Revised Alternatives Analysis and Project Assessment
For Proposed County Road 595

Marquette County Road Commission

January 9, 2012

EXECUTIVE SUMMARY

An application for permit was filed with the Michigan Department of Environmental Quality (MDEQ) by Woodland Road LLC in August 2009 for the proposed Woodland Road in Marquette County. In May 2010 Woodland Road LLC withdrew the application for permit due to the inability to resolve pending issues with the project as raised by the MDEQ and U.S. Environmental Protection Agency (EPA). After withdrawal of the application, one of the members of the Woodland Road LLC, Kennecott Eagle Minerals Company (KEMC) made a decision to proceed with County Road 550 as the primary transportation route for the Eagle Development Project. The decision to utilize the CR 550 route, a portion of which travels through the cities of Marquette, Negaunee, and Ishpeming, caused substantial concern among local governmental units and the general public.

As a result of the actions explained above, on October 4, 2010 the Marquette County Board of Commissioners formally requested that the Marquette County Board of Road Commissioners (MCRC) develop a new all-season primary county road from US-41 to Triple A Road within a four-mile wide corridor beginning at County Road FY (Appendix A). In response to this directive and after a public hearing, MCRC adopted a resolution on October 18, 2010, that concluded, in part, "that it is in the public's interest to create a new all-season primary county road to run north-south beginning at the intersection of US-41/CR FY northerly to CR IAA (aka Triple A Road) and the name of the route shall be known as CR 595" (Appendix A). As the governing body granted authority by law to provide for and maintain public road infrastructure in Marquette County, MCRC is therefore applying for a permit from MDEQ to construct CR 595.

The purpose of the proposed CR 595 project is to construct a primary county north-south road that (1) connects and improves emergency, commercial and recreational access to a somewhat isolated but key industrial, commercial and recreational area in northwest Marquette County to US-41, and (2) reduces truck travel from this area through the County's population centers.

Project Need

MCRC has determined the CR 595 project is necessary to serve the mining, timber, aggregate, and recreation industries as well as emergency services in Marquette County. A primary economic benefit of CR 595 would be the overall reduction of travel distance required to access these industries and activities in northwest Marquette County by replacing the existing seasonal and circuitous routes. Improving trucking efficiency is important to the mining, timber, and aggregate industries and will benefit their long-term success. Not only would these industries benefit directly from CR 595, but the many businesses that serve these industries would benefit as well. The construction of CR 595 would directly create an estimated 200 jobs and the related benefits to the area businesses would be significant.

More importantly, however, the CR 595 project will address public needs going far beyond the economic interests of these regionally key industries. There is a demonstrable need for improved access to northwest Marquette County for emergency fire control, emergency medical services, search and rescue, and for recreational access. Location of the project west of the Dead River dam system optimally addresses this need as a safeguard against access impediments created if that dam system fails again (as in 2003).

There is a significant timber resource in northwest Marquette County and fire suppression provided by the Michigan Department of Natural Resources (MDNR) is critical to protecting this resource. In addition, providing better firefighter emergency access to the many private recreational "camps" in the area is an important additional benefit. CR 595 would vastly improve emergency response during winter months due to the shorter distance that snowmobile units with rescue sleds would have to travel from accident sites to reach an ambulance waiting on CR 595. Logging accidents are common in this area of Marquette County and requests for assistance from recreationists are also common. CR 595 would significantly enhance response time for EMS in this area. Specifically, as explained by Marquette County Sheriff Mike Lovelace and his staff:

> "Enhancement number one would be the effective and efficient response to any and all incidents, accidents, forest fires, floods, other emergencies and natural disasters in the remote northwestern portions of Marquette County that we did not previously possess. Currently we have to respond via two-track roads with front wheel drive patrol cars, four-wheel drive patrol trucks, ATVs, dirt bike, or on foot with Deputies and/or Search and Rescue volunteers. During the winter we would probably have to respond with snowmobiles on the State-maintained snowmobile trails in order to get anywhere as the seasonal roads are not plowed during the winter. Less time in a rescue sled being towed by a ATV on a rough two track road or trail, or by a snowmobile in the winter with more time spent in an ambulance on paved roads greatly enhances the chances for a victim's survival."

MDNR Forest Management Division has stated that CR 595 would reduce fire fighter response time to the Yellow Dog Plains from the MDNR Ishpeming office to about 45 minutes, about half of the existing response time. The proposed road would also facilitate access for fire fighters to other areas of Marquette County to the north, such as Northwestern Road, and would provide quicker access to some of the lands south of the Huron Mountains. Forest fire response time can be critical to the success of containing a forest fire, especially in the jack pine plantations common in the Yellow Dog Plains.

The proposed CR 595 would divert substantial truck and other vehicle traffic away from urban areas of Marquette County, thereby reducing traffic congestion and improving public safety. CR 595 would mitigate the potential impact of increased traffic volume associated with mining and timber operations in the more densely populated areas of Negaunee, Ishpeming, and the City of Marquette. As it relates to the increased traffic volume, area timber companies have estimated that their workers accessing the work sites in this area (not including the hauling of harvested timber) travel over 2,000 round trips per year. Most of those workers' trips are currently on CR 510 or CR 550 and through Marquette. In addition, nearly 2,000 loads of timber are hauled out of the woods from the northwest part of the county on an average annual basis, meaning that there are 4,000 round trips of logging trucks. Currently half of those loads travel on CR 550 and through the City of Marquette.

Wetland Impacts and Mitigation

The proposed CR 595 impacts approximately 25.81 acres of wetland over a distance of 21.4 miles, including the impacts associated with the Trail 5 snowmobile trail relocation project and Triple A stream restoration. Impacts to wetlands are unavoidable with the proposed CR 595 project, but extensive planning and engineering design for the road has resulted in avoiding wetlands to the extent practicable and minimizing impacts as much as possible. A wetland mitigation plan has been prepared based upon extensive field study of potential sites. The unavoidable impacts to wetlands would be replaced at a minimum ratio of 1.5 to 1 in order to provide for no net loss of wetland. Wetland functions would be replaced by creation of a minimum of 48.41 acres of new wetlands.

Five wetland mitigation sites are located in three of the four watersheds involved in the proposed CR 595 project. Due to the small amount of wetland impact in the Michigamme River watershed (0.6 acre), the wetland mitigation for those impacts is proposed in the Escanaba River watershed, relatively close to the wetland impact. It is anticipated that these wetland mitigation sites will replace the functions lost with the impacts to existing wetlands by providing similar ecosystem types in similar positions in the regional landscape.

There are a total of 22 river and stream crossings of the proposed CR 595 road corridor (not including the East Branch of the Salmon Trout mitigation project) resulting in new, expanded and improved road crossings via the installation of new bridges or concrete box culverts at those locations. These crossings can have both a negative and positive impact on surface water resources. Of the 22 regulated stream crossings in the CR 595 project, 15 are existing stream crossings and seven will be new crossing locations. Of those 15 existing crossings, all of the structures are considered to be inadequately sized or are having degrading effects on the stream habitat.

The implementation of aspects of Stream Simulation Methodology adopted by MDNR and MDEQ for this project will ensure that each of the stream crossings proposed on CR 595 has minimal negative long-term impact on the stream and near-stream habitat.

A component of the stream mitigation plan is the relocation of a portion of Triple A Road and the removal and restoration of three existing culvert crossings on the East Branch Salmon Trout River. The road relocation will reduce the number of stream crossings over the East Branch Salmon Trout River on Triple A Road from three to one. The proposed new stream crossing is a 65-foot span box beam bridge that will span the East Branch Salmon Trout River and will not disturb the natural stream bottom or stream banks. The East Branch Salmon Trout River stream restoration project is a significant undertaking. This stream mitigation plan will rectify a situation that has had negative impacts on the East Branch Salmon Trout River for many years.

Conclusion

The CR 595 project is beneficial for the general public, businesses, the local and regional economy and local governmental agencies and is essential for public safety. The public trust in the resources that would be impacted by the project has been protected to the extent feasible, and measures will be taken to mitigate unavoidable impacts. The proposed CR 595 will improve public access to thousands of acres of land open to public use for hiking, fishing, canoeing or kayaking, hunting, and gathering.

1.0 INTRODUCTION

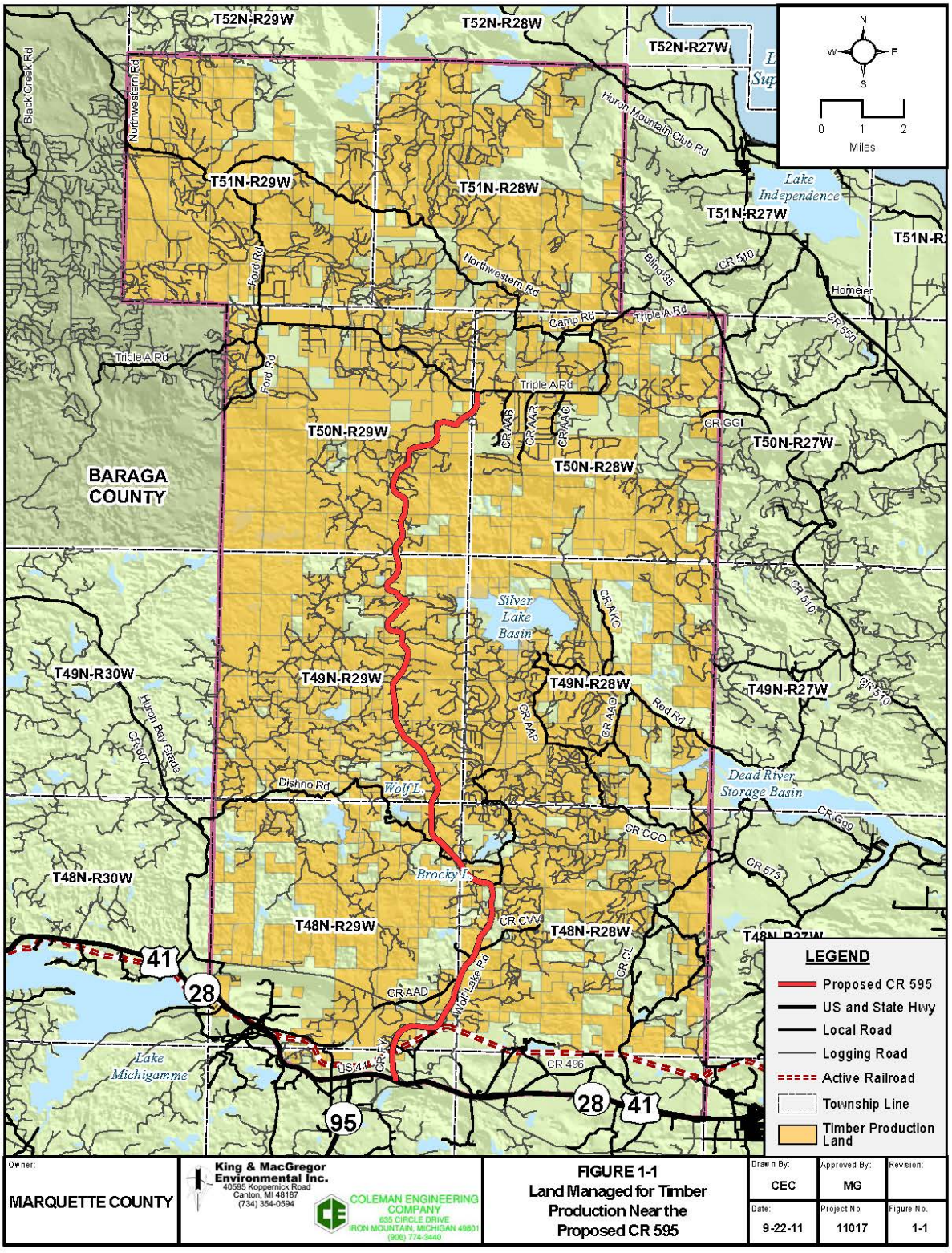
The proposed CR 595 is located in northwest Marquette County where the land use is best described as primarily commercial timber production and recreation. The landscape is rugged in many places with steep terrain, large bedrock outcrops, stream flowages with wetlands often flanking the streams, isolated wetlands of varying sizes and types, and very little non-forested open land. The forested lands are generally in all stages of succession; from mature timber stands to clear-cut or selectively harvested areas. It must be emphasized that this area has been logged systematically over the past 150 years and although there are mature stands of timber, they are not considered to be "old growth" forest. Logging roads and trails lace the landscape as a result of past timber harvests. These roads and trails are actively utilized for recreation all year, due to most of the timber production lands being open to public use.

