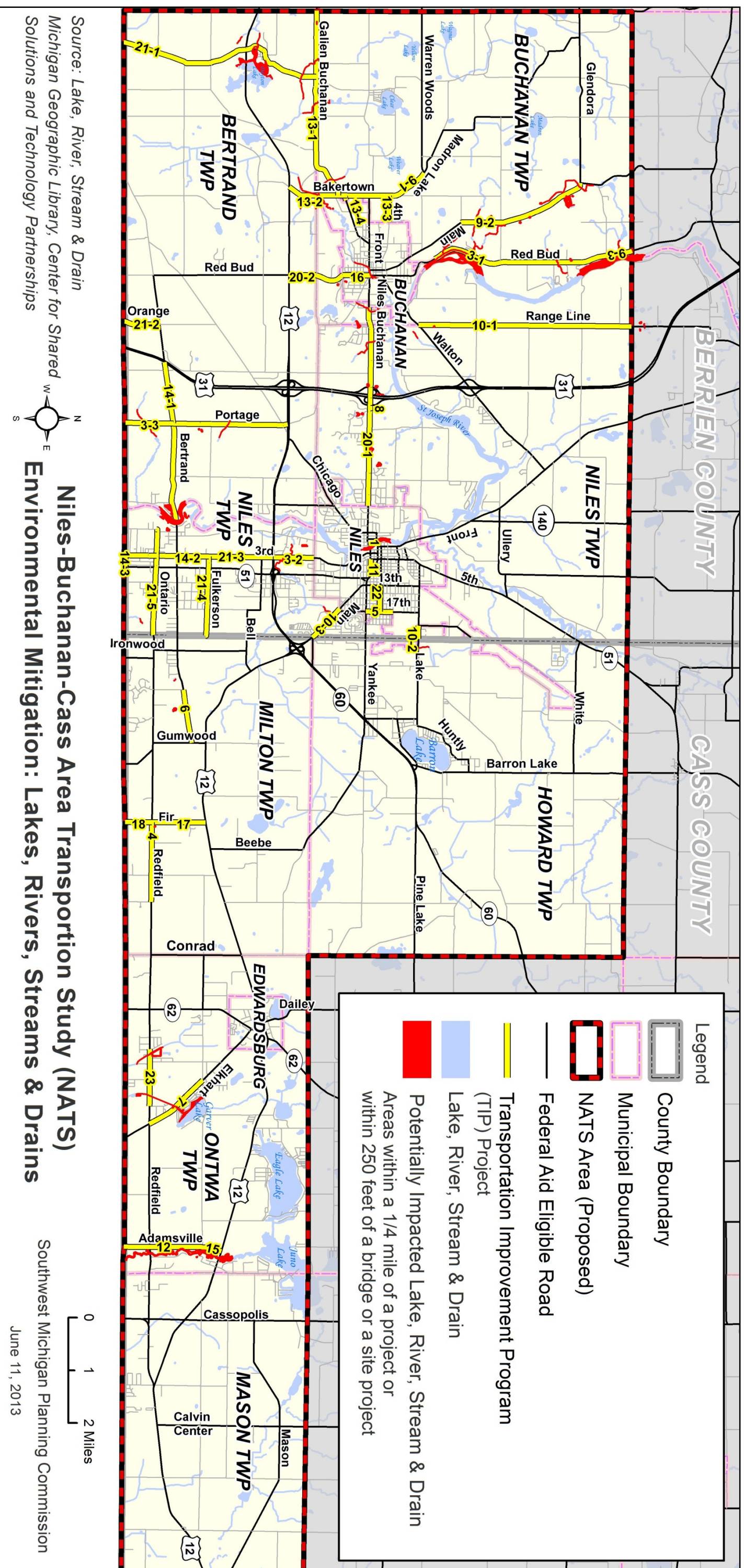


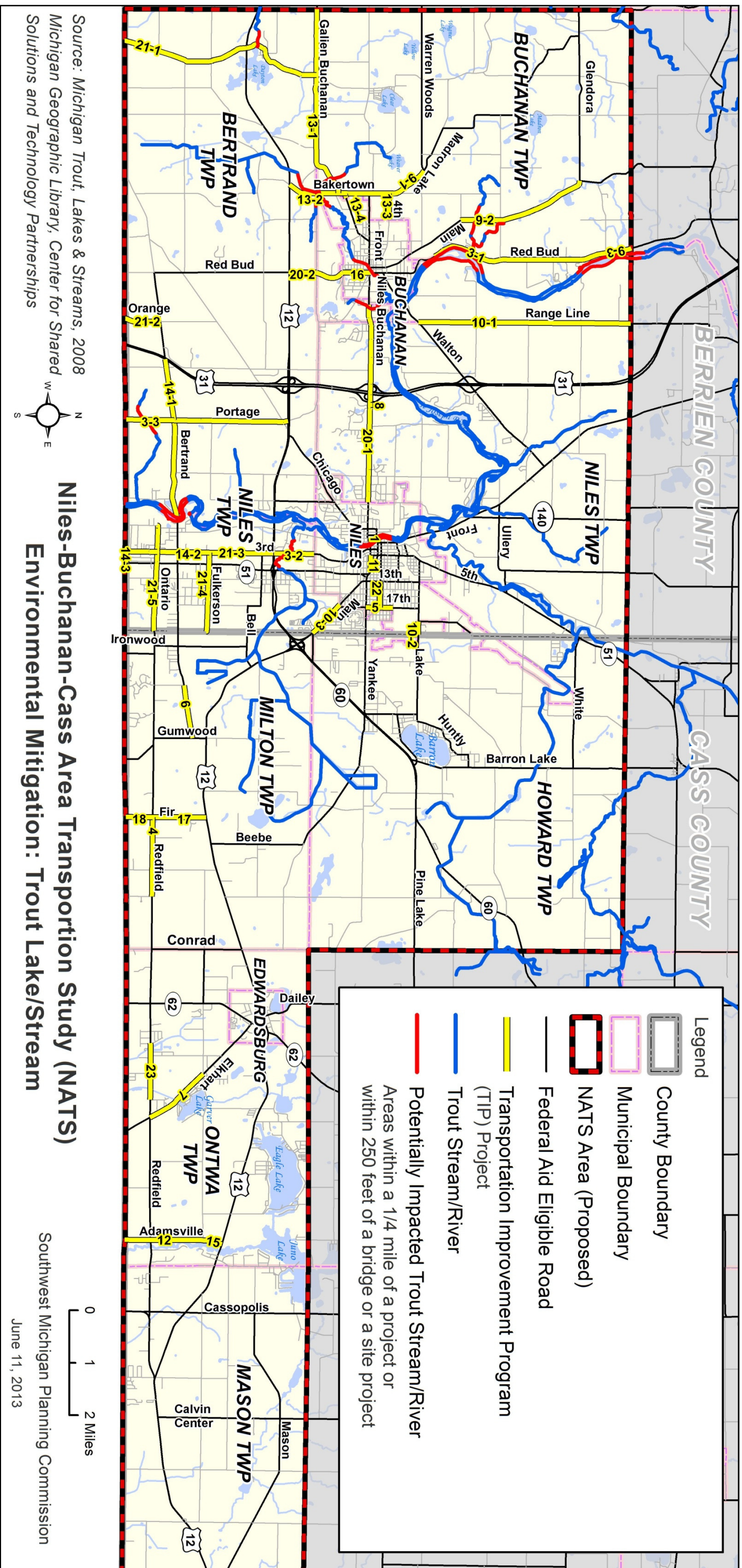