Lands managed for timber production are mostly owned by timber companies, the State of Michigan and Federal government (Figure 1-1). Large acreage of timber company ownership provides for on-going logging activities throughout the year as stands of timber reach a size where harvest is appropriate. Much of the hardwood harvested in northwest Marquette County is considered a globally valuable resource and wood products made from hard maple and other species are marketed worldwide. Softwoods provide raw materials for large paper mills, plywood, oriented strand board, fuel for energy production, and other regionally important products.

The Marquette County Board of County Road Commissioners (MCRC) is submitting the application for permit to MDEQ primarily under the Michigan Natural Resources and Environmental Protection Act, PA 451 of 1994, Part 303 (Wetland Protection), Part 301 (Inland Lakes and Streams), and Part 31 (Floodplain Regulatory Authority) for the construction of a new primary county road. MCRC is granted the authority by law to provide and maintain the public road infrastructure of Marquette County. As the purpose and need for a new county road is demonstrated, MCRC has responsibility to obtain approval and coordinate the construction of the road.

A number of Marquette County governmental agencies, including the Marquette County Board of Commissioners; the City of Marquette; the boards of Marquette Township, Humboldt Township, Champion Township, Ely Township, Powell Township, and Michigamme Township; and local businesses and industry have been attempting to resolve the heavy truck transportation issues in the region, particularly traffic originating from the area northwest of the City of Marquette and traveling through the city. The expected increase in truck and other traffic associated with the Eagle Development Project in concert with public officials' efforts to address the long-term transportation needs for better logging access and emergency access to northwest Marquette County have now made resolving this issue a critical need for Marquette County.

On October 4, 2010, Gerald O. Corkin, Chairman of the Marquette County Board of Commissioners, sent a letter to James Iwanicki, Engineer/Manager of MCRC (Appendix A) formally requesting MCRC develop a new all-season primary county road from US-41 to Triple A Road in a four-mile wide corridor beginning at CR FY (Appendix A). A four-mile wide corridor was determined based on the fact that there is an existing road (CR 607) about two miles west of the west edge of the proposed CR 595 study corridor; therefore further expansion of the CR 595 road study corridor to the west would encroach upon the land area served by CR 607. The road study corridor is shown in Figure 2-1.


T52N-R29W
T52N-R28W
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T49N-R30W
T49N-R29W
T49N-R28W
T49N-R27W
T48N-R30W
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T48N-R28W
BARAGA COUNTY
Lake Independence
Silver Lake Basin
Dead River Storage Basin
Lake Michigamme
Wolf L.
Brocky L.
Homeier
Black Creek Rd
Northwestern Rd
Huron Mountain Club Rd
Ford Rd
Camp Rd
Triple A Rd
Ellington
CR 510
CR 550
CR GGI
CR AAB
CR AAR
CR AAG
CR AKC
Red Rd
CR AAP
CR AAO
Dishno Rd
Huron Bay Grade
CR 607
CR GG9
CR CCO
CR 573
CR CV4
CR CL
CR AAD
Wolf Lake Rd
CR EA
US 41
CR 496
41
28
95
N
W
E
S
0 1 2
Miles
LEGEND
Proposed CR 595
US and State Hwy
Local Road
Logging Road
Active Railroad
Township Line
Timber Production Land
Owner:
MARQUETTE COUNTY
King & MacGregor Environmental Inc.
40595 Koppernick Road
Canton, MI 48187
(734) 354-0594
COLEMAN ENGINEERING COMPANY
635 CIRCLE DRIVE
IRON MOUNTAIN, MICHIGAN 49801
(906) 774-3440
FIGURE 1-1
Land Managed for Timber Production Near the Proposed CR 595
Drawn By: CEC
Approved By: MG
Revision:
Date: 9-22-11
Project No. 11017
Figure No. 1-1

The eastward extent of the corridor was based primarily on the width of the corridor being centered upon the CR FY intersection with US-41 on the south and also incorporating the intersection of Trail 5 and Triple A Road on the north, which were considered as the south and north termini of the proposed CR 595, respectively. The east limit of the road study corridor also locates potential routes upstream (i.e. west) of the Silver Lake Basin, which is the uppermost impoundment on the Dead River system. Notwithstanding these reasons, the expansion of the road study corridor to the east may have been feasible and, in fact, a portion of the proposed CR 595 extends east of the east study corridor just south of Brocky Lake. In addition, other routes that extend east of the road study corridor have been evaluated. Therefore, there has been a *de facto* analysis of potential routes up to two miles east of the road study corridor.

In Section III of the Michigan Department of Transportation (MDOT) document titled "Instructions and Forms for Preparing: Annual Road Mileage Certification for Counties in Accordance with Act 51 of Public Act 1951, as Amended" (Appendix B), guidance is provided for requesting a change in the county primary road system. Under the heading "Uniform Standards for the Selection of County Primary Roads", subsections D.1 and D.3 are applicable to CR 595. D.1 states, "*In rural agricultural areas, routes should be spaced from three to four miles apart*." Subsection D.3 states, "*In sparsely settled areas, land use should be the controlling factor in establishing the need for collector (feeder) routes*." Subsection E. states, in part, "*The location of large industries, trade centers, public institutions, parks, and so forth, may also increase the need for additional routes*."

In summary of the justification of the four-mile wide road study corridor for CR 595, it is the responsibility of MCRC to determine where a proposed county road is needed. MCRC made the determination that the proposed CR 595 should be located within the four-mile wide corridor. However, potential routes outside of the this four-mile wide corridor were evaluated; therefore concerns about the width of the study corridor would seem to be diminished.

The October 4, 2010 letter stated, *"there would be many public benefits from the new road. The road would improve access to recreation land, western Marquette County businesses would benefit from a safe, efficient transportation route, and truck traffic from the Kennecott mine would use the new road rather than US-41/M-28, CR 510, CR 550, CR 492, CR 502, and CR 473, improving safety on existing state highways and county roads. In addition, the new road would greatly benefit the timber industry."* On September 20, 2010 MCRC authorized a public hearing to receive input from the public on the project. This public hearing was held on October 7, 2010 at the Ishpeming Township Hall. The minutes of the October 7, 2010 MCRC meeting and public hearing are provided in Appendix A.

At the following MCRC meeting on October 18, 2010, MCRC adopted a resolution. This resolution made the following findings, in part:

- *"Whereas, a public need for a new road has been identified and established by the Marquette County Road Commission, the County Board of Marquette, and all four affected townships (Champion, Ely, Humboldt, and Michigamme);*

- *Whereas, a public need for a new road has been identified by other local government agencies such as the City of Marquette, Powell Township, and Marquette Township that are indirectly affected;*

- *Whereas, developing a new all-season primary county road to run north-south beginning at the intersection of US-41/CR FY northerly to CR IAA is in the public's best interest;*

- *Whereas, this new road will provide additional recreational opportunities to the public as well as provide a direct benefit to the timber, mining, and gravel industries;*

- *Whereas, highway public safety, emergency response, and emergency services will be significantly enhanced;"*

The resolution concluded, in part, "*that it is in the public's best interest to create a new all-season primary county road to run north-south beginning at the intersection of US-41/CR FY northerly to CR IAA and the name of the route shall be known as CR 595"* (Appendix A). (Triple A Road is officially designated as CR IAA in Michigamme Township.) Minutes of the October 18, 2010 MCRC meeting are provided in Appendix A.

On or about August 15, 2011, MCRC provided the Alternatives Analysis and Project Assessment Draft for Public Review and a map of the proposed CR 595 route for public comment. MCRC convened four public information workshops in order to provide a venue for discussion of the proposed CR 595 project and to receive formal comments from the public. Two workshops were held on August 30, 2011 at the Lakeview Arena in Marquette, and two workshops were held on August 31, 2011 at the Ishpeming Township Hall. Public comments and MCRC responses to the public comments are provided in Appendix D.

On September 19, 2011 MCRC held its normal monthly meeting, which was convened at the Ishpeming Township Hall. The proposed CR 595 project was on the MCRC agenda. After a presentation by MCRC Engineer-Manager James Iwanicki and public comment, the MCRC voted unanimously to adopt the recommendation of Mr. Iwanicki to proceed with the application for permit process with MDEQ. The recommendation included a revision of the proposed CR 595 route to be located west of Brocky Lake, instead of east of Brocky Lake as proposed in the August 15, 2011 draft documents. This revision was brought up at the public information workshops on August 30 and 31, 2011 and was subsequently evaluated in the field by the project team including surveyors, ecologists, the project engineers and MDEQ staff. As a result, a revised route was prepared by the project engineers and is included as part of this permit application. The minutes of the September 19, 2011 MCRC meeting are provided in Appendix A.

The proposed primary county road will be a public road, with all of the associated benefits that go with that designation. Those benefits include the fact that the new road will be open to public use and will be maintained as part of the Marquette County road system. All traffic laws will be enforced by law enforcement agencies such as the Michigan State Police, Marquette County Sheriff's Department, and possibly township law enforcement agencies.

Logging and mining have been integral to the base economy of Marquette County and the entire western Upper Peninsula since settlement. The value of the logging and mining industries to this region is significant. Much of the infrastructure in Marquette County can be attributed to these two industries; including roads, power plants and hydropower facilities, recreation amenities, and public services. This proposed project, the construction of a new primary county road to serve these two heritage industries as well as providing access to lands for recreation and other public benefits, is essential public infrastructure to continue to

support these baseline industries that form and sustain the region's economy. The full economic benefits of the mining and logging industries cannot be realized without the proposed road. In fact, the criteria from the Federal Highway Administration (FHWA) as provided in the "FHWA Functional Classification Guidelines" (Appendix B), Section II on page 7 of 10, states that placing a major collector road on the federal aid rural collector system is to provide service to "*other traffic generators of equivalent intracounty importance, such as consolidated schools, shipping points, county parks, important mining and agricultural areas, etc*…."

This permit application document is intended to combine the demonstration of purpose and need for the proposed road along with an assessment of the impacts of the project to the public trust, riparian rights, and the environment, as well as to provide an analysis of the alternatives to the proposed action.

The proposed CR 595 is a modified and revised route from that of the previously proposed Woodland Road by Woodland Road LLC. This application for permit document contains references to routes and studies conducted for KEMC or Woodland Road LLC prior to MCRC initiating the proposed CR 595 project in October 2010. MCRC has been authorized by KEMC to use these studies and documents to save duplication of effort and time. The Woodland Road studies and surveys were critical to the overall planning for the CR 595 project and as such the pertinent information is included in this application for permit to provide full background disclosure.

A *primary* county road is the highest classification of road under the jurisdiction of road commissions. Other county roads are classified as *local* county roads. State highways are under the jurisdiction of the MDOT, although maintenance is often transferred to county road commissions. Funding for maintenance of county roads is provided by the State to counties, in part, according to the mileage of each classification of roads in the county as provided by Public Act 51 of 1951, as amended (MCL 247.651 et seq).

Act 51 also provides for the establishment of the primary county and local county road systems, as designated by the Boards of County Road Commissions and subject to approval by the State Transportation Commission. Act 51 states that "…primary county roads shall be selected on the basis of greatest general importance to the county…" (247.652, Sec. 2). The MDOT document titled "Instructions and Forms for Preparing: Annual Road Mileage Certification for Counties in Accordance with Act 51 of Public Act 1951, as Amended" (Appendix B), provides descriptions of county road classifications. The responsibility for adding to the primary county road system is conferred by Act 51 to the Boards of County Road Commissions.

In a letter dated October 28, 2010 MCRC requested *"that MDOT commit to placing CR 595 on the primary road system once built"* (Appendix B). In a letter dated November 18, 2010 to MCRC, MDOT endorsed the CR 595 project, and certified CR 595 as a primary county road in Marquette County (Appendix B). MDOT agreed that, *"CR 595… will serve as a vital commercial and connector route in Marquette County."* This finding by another State agency responsible for the State's road transportation system is an important factor in documenting the need for the project.

In a letter from MDOT to MCRC dated January 11, 2011, MDOT notified MCRC that FHWA, on December 17, 2010, approved CR 595 as a federal aid route designated as a

"…proposed future major collector, rural route." (Appendix B). FHWA Functional Classification System Guidelines that provide qualification of this finding are discussed earlier in this section and are provided in Appendix B. FHWA also requested MCRC to notify them of the as-built alignment once the road is constructed so that it can be added to the Michigan Geographic Framework GIS mapping.

A third letter from MDOT dated June 2, 2011 was written by MDOT Director Kirk T. Steudle and supports *"…the MCRC finding that this proposed route is a necessity for providing vital commercial and access improvements for the county."* This letter is also included in Appendix B.

2.0 PROJECT PURPOSE

A starting point for the evaluation of alternatives under the requirements of Part 303 and Part 301 is a statement of the project purpose. The project purpose defines the scope of the alternatives analysis. The alternatives that will achieve the project purpose were evaluated by the applicant for this permit application; however other routes were also evaluated and information provided in this document to demonstrate and verify the need for CR 595.

The purpose of the proposed CR 595 project is to construct a primary county north-south road that (1) connects and improves emergency, commercial and recreational access to a somewhat isolated but key industrial, commercial and recreational area in northwest Marquette County to US-41, and (2) reduces truck travel from this area through the County's population centers.

The project purpose is the description of the proposed project. A new county road is needed from "point A to point B" as defined by a north-south corridor by the Marquette County Board of Commissioners and MCRC, with the CR FY/US-41 intersection being the south end-point of the proposed road within the study corridor.

The road study corridor is located generally in the area that would provide typical eight-mile wide east-west spacing for primary county roads. MDOT and FHWA transportation planning standards recommend this type of spacing in rural areas as an acceptable density of primary county roads. Figure 2-1 graphically demonstrates the location of the road study corridor, the proposed CR 595, and the eight-mile spacing in relationship to the existing primary county roads. Support for this planning standard can be seen in FHWA's and MDOT's concurrence approving CR 595 as a federal aid route and approving it as a county primary road that was presented in the previous section of this document.

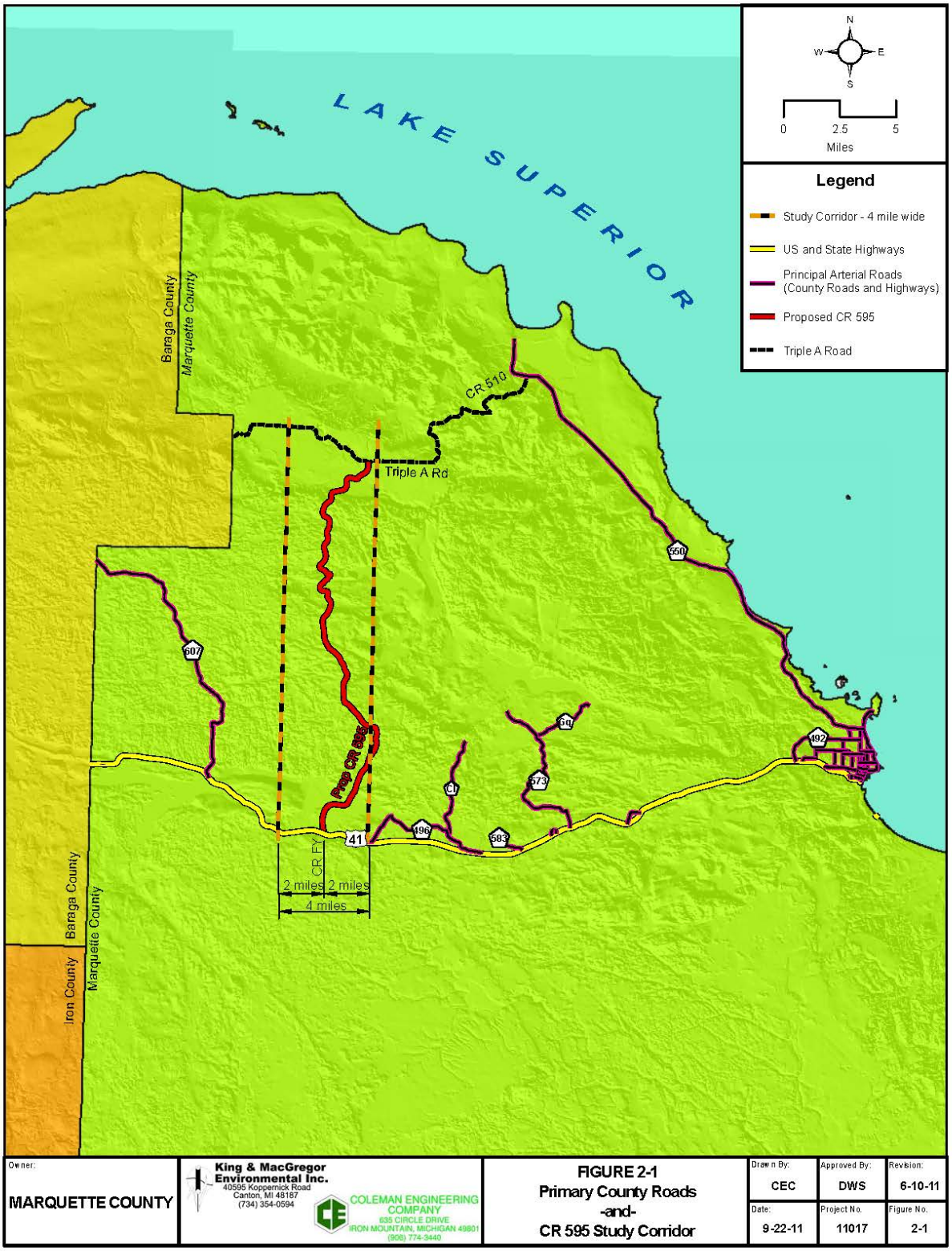
Alternatives for the location of the proposed CR 595 within the study corridor are discussed in this application. Also, improvements to existing primary county roads (e.g. CR 550 and CR 510) were assessed and determined by MCRC to be "no-build alternatives" to the proposed CR 595 since improvements to existing roads would not meet the project purpose.

There are substantial industrial (mining), commercial (timber lands), and recreational properties in northwest Marquette County. Existing access to these properties is mostly seasonal. A new road with access to US-41 would serve the needs of Marquette County as expressed by governmental units. The design speed and road width (section) of the proposed CR 595 have been reduced from that of a typical primary county road to minimize wetland impacts, even though there will be a mix of general public and truck traffic that will use CR 595.