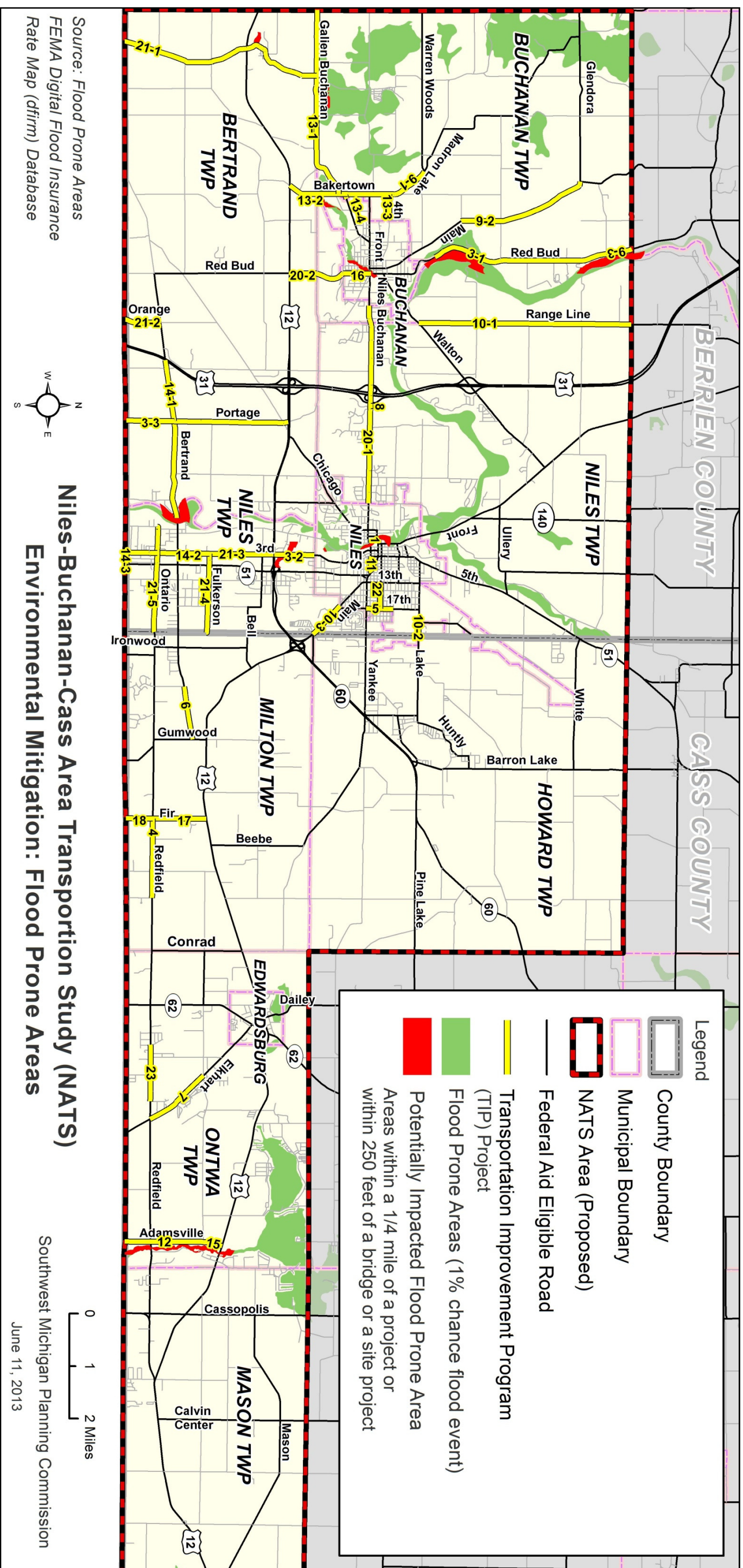