The need for the proposed road has been known for many years by the general public and public officials of Marquette County, well before the Eagle Development Project came about. However, mining has focused the need for a new public road in northwest Marquette County. Although CR 595 is extremely important to mining, the proposed public road will serve many more purposes and needs for a long period of time. There is presently only a single public road to the Eagle Development Project. That public road is Triple A Road, which has historically been an unimproved, seasonal county road that is currently under construction for improvements. If Triple A Road is blocked or impassible during an emergency (e.g. forest fire, facility accident, severe weather, etc.) then public safety may be compromised. With the

large number of people that will be employed by the Eagle Development Project, in addition to contractors, vendors, and governmental agency personnel that will provide services at the facility, an additional public road access is essential for public safety and emergency response. CR 595 would provide much more efficient access to this northern area of Marquette County; this second public road access will become a necessity in light of the number of people that will be employed in the mining and forest industry in northwestern Marquette County.

Another important factor in the proposed CR 595 location is the need for a primary county road west of Silver Lake Basin. Such a road will provide an alternate public transportation route that avoids crossing the Dead River. This route will provide public access to the northern portion of Marquette County in the event of another catastrophic flood event, such as occurred in 2003 causing the failure of the Silver Lake Basin berm. That flood destroyed two county road bridges (i.e. CR AAO and CR AAT) and also caused the failure of Tourist Park Dam, as well as creating accessibility issues to locations north of the Dead River in the county. All of the bridges over the Dead River were closed due to safety concerns, including bridges on CR 550, CR 510, CR HD (Forestville Road), CR AAO (Red Road), and Lakeshore Boulevard, which isolated the Village of Big Bay until the flooding subsided and the bridges could be inspected and their safety verified for public travel. The proposed CR 595 would provide access upstream of the dams; the routes east of CR 595 would not serve this important public safety access.


LAKE SUPERIOR
N
W
E
S
0
2.5
5
Miles
Legend
Study Corridor - 4 mile wide
US and State Highways
Principal Arterial Roads (County Roads and Highways)
Proposed CR 595
Triple A Road
Baraga County
Marquette County
Iron County
CR 510
Triple A Rd
Prop CR 595
CR FY
2 miles
2 miles
4 miles
41
607
550
492
573
583
496
Owner:
MARQUETTE COUNTY
King & MacGregor Environmental Inc.
40595 Koppernick Road
Canton, MI 48187
(734) 354-0594
COLEMAN ENGINEERING COMPANY
635 CIRCLE DRIVE
IRON MOUNTAIN, MICHIGAN 49801
(906) 774-3440
FIGURE 2-1
Primary County Roads
-and-
CR 595 Study Corridor
Drawn By: CEC
Approved By: DWS
Revision: 6-10-11
Date: 9-22-11
Project No. 11017
Figure No. 2-1

3.0 PURPOSE AND NEED FOR THE PROPOSED ROAD

Transportation planning to serve economic growth, recreation, and landowner needs revolves around the determination of purpose and need for any particular project. By land area, Marquette County is the largest county in Michigan and is the 17th largest county east of the Mississippi River. MCRC maintains 284 miles of primary county roads, 988 miles of county local roads, 93 county bridges, and maintains 169 miles of state trunkline under contract from the State of Michigan.

Primary county roads are ideally spaced about eight miles apart in north-south and east-west orientations to adequately serve county transportation needs. Of course, some areas of more rural counties that are undeveloped or remote may not require a primary county road, which has been the case with northwest Marquette County in the past. However, with the advent of the Eagle Development Project added to the timber industry and recreation activities in northwest Marquette County, the need for the proposed CR 595 requires transportation access that can only be provided by a new primary county road to this area.

The transportation needs of northwest Marquette County have been carefully evaluated for public safety, emergency response, mining, logging, aggregate industries and related services as well as for general public access. The economic benefits of the proposed primary county road to Marquette County and the entire region are such that construction of the proposed CR 595 has been determined by the Marquette County Board of Commissioners and MCRC to be a necessity. Use of existing roads will not fulfill the demonstrated need for the proposed CR 595.

3.01 Project Background and Need for Action

Public comments, especially those made during the Eagle Development Project mine permitting process, MCRC public hearing on October 18, 2010, and at City of Marquette public hearings on city street truck restrictions, identified a clear public preference for a new north-south primary county road in western Marquette County to help alleviate heavy truck traffic in the City of Marquette, as well as in Marquette Charter Township, the City of Negaunee, and the City of Ishpeming. This public input and community support to seek alternatives to existing county roads for access to the northwest part of Marquette County resulted in a comprehensive evaluation of the alternatives for providing the needed improved access to this region. Some of this evaluation was performed for the 2009 application for MDEQ permit for the Woodland Road by Woodland Road LLC. In addition, various and detailed environmental studies have been conducted for the proposed CR 595.

Another need for CR 595 may be best shown by consideration of the destinations of the bulk of the heavy truck traffic that would utilize the proposed road. Ore will be transported from the Eagle Development Project to the Humboldt Mill for initial processing; rock backfill will be hauled back to the Eagle Project. Timber in the form of pulp, saw logs, and chips is hauled from the vast holdings of timber company property in northwest Marquette County to mills in various locations, primarily south and west in the Upper Peninsula and northern Wisconsin. The proposed CR 595 is the most direct and efficient route for these industries. The destinations for the timber products are shown in Figure 3-1.


LEGEND
1 A Timber Market Destination
Community
Interstate Highway
US Highway
MI Highway
Active Railroad
IRON County
Road Study Corridor
0 10 20 30 40
Miles
N
Timber Product Destinations
1 Bessemer Plywood
2 Besse Forest Products
3 Erickson Lumber
4 L'Anse Warden Electric Co. Fuel Aggregate Facility
5 Plum Creek Yard
6 Longyear Yard
7 GMO Renewable Res.
8 Holli For. Products Yard
9 Potlatch Corporation
10 Timber Products Michigan LP
11 Sagola Hardwoods
12 Louisiana-Pacific Sagola
13 Northern Components
14 Verso Pulp & Paper Mill
15 New Page Pulp & Paper Mill
16 SN Forest Marketing
17 Canadian National Depot
18 Verso Woodyard
19 Northern Hardwoods
20 Pine River Hardwoods
21 Francis Youngren Yard
22 New Page Woodyard
23 Sappi Woodyard
24 Escanaba & Lake Superior RR Woodyard
25 Louisiana-Pacific Newberry
26 Wood Fibers Inc.
Proposed Biofuel Power Plants
A Verso Quinnesec
B City of Escanaba
C Former KI Sawyer
D Renewafuel - Cliffs Resources
E Niagara Development LLC
F White Pine Electric Power LLC
G Frontier Renewable Resources LLC (Ethanol)
Lake Superior
Lake Michigan
WISCONSIN
KEWEENAW
HOUGHTON
ONTONAGON
BARAGA
GOGEBIC
IRON
MARQUETTE
DICKINSON
MENOMINEE
DELTA
ALGER
SCHOOLCRAFT
LUCE
CHIPPEWA
MACKINAC
CHARLEVOIX
EMMET
CHEBOYG
LEELANAU
ANTRIM
OTSEGO
Copper Harbor
Calumet
Hancock
Houghton
South Range
Chassell
Ontonagon
White Pine
Mass City
Bergland
Bessemer
Wakefield
Ironwood
Bruce Crossing
Covington
Sidnaw
Watersmeet
Amasa
Iron River
Crystal Falls
Channing
Sagola
Felch
Florence
Iron Mountain
Kingsford
Quinnesec
Norway
Niagara
Goodman
Powers
Bark River
Stephenson
Menominee
Escanaba
Gladstone
Rapid River
Perkins
Manistique
Garden
Gould City
Naubinway
Epoufette
Brevort
Moran
Hessel
Saint Ignace
Trenary
Gwinn
Republic
Michigamme
Champion
Humbolt
Negaunee
Marquette
Harvey
Sawyer
Skandia
Chatham
Munising
Shingleton
Seney
Newberry
Grand Marais
Paradise
Sault Ste. Marie
Brimley
Eckerman
Kinross
Rudyard
Trout Lake
Curtis
Engadine
Germfask
Steuben
Hiawatha
Blaney Park
Big Bay
Skanee
L'Anse
Baraga
Owner:
MARQUETTE COUNTY
King & MacGregor Environmental Inc.
40595 Koppernick Road
Canton, MI 48187
(734) 354-0594
COLEMAN ENGINEERING COMPANY
635 CIRCLE DRIVE
IRON MOUNTAIN, MICHIGAN 49801
(906) 774-3440
FIGURE 3-1
County Road 595
Map of Timber Destinations
Drawn By: CEC
Approved By: DWS
Revision: 6-10-11
Date: 9-22-11
Project No. 11017
Figure No. 3-1

Employees and potential employees working in the forests of northwest Marquette County or at the Eagle Mine that live in western Marquette County or in Baraga County would have a route to work on CR 595 that would be a much shorter distance than using existing roads. For example, employees traveling from the M-95/US-41 intersection to the Eagle Mine would save about 80 miles per round trip. If CR 595 is not available, these workers may not find it feasible to drive that distance to work, especially in winter. Over the course of a year the use of existing roads compared to CR 595 could add nearly 10,000 miles of driving for each employee living in the western areas of Marquette County.

3.01.A. Documentation of Eagle Development Project Needs for CR 595

The KEMC Eagle Development Project is under construction, with the start of production presently planned for late in 2013. When the mine was permitted by MDEQ under Part 632, CR 550 was the intended access route. Substantial public concern about/with CR 550 being the mine access route resulted in KEMC evaluating alternate routes, and eventually participating with Woodland Road LLC in proposing Woodland Road in an application for permit filed with MDEQ in August 2009. Over 900 citizens from Big Bay, the City of Marquette, as well as residents along CR 550 have requested (through signed petitions) that an alternate route for truck traffic on CR 550 and CR 510 be found.

In May 2010, Woodland Road LLC withdrew the application for permit due to the inability to resolve pending issues with the project as raised by MDEQ and EPA prior to permitting deadlines. After withdrawal of the application, KEMC made a decision to proceed with CR 550 as the primary transportation route for the Eagle Development Project. The decision to utilize the CR 550 route, a portion of which travels through the cities of Marquette, Negaunee, and Ishpeming, caused substantial concern among local governmental units and the general public, which eventually resulted in MCRC being requested by the Marquette County Board of Commissioners to seek approval to build CR 595.