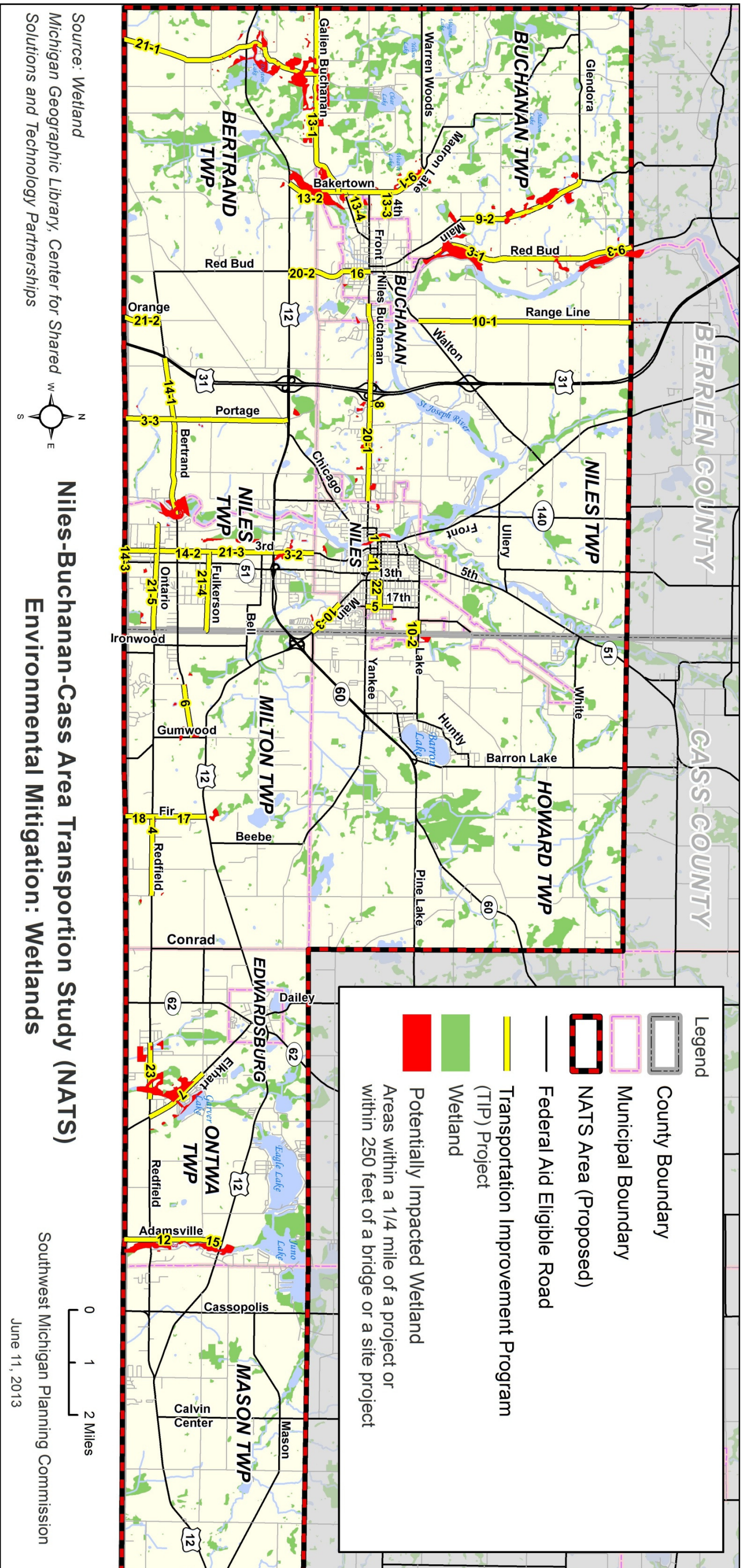
Map 31 - Major Watersheds of Southwest Michigan