The need for CR 595 for the Eagle Development Project has not changed substantially from that presented in the Woodland Road application for permit. The primary benefits of CR 595 compared to CR 550 as the primary access route are as follows:

- CR 595 is a direct route to US-41 near the Humboldt Mill and at 21.4 miles in length is 38.6 miles shorter than the CR 550 route to the intersection of US-41 and CR FY. This reduced road length will save an estimated 1.4 million miles of truck travel alone per year for hauling ore from Eagle to Humboldt using the CR 550 route and will have a resultant reduction in greenhouse gas emissions and fuel savings.

- Although the total overall cost of utilizing the CR 550 route compared to constructing and using CR 595 is about the same for the Eagle Development Project, the reduction of miles traveled in areas of development and heavy traffic will reduce the chances of accidents if the CR 595 route is implemented. Safety is a top priority of MCRC and KEMC .

- CR 595 will reduce access time for emergency services to the mine site, reduce travel for employees that live in the west part of Marquette County or Baraga County, and will provide an important access upstream of the Dead River dam system in case of flooding that may cause bridges to be closed.

To summarize the values for the proposed CR 595 to the Eagle Development Project, the road would minimize a substantial amount of potential problems with traffic in municipal areas, improve safety, create energy savings, and facilitate employee and emergency services access.

3.01.B. Documentation of Logging Industry Needs for CR 595

The proposed CR 595 project is an important need for the timber companies and other companies associated with logging to maintain a viable business based on growth and sustainable harvest of timber on the extensive land holdings in northwest Marquette County and eastern Baraga County. Not only would timber companies benefit directly from CR 595, but the many businesses that serve the timber industry as well as the general public would also benefit. Improved safety for hauling timber as well as emergency response to logging accidents are also very important attributes of CR 595 for the timber industry.

CR 595 will make the harvest of timber more efficient due to the improved access for getting timber to markets and yards in the western UP and northern Wisconsin. This improved efficiency of operations attributed to CR 595 would have a secondary positive impact on the general public that hunts, fishes, gathers, and otherwise enjoys recreation on the thousands of acres of timber company lands open to public use through the Commercial Forest Act (CFA) designation on most of these properties. If the production and harvest of timber becomes so inefficient due to poor access, lands could be sold and the right of the public to recreate on these lands may then be lost.

The primary timber producing companies in northwest Marquette County were asked for input to document their need and level of predicted use of CR 595. Plum Creek Timber Company, J.M. Longyear LLC, GMO, and Holli Forest Products provided data that is depicted in Table 3-1.

Table 3-1. Timber Company Activities and Annual Estimated Level of Use for CR 595.

Activity or Factor	Anticipated Level of Use (Round Trips)				Totals
	A*	B	C	D	
Land and Timber Management Trips per Year by Landowner or Contractors	210	50	345	50	655
Timber Harvest Traffic (i.e. Service and Equipment Mobilization)	110	20	80	25	235
Logging Contractor Employees Daily Access Trips per Year	250	100	1,200	100	1,750
Total Trips per Year to Service or Manage Timber and Timber Harvests	570	170	1,625	175	2,640
Average Annual Timber Harvest (acres)	1,800	250	2,000	200	4,250
Average Number of Loads of Timber Annually	900	100	860	200	2,060
Reduction in Loads Hauled Through Marquette Annually	230	20	834	200	1,284
Approximate Number of Logging Contractors Involved in Timber Harvest	4	2	5	1	9-12
Approximate Number of Trucking Contractors Involved in Timber Harvest	20	4	15	1	35-40
Approximate Number of Maintenance/Service Companies Serving Timber Contractors	6	2	5	2	6-15
Estimated Reduction of Annual Miles for Timber Transport Trucking Only	54,000	5,000	43,000	10,000	112,000
Reduction in Average Cycle Time for Trucking Contractors to Haul Timber to Market Destination/Yards (hours)	2	1.5	2	1	--
Reduction in Fuel Cost and Gallons @ $4.00/Gallon	$72,000 18,000 gallons	$7,000 1,600 gallons	$49,200 12,300 gallons	$11,200 2,800 gallons	$139,400 34,700 gallons
Reduction in Loads of Timber Hauled Through L'Anse Annually	200	0	0	0	--

*Company names have not been included for proprietary reasons; companies responding with this information are listed as A, B, C, or D.

There is substantial traffic associated with timber management and harvest in northwest Marquette County. As shown in the first three rows of Table 3-1, travel on CR 595 associated with workers accessing their work sites in this area (not including the hauling of harvested timber) would amount to an estimated 2,640 round trips per year, most of which must presently travel on CR 510 or CR 550 and through Marquette. Add to that the 2,060 loads of timber hauled out of the woods from the northwest part of the county on an average

annual basis as well as the reduction of about 1,284 loads that now travel on CR 550 and through the City of Marquette, and the significance of CR 595 is evident.

Table 3-1 provides data on the annual impact of the timber industry on the economy of Marquette County and surrounding areas and the potential benefit of CR 595. The four largest timber companies in Marquette County provide employment for the following:

- An estimated nine to 12 logging contractors, with each logging contractor having multiple employees;

- An estimated 35 to 40 trucking contractors to haul the timber out of the woods and to market destinations, with each trucking contractor having multiple employees;

- An estimated six to 15 service companies that provide fuel delivery, equipment maintenance, and other supplies to the logging and trucking contractors in the field. There are many more businesses that support the logging and trucking contractors and benefit from their business, such as logging equipment dealers, truck dealerships, and automobile and truck parts/supplies stores, etc.

The annual reduction in miles traveled, the gallons of fuel saved, and the associated cost savings shown in Table 3-1 if CR 595 is constructed are significant. About 112,000 miles of truck travel will be saved annually if CR 595 is built, at a savings of 34,700 gallons of fuel at $4.00 per gallon that would cost about $139,000. Not only are the costs associated with this truck travel savings important, but also significant are the thousands of hours that trucks would not have to be on the road to haul the same amount of timber. In addition, the miles of travel saved and the reduced fuel consumption by pickup trucks and other vehicles accessing logging operations by being able to use CR 595 would be substantial, although not quantified in this report.

The proposed CR 595 is extremely important to the timber companies and those dependent on the logging industry, with the primary benefit being the overall reduction in hauling distance to get the forest products to markets/yards. Making trucking more efficient is extremely important to the operation of the timber product trucking industry and the long-term success of the timber companies.

Presently there is no direct road access to the south from the Yellow Dog Plains for timber companies to transport timber from the north part of Marquette County to markets. When timber lands generally north of the Yellow Dog River are harvested, the timber must be hauled out on Triple A Road, Ford Road, or Northwestern Road either east to CR 550 through Marquette or west through Baraga County to L'Anse, a long and difficult route. CR 595 would provide the best route south to US-41 connecting the timberlands in the north part of Marquette County more directly to markets and timber yards (Figure 3-1).

In summary, the timber industry has the most substantial long-term need for CR 595. Timber production, especially hardwoods, takes decades to grow to a point where harvest is possible and profitable. The long-term viability of the timber industry in northwest Marquette County will be strongly benefitted by CR 595 with improved access as well as avoidance of hauling thousands of loads of timber through residential and commercial portions of the County each year.

3.01.C. Emergency Medical Services Benefits of CR 595

The proposed CR 595 is not needed simply for economic reasons; there is a demonstrable need for improved access to northwest Marquette County for emergency access for fire control, emergency medical services, search and rescue, and for recreational access. There is a significant timber resource in northwest Marquette County, and fire suppression as provided by the MDNR is critical to protecting these resources. In addition, providing better firefighter and emergency access to camps in the area is an important benefit. According to the Bureau of Labor Statistics, logging is the second-most dangerous occupation in the United States and truck driving is the ninth-most dangerous occupation (US Department of Labor 2010). Emergency services are frequently needed to respond to accidents in northwest Marquette County.

Emergency personnel response times to northwest Marquette County are a critical consideration for protection of the public health, safety, and welfare. There are multiple responding locations for Emergency Medical Services (EMS), fire, and law enforcement for calls from northwest Marquette County and therefore response times vary.

Bell Hospital EMS provides services for the portion of Marquette County west of the Michigan State Police Post, including Michigamme, Champion, Ishpeming, and Ely townships. Bell Hospital EMS is responsible for responding to emergencies at the Eagle Development Project. Bell Hospital in Ishpeming has four transport ambulances and one non-transport ambulance and the service is staffed 24 hours a day, seven days a week with professional EMS personnel. This professional on-site staffing can be critical in the case of life-saving calls where time saved can result in a life saved.

According to Don Manty, Director of Emergency Medical Services for Bell Hospital, CR 595 would fill a significant need for responding to EMS calls in northwest Marquette County. Responding to emergencies during the winter would be especially aided by CR 595 due to the shorter distance that snowmobile units with rescue sleds would have to travel from accident sites to reach an ambulance waiting on CR 595. Logging accidents are frequent in northwest Marquette County and requests for assistance from recreationists are also common. CR 595 would significantly enhance response time for EMS in this area.

Presently if a 9-1-1 call for assistance comes in to Central Dispatch for an emergency in northwest Marquette County, an EMS unit would likely be dispatched from the station in Big Bay, which is 20-30 minutes response time to Eagle Development Project (according to the Marquette County Emergency Management Coordinator). The Eagle Development Project is the most likely location for future emergency calls due to the nature of the activity there and the large number of people that are presently working there, or will be employed there when the facility is operational. CR 595 would not decrease this response time for EMS responding from Big Bay; but if additional assistance is needed, EMS would presently be dispatched from Marquette or Ishpeming.

CR 595 would allow 24/7 response from Bell Hospital EMS with a similar response time as Big Bay, and if Big Bay EMS is on another call and not available then Bell Hospital would be able to respond with a similar response time as Big Bay. Return time to Bell Hospital is less than the time to Marquette General Hospital. Presently the response time from Bell Hospital through Marquette to the Yellow Dog Plains is about 90 minutes. Response time on CR 595 from Ishpeming is estimated to be 30 minutes. However, if there is an accident in northwest

Marquette County and multiple EMS units are needed, then CR 595 would be critical for EMS units from Bell to respond and transport victims to Bell Hospital.

In summarizing the benefits of CR 595 for emergency services, it is not the emergency services that benefit, but the people that are being served by the EMS personnel that will benefit. Improving public safety is a critical reason for building CR 595, as shown in this assessment. CR 595 can reduce response times to a substantial area of Marquette County, which may ultimately save human life.

3.01.D. Benefits of CR 595 for Fire Response

CR 595 would provide much improved fire department access for Champion, Humboldt, and Michigamme departments to portions of their townships. Small forest fire containment and structure fire response to the Yellow Dog Plains would come primarily from the fire station in Big Bay, with a response time of 30 minutes to Eagle Development Project as a central location (according to the Marquette County Emergency Management Coordinator). MDNR is the agency charged with fighting forest fires and would be called on any forest fire and, according to MDNR Forest Management Division, would have a response time from the MDNR office west of Ishpeming to the Yellow Dog Plains of 70 to 90 minutes, depending on the fire location and equipment responding. If MDNR fire fighters are on another fire, which is frequently the case during peak spring fire season, or if a call comes when staff are not at the MDNR Field Office, response time could be even longer. Response time also is dependent upon the type of equipment. Many of the MDNR trucks are older army surplus vehicles and are relatively slow; response with pickup trucks is faster; however pickup trucks only transport equipment for manual fire suppression.

According to MDNR Forest Management Division, CR 595 would reduce fire fighter response time to the Yellow Dog Plains from the MDNR Ishpeming office to about 45 minutes. The proposed road would also facilitate access for fire fighters to other areas of Marquette County to the north, such as Northwestern Road, and would provide quicker access to some of the lands south of the Huron Mountains.

Forest fire response time can be essential to the success of containing a forest fire, especially in the jack pine plantations common in the Yellow Dog Plains. CR 595 would decrease the average response time for MDNR forest fire personnel to northwest Marquette County by about 50 percent.

As noted by MDNR Forest Management Division, one negative impact of the proposed CR 595 will be that more people may be able to access northwest Marquette County for recreation, which may result in more forest fires, more search and rescue calls, and more EMS calls to this region of the county. MDNR forest fire budget and employee levels have steadily declined and fewer fire fighters are available to fight forest fires. However, the benefits of the improved access for fire fighters outweigh the detriments of having more people in the woods.

Backup units for structure fires in northwest Marquette County presently have to come up CR 550 from/through Marquette and, depending on the location responding, would have at least a 45-minute response time to assist. Given this delayed response time, calls for backup must go out as soon as the situation warrants additional help to avoid fires from getting out of control and becoming threats to other structures, timber resources, or people.

The benefits of improved access for fire fighters would mainly be to protect timber investment because of the relatively sparse density of residential structures northwest Marquette County. Timber resources are substantial and fire protection is vital. However, having a reasonable response time to fight structure fires is also important.

3.01.E. Benefits of CR 595 for Law Enforcement

Requests for assistance for law enforcement (i.e. Sheriff in Marquette and Michigan State Police in Negaunee) from northwest Marquette County would have a response time of up to one hour (according to the Marquette County Emergency Management Coordinator). Comments regarding the proposed CR 595 were requested from the Michigan State Police and the Marquette County Sherriff's Department. Their comments are provided below.

Michigan State Police

Michigan State Police has a Post east of Negaunee on US-41. According to the State Police, the proposed CR 595 would not have any detriments to State Police services and operations, but CR 595 would be a definite asset to them for north-south access. Presently if a State Police unit is in the west end of Marquette County and receives a call for the Big Bay area and no other units are available to respond, the officer must travel through Marquette and up CR 550 to respond to the call. There are only a limited number of road patrols during certain times of the day. If CR 595 was available, the route would be used when response is needed in northwest Marquette County, which could reduce State Police response time by over an hour.

MCRC requested a Finding of Necessity for CR 595 from the Michigan Department of State Police. A letter from the Commander of Traffic Safety Division dated July 18, 2011 indicated that *"the construction of CR 595 will almost certainly increase traffic safety by creating a more uniform and efficient traffic flow on County Road 550 and along the US-41/M-28 corridor through the Cities of Marquette, Negaunee, and Ishpeming."* The letter is provided in Appendix G.

Marquette County Sheriff

Marquette County Sheriff Mike Lovelace and his staff provided the following information (shown in *italics*) regarding the need for CR 595 and the positive effects the road would have on serving the northwest part of Marquette County. The following italicized paragraphs were only edited for punctuation and formatting.

"Enhancement number one would be the effective and efficient response to any and all incidents, accidents, forest fires, floods, other emergencies and natural disasters in the remote northwestern portions of Marquette County that we did not previously possess. Currently we have to respond via two-track roads with front wheel drive patrol cars, four-wheel drive patrol trucks, ATVs, dirt bike, or on foot with Deputies and/or Search and Rescue volunteers.

"During the winter we would probably have to respond with snowmobiles on the State-maintained snowmobile trails in order to get anywhere as the seasonal roads are not plowed during the winter. Less time in a rescue sled being towed by an ATV on a rough two-track road or trail, or by a snowmobile in the winter with more time spent in an ambulance on

paved roads greatly enhances the chances for a victim's survival. I remember quite some years ago a plane crashed west of Ishpeming Township on approach to the old Marquette County Airport and the only access was on foot by our Deputies and Search and Rescue Team. Obviously a paved county road in this area of the county would only enhance our service to the people we are sworn to protect and serve. Fuel and other operating costs, deputies working hours, and wear and tear on our patrol vehicles will be greatly reduced.

"The second enhancement deals with the elimination of heavy haul truck traffic that would exist on County Roads 510, 550 and US-41/M-28 through the cities of Marquette, Negaunee, and Ishpeming if this road were not (obvious error in that the Sheriff means to say if the road were constructed) to be constructed. Heavy haul truck traffic through these areas would not only be a nightmare for citizens each and every day but also put a tremendous strain on all of the counties already minimally-staffed law enforcement agencies, not just ours, thus maintaining our current level of safety without this increase in traffic.

"The third enhancement deals with the evacuation/access of the northern portion of Marquette County. We had a flood several years ago that took out the bridges on County Roads 510 and 550, virtually cutting off the town of Big Bay from all essential services and goods. Due to the length of the emergency, people began to ship goods and people via boats on Lake Superior back and forth from Big Bay to Marquette and vice-versa. No one could access civilization unless they drove hours through the woods to L'Anse or Skanee on two-track roads. Having the proposed new county road would now allow access to Marquette County and anywhere beyond via U.S. 41 not driving the 4 to 5 hours to Baraga County.

"The current response time to calls for service in the Yellow Dog Plains area depends on the location from where the responding unit is in the county when the call is received. If the unit is in Big Bay or on CR 550, it would be 20 minutes with the current road as it is. If it's in Marquette area, the response time would be approximately 35-45 minutes. All response times are dependent on weather and road conditions at the time. If you're anywhere outside of Marquette city you can add 20-40 minutes to the above-referenced time.

"For the Michigamme Township Officer, who only works day shift Tuesday through Saturday, traveling from the Village of Michigamme to the main gate at Eagle Mine, it's 80 miles and approximately 1 hour and 40 minutes in good driving conditions using US-41 to Wright Street in Marquette, CR 550 to CR 510 to the road known as the Triple A, to the main gate. If an incident occurs beyond the gate anywhere on the AAA/Ford Road/Anderson Corners and beyond, time would be much longer. If you take US-41 to CR 502 (Midway Drive) to CR 510 to the AAA to the gate your miles reduce but because of the dirt road and construction of the road, the time is about the same depending on road conditions. If you take US-41 to Cooper Lake Road to Deer Lake Road to the Red Road to CR 510 to the Triple A Road to the gate, the miles are in between the two listed above but the road type is gravel, twisty, and dirt and the time is about 1 hour 30 minutes. You must also keep in mind that our remaining deputies are only on duty from 8 a.m. to 2 a.m. as the Michigan State Police work midnight shift for us.

"All police, fire and EMS response would be greatly enhanced. As listed above, if there was a Class A paved road and is as straight as possible then the time would be cut by 1/2 to 2/3 the time that it now takes. If a crash with a car, snowmobile, ORV, truck, etc. then the current response time is as stated above, but with the CR 595 road, we can get equipment there in half the time and the chances of saving a life increases greatly. Boaters, lost

hunters, skiers, and hikers can expect a much quicker response and life saving is greatly enhanced. Just being able to cut travel time would allow us to cover more area in less time.

"This road will obviously be used for recreational access to those areas of the county that residents may have previously had very little access. They will be hunting, fishing, hiking, skiing, mountain biking, camping, and who knows what else (Meth Labs?). These individuals WILL at some point become lost, injured, or deceased. My Search and Rescue Team is an invaluable tool that WILL be called out to rescue all types of individuals recreating in this newly-opened area. All of the previously mentioned enhancements will hold true for them also. Faster response time to the incident scene means faster discovery and/or recovery."

Sheriff Lovelace also indicated that the Sheriff's Deputy assigned to the west end of the county (presently funded by KEMC) will patrol CR 595 on a daily basis. Therefore, enforcement of posted speed limits will be conducted.

The benefits of improved access on CR 595 for law enforcement to northwest Marquette County focus on search and rescue and coordination in time of emergencies such as natural disasters (forest fires, flooding, etc.). Although law enforcement officers enforce civil and criminal laws, that activity would not be the primary reason for building CR 595. Public safety is the prime consideration.

3.01.F. Benefits of CR 595 for Access to Northwest Marquette County in a Flood Emergency

As stated in this document, there is a demonstrated need for a second public road access, not only to the Eagle Development Project but also to northwest Marquette County, in case catastrophic weather conditions, fire, or flooding prevent the use of CR 510 or Triple A Road for emergency access to the area. With the large number of people that will be employed at Eagle Development Project, assured emergency access is a necessity. A second public road access is also needed west of Silver Lake Basin in order to provide a reasonable route to northwest Marquette County that is not downstream of the impoundments on the Dead River.

The MCRC has provided documentation of permits issued by the MCRC for hauling heavy equipment during a time when weight restrictions are in effect or for oversize loads associated with emergency repair and maintenance of dams on the Dead River (Appendix J). These permits issued over a 10-year period beginning in 2001 are provided to illustrate the need for an alternate primary county road route upstream of the dams on the Dead River. Situations with the dams that necessitate road closures downstream of the dams when alternate road access to the areas north of the Dead River is needed will definitely occur over time. CR 595 as proposed would provide such emergency access.

Flood emergencies are frightful, as the true power of nature is exhibited in a flood. To have people cut off from emergency services and the ability to obtain food, fuel, and other necessities is extremely problematic to the community. CR 595 would provide an access to northwest Marquette County that is upstream of the series dams on the Dead River in the event of a flood emergency. Copies of some newspaper articles from 2003 that described the flood emergency and associated damages are included in Appendix K.