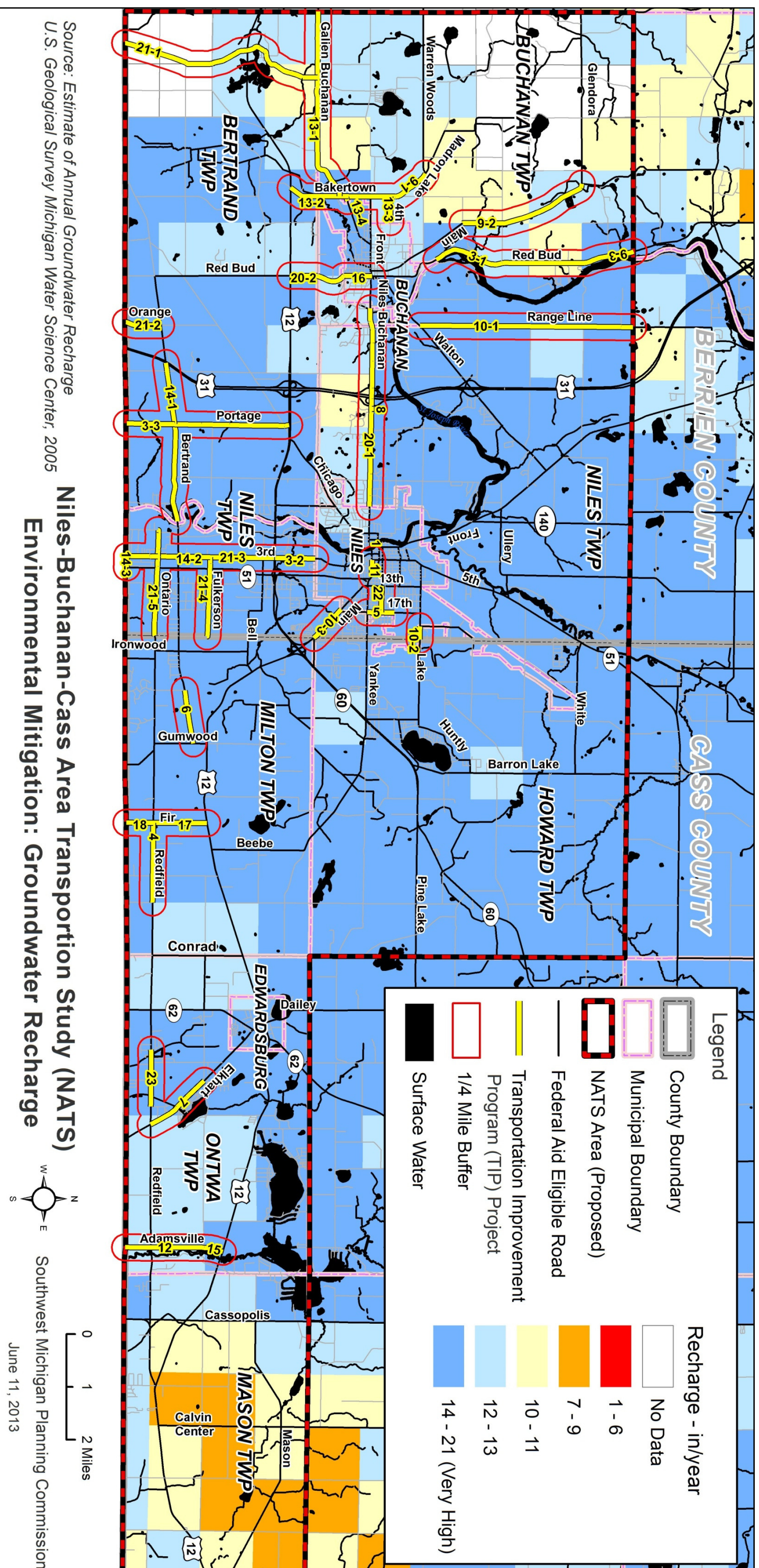


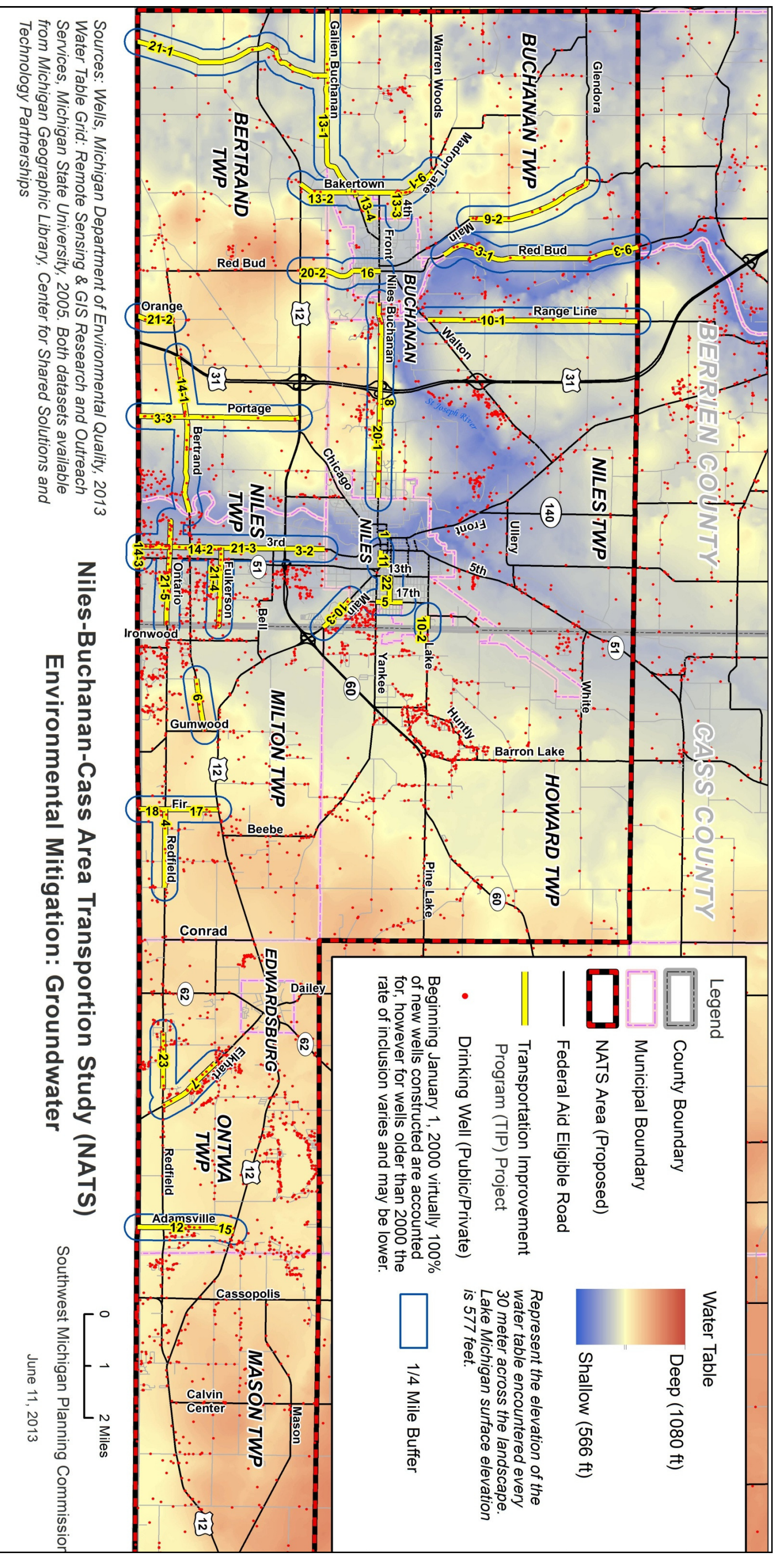


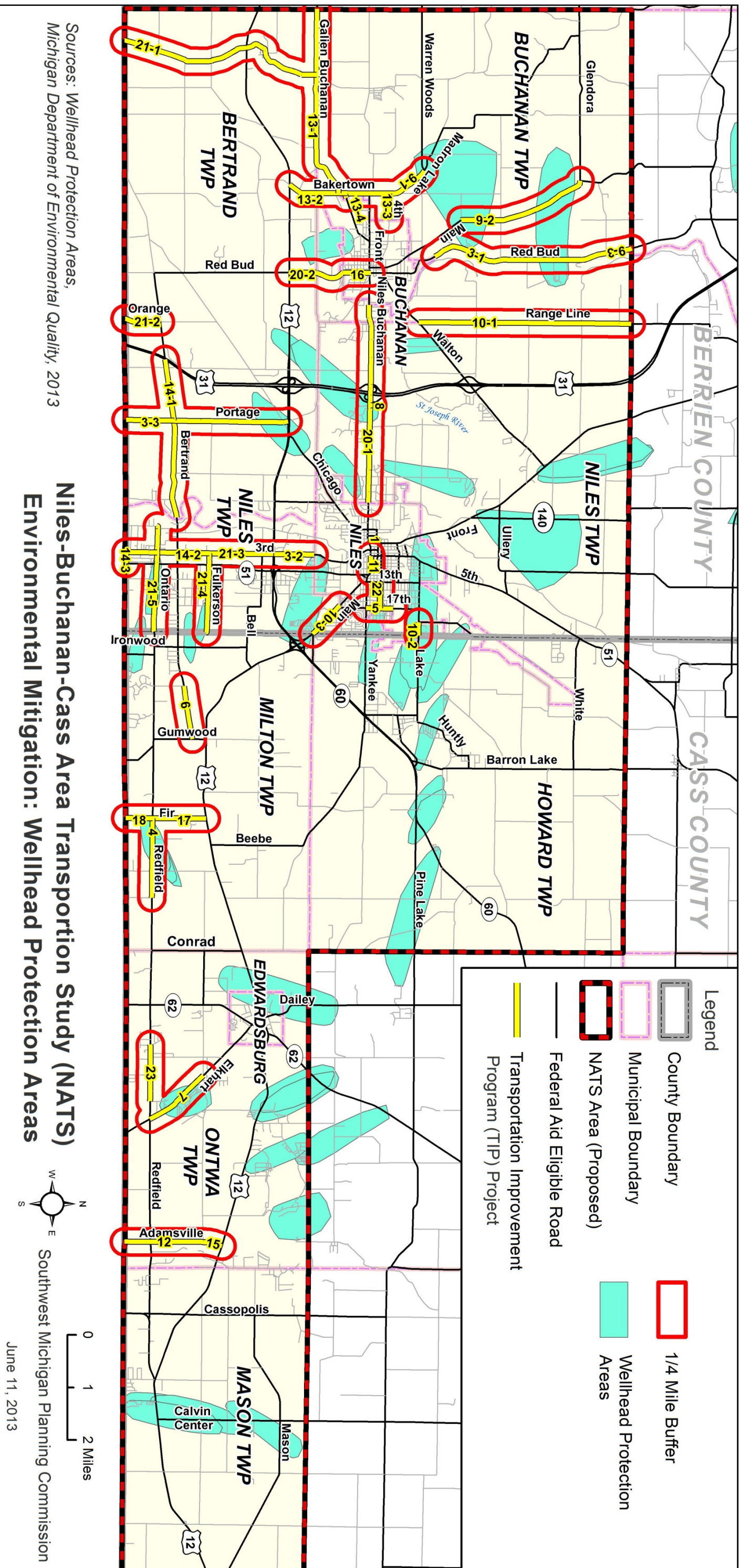












SUMMARY OF IMPACTS ON ENVIRONMENTALLY SENSITIVE RESOURCE

Below is a quick summary of the major resources that will potentially be impacted by planned transportation projects displayed in Table 62.

Table 62 - Environmental Mitigation Inventory Summary

Map Label	Project Name	PCA	Wetland	Trout Rivers/Lakes	Water Features	Flood Zone	Forested *	Agriculture**	Parks	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	Red Bud Trl, Third, Portage	X	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		
8	US-31 NB						X	X		
9	Madron Lake Rd, N Main, Red Bud Trl	X	X	X	X	X	X	X		
10	Range Line Rd, Lake St, Main St	X	X		X		X	X	X	
11	Broadway		X						X	
12	Adamsville	X	X		X	X	X	X	X	
13	Galien-Buchanan, Bakertown, Fourth, Terre Coupe	X	X	X	X	X	X	X	X	X
14	Bertrand, Third St, State Line	X	X	X	X	X	X	X	X	
15	Adamsville St.	X	X		X	X	X	X	X	
16	Red Bud Trl		X	X	X	X	X		X	X