3.01.G. Finding of Necessity for CR 595 by Michigan Department of Transportation

MCRC requested MDOT to provide comments on the necessity of CR 595 in the road transportation infrastructure in Marquette County. MDOT Director Kirk T. Steudle provided a response letter dated June 2, 2011 (Appendix B). In the letter, Director Steudle states, *"the department supports the MCRC finding that this proposed route is a necessity for providing vital commercial and access improvement benefits for the county."* This support from the director of the state department responsible for the transportation network statewide is important and provides further justification of the purpose and need for CR 595.

3.02 Public Trust

The construction of CR 595 will not impair the public trust or public use of the streams to be crossed. Michigan common law applies the term "public trust" primarily to promote and protect public uses of waterways. In this context, the construction of CR 595 will improve upon the public trust in that it will make waters accessible for public use that are not currently accessible or are difficult to reach. Road construction will not impair navigation since very few of the streams to be crossed are suitable for navigation and those that are will be crossed by bridges that will not interfere with recreational navigation.

In Michigan the concept of the "public trust" is derived from a common law doctrine applicable to "navigable" waters within the State. The doctrine has its origins in the Northwest Ordinance of 1787, which declared the navigable rivers of the territory to be public highways for travel. Upon statehood, Michigan was given ownership of the Great Lakes and of the navigable waters, all subject to the right of navigation.

Early on in Michigan's history, conflicts developed between loggers and land owners over who had the right to use streams to float logs to market. The Michigan Supreme Court developed a log flotation test which relies upon use or capability of use for commercial logging as the basis for the test for navigability. The commercial logging test determines those waters impressed with the public trust since the public trust applies to navigable waters. The common law log flotation test continues to be the law today. In practice, determining which waters are navigable and impressed with the public trust on small isolated streams is often difficult. Later case law expanded the public trust to include the right to hunt and fish and, more recently, the right to walk Great Lakes beaches lakeward of the ordinary high water mark.

It is clear some of the streams to be crossed by the CR 595 route are navigable. Some of the smaller streams are more difficult to determine navigability. There are some streams that are proposed to be crossed by CR 595 that are clearly too small to meet the test of navigability: those are private streams with no public rights of use. The purpose of this application for permit is not to determine which streams are navigable and which are not. This application for permit seeks to build a road that involves stream crossings, some of which involve streams impressed with the public trust. In all cases this application for permit treats streams as though they are public and seeks to avoid any interference with potential public use.

The CR 595 application for permit is made under three separate statutes: The Wetlands Protection Act (Part 303 of the Michigan Environmental Protection Act ("NREPA"); Part 301 of NREPA (the Inland Lakes and Streams Act); and Part 31 of NREPA (Water Resource Protection). Parts 303 and 31 do not reference the public trust or implicate it as a permitting

standard. The Rules under Part 301, MCL 324.30101, *et seq*., more broadly define the public trust than does the common law. Specifically:

> R281.811
>
> Rule 1. (1)(g) "Public trust" means all of the following:
> (i). The paramount right of the public to navigate and fish in all inland lakes and streams that are navigable.
> (ii). The perpetual duty of the state to preserve and protect the public's right to navigate and fish in all inland lakes and streams that are navigable.
> (iii). The paramount concern of the public and the protection of the air, water, and other natural resources of this state against pollution, impairment, and destruction.
> (iv). The duty of the state to protect the air, water, and other natural resources of this state against pollution, impairment, or destruction.

Applying even these broader "public trust" standards to the construction of CR 595 does not present an obstacle to issuing the permit. The public's right to fish and navigate navigable streams will not be impaired. The road will improve access to many streams, allowing the public to more easily enjoy the opportunity to fish the streams. The road design will not interfere with stream navigation. And it will, in some instances, replace inadequately-sized culverts or bridges with larger structures, thereby allowing for the free flow of waters. Larger streams will be crossed with clear-span bridges that will not interfere with stream use and will provide wildlife passage along the stream banks.

Whether or not some streams within the project area are not navigable or public. this application for permit has treated all streams as though they are public and designed to protect existing and future public uses. Care has been used in the design of road crossings to protect stream flow and control stormwater runoff from the roads to avoid direct discharge into streams. The design has been created to minimize impacts on the natural resources of the area. The new and replaced stream crossings will not pollute or impair the waters they cross.

Existing stream crossings will be reconstructed at 15 of the 22 proposed stream crossing locations on the proposed CR 595. When existing stream crossings are removed and replaced with clear-span bridges or box culverts much larger than the existing bridges or culverts, the stream habitat and aquatic life will benefit substantially. The design of the new crossings and structure sizes will serve to minimize negative effects of the crossings, which is the purpose of the application of various aspects of Stream Simulation Methodology that were implemented for this project as described later in this document.

3.03 Transportation and Traffic

3.03.A. Transportation

The transportation analysis presented in this section evaluated data from several routes. The routes are:

- **CR 550 Route**: This route begins on Triple A Road at the Trail 5 intersection and proceeds on Triple A Road to CR 510, then on CR 510 to CR 550, then on CR 550 to

Sugar Loaf Avenue, then to Wright Street, then westerly on Wright Street to US-41, then on US-41 westerly to the intersection with CR FY. The CR 550 route is about 60 miles in length.

- **CR 510-Red Road-Sleepy Hollow Route**: This route begins at the same location as the CR 550 route on Triple A Road, but proceeds southerly on CR 510 to Red Road, then on Red Road to the intersection with Sleepy Hollow Road, then westerly to Wolf Lake Road, then southerly to US-41 at the intersection of CR FY. The CR 510-Red Road-Sleepy Hollow route is about 41 miles in length.

- **Proposed CR 595 Route**: This route begins at the intersection of Trail 5 and Triple A Road and proceeds generally southerly, mostly on Trail 5, to Wolf Lake Road, then with several reroutes southerly to US-41 at CR FY. The proposed CR 595 route is about 21.4 miles in length.

The following analysis is based on information contained in the Woodland Road application for permit, 2009 traffic count data provided by MCRC recorded from May through July, and the 2009 MDOT Annual Average Daily Traffic (AADT) data. Average Daily Traffic (ADT) and average speed for the 85th percentile speed from automatic traffic recorders were obtained for locations along the proposed segments and select north-south segments and are summarized in Table 3-2. MCRC does not utilize GPS to locate automatic traffic recorders; therefore, the approximate locations of automatic traffic recorders are based on descriptions provided with the data set and are shown in Figure 3-2. Traffic count data was recorded by MCRC at seven locations along the CR 550 route, three locations along the CR 510-Red Road-Sleepy Hollow route, and one location along the CR 595 route. It should be noted that the traffic count data was not gathered for the purpose of the CR 595 assessment.

MDOT AADT for US-41 is shown in Table 3-3. MDOT AADT was recorded along a specific reach of US-41 but the actual counter location was not provided. Therefore, approximate locations of automatic traffic recorders are based on descriptions provided with the data set and are shown in Figure 3-2. Traffic count data was recorded by MDOT at 12 locations along the CR 550 route.

Table 3-2. Average Daily Traffic and Speed Data for Routes within the Study Area.*

Route	Station Number[1]	Traffic Counter Location	Average Daily Traffic	Speed 85th Percentile (mph)
CR 550	1	CR 550 East of CR 510 (Near Big Bay)	1,403	57.5
CR 550	2	CR 550 North of CR 510 (Near Big Bay)	1,449	58.1
CR 550	3	CR 550 North of CR HG (North of Marquette)	2,540	52.6
CR 550	4	CR 550 at Marquette City Limits	3,077	49.3
CR 550	5	CR 550 Southeast of CR HG (Near Marquette)	2,966	49.3
CR 510-Red Road-Sleepy Hollow Road	6	CR 510 at CR 550 (Near Big Bay)	209	39.3
CR 510-Red Road-Sleepy Hollow Road	7	CR 510 Southeast of Triple A Road (Near Eagle Development Project)	251	38.2

Table 3-2 (continued). Average Daily Traffic and Speed Data for Routes within the Study Area.*

Route	Station Number[1]	Traffic Counter Location	Average Daily Traffic	Speed 85th Percentile (mph)
CR 550	8	Wright Street (CR 492) East of Forestville Road (CR HD)	5,603	57.7
CR 550	9	Wright Street North of US-41 (West of Marquette)	630	31.9
CR 550	10	New CR 492 North of US-41 (West of Marquette)	5,262	32.9
CR 550	11	Wright Street (CR 492) South of CR HD (West of Marquette)	6,001	48.9
North-South	12	Forestville Road (CR HD) North of CR 492 (North of Marquette)	757	44.9
North-South	13	Forestville Road (CR HD) at Railroad Tracks (West of Harlow Lake)	108	N.A.
North-South	14	Forestville Road (CR HD) South of CR HD Bridge (West of Marquette)	378	33.8
North-South	15	Deer Lake Road (CR 573) South of CR SU	869	47.7
North-South	16	Deer Lake Road (CR 573) North of CR GU (South Camp Road)	632	49
North-South	17	Deer Lake Road (CR 573) North of Cooper Lake Road (CR GP)	1,018	49.5
North-South	18	Deer Lake Road (CR 573) South of Cooper Lake Road (CR GP)	751	50.8
North-South	19	CR 578 at Carp River Crossing	863	37.9
North-South	20	Cooper Lake Road (CR GP) North of US-41	915	44.1
North-South	21	Deer Lake Road (CR 573) Between CR GM and CR GO	243	37.7
North-South	22	Deer Lake Road (CR 573) North of CR GQ	292	54.9
North-South	23	Cooper Lake Road (CR GP) South of Deer Lake Road (CR 573)	384	33.9
North-South	23	Cooper Lake Road (CR GP) South of Deer Lake Road (CR 573)	384	33.9
North-South	24	Gold Mine Lake Road (CR CL) North of CR 496	392	34.1
North-South	24	Gold Mine Lake Road (CR CL) North of CR 496	392	34.1
North-South	25	CR 496 West of CR 478	563	44
North-South	25	CR 496 West of CR 478	563	44
North-South	26	CR 496 East of CR 478	297	43.4
North-South	26	CR 496 East of CR 478	297	43.4
North-South	27	CR 478 South of CR 496	464	28.9
North-South	27	CR 478 South of CR 496	464	28.9
Red Road-Sleepy Hollow	28	Wolf Lake Road (CR AX) at Railroad Crossing	145	43.6
Red Road-Sleepy Hollow	28	Wolf Lake Road (CR AX) at Railroad Crossing	145	43.6

*Source: Marquette County Road Commission, 2009

1- Station number corresponds to locations shown in Figure 3-2.