17	Fir Rd	X	X				X	X		
18	Fir Rd						X	X		
20	Niles-Buchanan and Red Bud Trl	X	X	X	X		X	X	X	

Map Label	Project Name	PCA	Wetland	Trout Rivers/Lakes	Water Features	Flood Zone	Forested *	Agriculture**	Parks	Non-Motorized Trail
21-1	Dayton, Orange, Third, Fulkerson, Ontario	X	X	X	X	X	X	X		
22	Sycamore St		X						X	
23	Redfield St	X	X		X		X	X		

*Over ¼ of the acreage within the buffer are is forested lands

**Over ¼ of the acreage within the buffer is agricultural lands

Buffer area - areas within a 1/4 mile of a project or within 250ft of a bridge or a site project

GENERAL ENVIRONMENTAL MITIGATION CONSIDERATIONS

It is important to note that in order to develop this section of the plan, and assess potential environmental impacts of NATS LRP projects, the SWMPC used a consultation process to enlist the assistance of many partners and completed 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, developing buffer sizes and reviewing the plan.
3. SWMPC staff utilized GIS software to map environmentally sensitive areas along with the identified LRP projects. Each project was mapped with a buffer to show the potential resources that could be affected.

This information will be given to each agency prior to the beginning of the construction process of their project to ensure that the agency is aware of the potential impacts of the project. It will be the responsibility of the agency to ensure that all appropriate mitigation guidelines are followed for the specifics of their project.

Table 63 details mitigation activities that could be employed throughout the region to reduce impacts to the natural features outlined throughout this section.

Table 63 - Potential Mitigation Activities

Resource	Potential Mitigation Activities
Wetland or water resources	Mitigation sequencing requirements involving avoidance, minimization, compensation (could include preservation, creation, restoration, in-lieu fees, riparian buffers); design exceptions and variances; environmental compliance monitoring.
Forested and other natural areas	Avoidance, minimization; replacement property for open space easements to be of equal fair market value and of equivalent usefulness; design exceptions and variances; environmental compliance monitoring.
Agricultural areas	Avoidance, minimization; design exceptions and variances; environmental compliance monitoring.
Endangered and threatened species	Avoidance, minimization; time-of-year restrictions; construction sequencing; design exceptions and variances; species research; species fact sheets, Memoranda of Agreements for species management; environmental compliance monitoring.
Cultural resources	Avoidance, minimization; landscaping for historic properties; preservation in place or excavation for archeological sites; Memoranda of Agreement with the Department of Historic Resources; design exceptions and variances; environmental compliance monitoring.
Parks and recreation area	Avoidance, minimization, mitigation; design exceptions and variances; environmental compliance monitoring.

Source: Memphis Urban Area MPO Long Range Transportation Plan, 2040, Environmental and Social Screening Section.

MITIGATION GUIDELINES

Each project, of any type, proposed in the LRP should be examined for potential environmental impacts prior to being programmed into the TIP. This is particularly critical in an area like the NATS region where natural features are abundant and important to residents. Because each NATS project was adjacent to at least one environmental feature, it will be necessary to implement planning and construction practices that will protect the natural environment and cultural resources. The following are general guidelines that will need to be implemented if projects are within the buffered areas. Transportation staff will work with local road agencies to ensure that best practices are utilized throughout the construction and maintenance of the projects.

PLANNING AND DESIGN GUIDELINES

1. 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.
2. Use Low Impact Development (see Michigan’s Low Impact Development Manual) to minimize the negative impacts, and in some cases effect create positive impacts, of transportation projects on water quality. Low Impact Development 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 customizes site design; and incorporates natural site elements (wetlands, stream corridors, mature forests) as design elements.
3. Identify the area of potential impact connected to each transportation project, including the immediate area as well as related project development areas.
4. Regularly update the environmental features inventory to determine if any environmentally sensitive resources could be impacted by the project.
5. Coordinate the LRP with the County Hazard Mitigation Plan.
6. Coordinate transportation projects with local plans, such as comprehensive plans, watershed management plans, recreation plans, etc.
7. Regularly collaborate and meet with local community officials and other relevant stakeholders to discuss environmental issues and goals.
8. Where impacts are unavoidable, mitigate them to the fullest extent possible.
9. Incorporate stormwater management into design using a “green streets concept” that takes into account landscaping needs and existing runoff issues.
10. Promote public education on protecting sensitive features in land use planning.

CONSTRUCTION AND MAINTENANCE GUIDELINES

1. Include all special requirements that address environmentally sensitive resources into plans and estimates used by contractors and subcontractors.
2. Distribute information regarding activities prohibited in environmentally sensitive areas.
3. Minimize construction and staging areas with clearly marked boundaries.
4. Utilize the least intrusive construction techniques and materials.
5. Avoid and protect wetlands; restore lost wetlands if possible.
6. Avoid disturbing the site as much as possible.
 - a. 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.
 - b. Implement sediment and erosion control techniques.
 - c. Do not stockpile materials in sensitive areas.
 - d. Protect water quality by controlling runoff, regularly sweeping streets, protecting storm drains from construction debris, and implementing salt management techniques.
 - e. Protect cultural and historic resources, including surrounding soils and materials.
 - f. Minimize noise and vibrations.
 - g. Provide for solid waste disposal
 - i. Use the least hazardous substances possible, and ensure that such substances are properly handled, stored, and disposed.
7. Keep construction activities away from wildlife crossings and corridors.
8. Reduce land disturbances through efficient organization of construction activities
9. Avoid equipment maintenance, fueling, leaks, spraying, etc. near sensitive areas.



10. Incorporate Integrated Pest Management techniques if pesticides are used during maintenance.
11. Properly size and place culverts to ensure fish passage and reduce erosion.
12. Conduct on-site monitoring during and immediately following construction to ensure that environmental resources are protected as planned.
13. Utilize buffer strips to protect sensitive features, especially wetlands.
14. Where possible, realign/design routes or interchanges to protect sensitive features, especially wetlands. Look for opportunities to restore wetlands or improve natural areas/features.
15. Consider alternatives to capacity expansion.
16. 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.*³³

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. Woodlands, wetlands, aquifer recharge areas, floodplains, and well locations were the most common features to fall within project buffers. The least common features within project buffers

³³ 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/

were cemeteries and areas of cultural significance. 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.

One should 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. In the future other environmentally sensitive features should be incorporated into this section for consideration. Candidates for future inclusion are wetland restoration areas, heritage routes, historic bridges and places, coldwater streams, water bodies not meeting water quality standards and prime and unique farmlands.