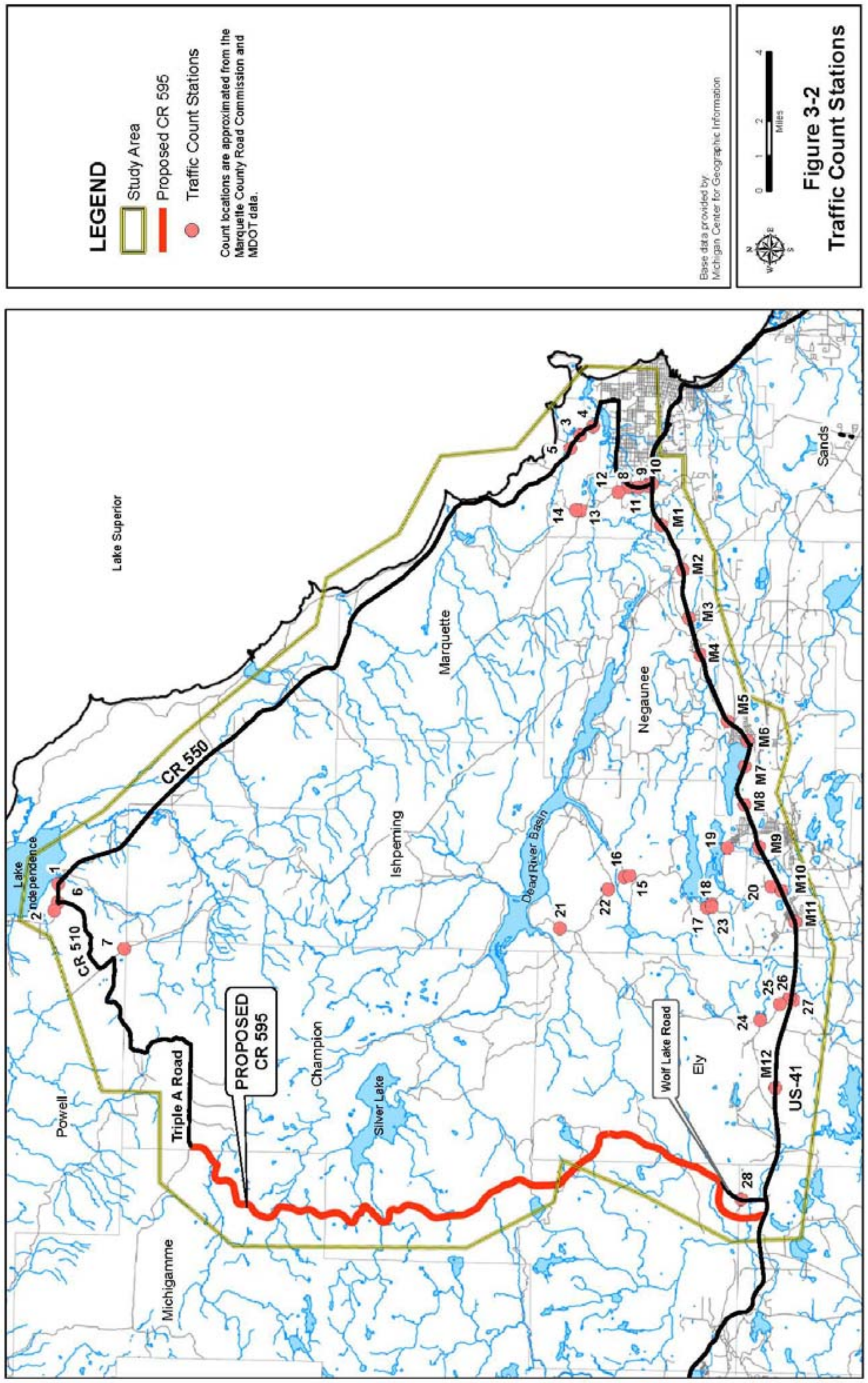

LEGEND
Study Area
Proposed CR 595
Traffic Count Stations
Count locations are approximated from the Marquette County Road Commission and MDOT data.
Base data provided by: Michigan Center for Geographic Information
Miles
Figure 3-2
Traffic Count Stations
Lake Superior
Lake Independence
CR 510
CR 550
Powell
Michigamme
Champion
Ishpeming
Marquette
Negaunee
Ely
Sands
Triple A Road
PROPOSED CR 595
Silver Lake
Dead River Basin
Wolf Lake Road
US-41

Table 3-3. Annual Average Daily Traffic Along US-41 Within the Study Area*.

Station Number[1]	US-41 Reach	AADT Passenger Vehicles	AADT Commercial Vehicles
M1	Wright Street to CR JPC	31,665	498
M2	CR JPC to "divided road"	18,110	498
M3	"divided road" to M-35	16,174	498
M4	M-35 to Negaunee City Limit	16,391	511
M5	Negaunee City Limit to Baldwin Ave.	16,865	511
M6	Baldwin Ave. to M-28 E. Junction	18,128	511
M7	M-28 E. Junction to Ishpeming City Limit	16,370	501
M8	Ishpeming City Limit to Second St.	17,420	501
M9	Second St. to Lakeshore Dr.	15,280	501
M10	Lakeshore Dr. to North Lake Dr.	14,205	501
M11	North Lake Drive to Westwood Dr.	10,192	381
M12	Westwood Dr. to M-95 Junction	5,598	381

*Source: MDOT, 2009.
1- Station number corresponds to locations shown in Figure 3-2.

In 2009 an estimated 80% of workers in Marquette County drove to places of employment alone, 10% carpooled, 1% took public transportation, 7% used other means, and the remaining 2% worked at home. The average commute was 17.5 minutes (ACS, 2009).

3.03.B. Traffic Volume: Existing

Road systems outside the city limits in Marquette County consist of state/federal trunk line highways, primary county roads, and local county roads. All-season roads within the study area primarily run east-west rather than north-south. The primary east-west route within the study area is US-41. Major primary county roads include; CR 492, CR 573, CR 510 and CR 550. By state law, MCRC is 100% responsible for maintenance and construction of the primary county road system. The local county roads within the study area are township roads such as Triple A, CR HK and CR CL. MCRC maintains these roads at its cost and improvements and reconstruction of these roads are done in partnership with the townships (Marquette County, 2008).

The highest levels of ADT were recorded on primary county roads CR 550 and CR 492 located near the City of Marquette (Table 3-2). With the exception of CR 573, ADT on north-south routes west of the City of Marquette and north of US-41 was generally under 1,000 vehicles per day. The US-41 segment that is part of the CR 550 route exhibited an ADT of approximately 16,300 vehicles, of which approximately 3% (ADT 483) were commercial vehicles (Table 3-2). The primary and local county road segments of the CR 550 route exhibited an ADT of 3,215 vehicles. The primary and local county road segments of the CR 510-Red Road-Sleepy Hollow route exhibited an ADT of 163 vehicles. The primary and local county road segments of the proposed CR 595 route exhibited an ADT of 145 vehicles.

The 85th percentile speed is the speed at or below which 85 percent of vehicles travel. Traffic studies indicate that the 85th percentile speed most closely conforms to a speed limit

which is considered safe and reasonable (Rawson, 2011). State law sets speed limits on most rural county roads at 55 mph, or is set at the 85th percentile. Highest speed for 85 percent of vehicles counted along a roadway was recorded on CR 550 between the City of Marquette and Big Bay, and also along CR 492 east of Forestville Road (Table 3-2).

3.03.C. Traffic Volume: Future

The projected increase in traffic volume on the other routes studied is shown in Table 3-4. Projections are based on expected increases in volume of large trucks and passenger vehicles associated with the expansion of ore mining and forestry industries. The projections also assume that the route evaluated would be the primary route for secondary vehicles including employees, contractors, and ancillary services associated with business operations.

Table 3-4. Projected Change in Average Daily Traffic in Marquette County Within Study Area.

Route	Existing ADT[4]	Projected Increase in ADT (Ore Transport)[1]	Projected Increase in ADT (Secondary Vehicles)[2]	Projected Increase in ADT (Timber Transport)[3]	Total Projected ADT	Total Projected Change
CR 550	3,538	104	174	15	3,831	293
CR 510-Red Road-Sleepy Hollow	230	108	174	15	527	297
CR 595	145	112	174	15	446	301
US-41	16,367	104	174	15	16,660	293

1- URS Transportation Study 2010
2- Estimate provided via personal communication Bob Nelesen URS 2010
3- *Supporting Documentation* - Woodland Road Application for Permit
4-MDOT annual average daily traffic from US-41 and CR 492 junction to US-41 and M-95 junction

If implemented, the CR 510-Red Road-Sleepy Hollow route would experience an increase in ADT of 297 additional vehicles. The CR 550 route would experience an increase in ADT of 293 additional vehicles if it was implemented. If CR 595 is the selected route, there would be an increase in ADT of 301 additional vehicles. However, if CR 595 is constructed it is expected that there would be a decrease in existing truck traffic on CR 550 and CR 510. Presently about 1,700 round trips are made by logging trucks on CR 550 and CR 510 during the eight months of the year when most timber is hauled. A majority of this truck traffic would use CR 595 instead of CR 550 or CR 510, thus substantially reducing existing hauling on these routes.

Commuter Traffic

The majority of daily traffic consists of commuting to and from places of work. Of workers 16 years of age or older, an estimated 90% of Marquette County residents utilized a car, truck or van to commute to work (Table 3-5). An estimated 80% of those workers drove alone. Public transportation was used by only 1% of the population to commute to work. An estimated 7% of workers walked or used other means such as bicycles and motorcycles to commute to and from work. The estimated average time of commute was 17.5 minutes (ACS, 2009).

Table 3-5. Mode of Transportation and Estimated Number of Workers 16 Years of Age or Older Who Commute to Work in Marquette County.

Mode of Transportation	2009 Estimates	Percent
Car, truck, or van -- drove alone	24,635	80%
Car, truck, or van -- carpooled	3,178	10%
Public transportation (excluding taxicab)	187	1%
Walked	1,527	5%
Other means	613	2%
Worked at home	656	2%
Total Workers 16 years and older	**30,796**	**100%**

Source: American Community Survey, 2009

Mass Transit

Marquette County Transit Authority (MARQ-TRAN) was created in 1985 through the consolidation of three public transit systems within Marquette County. MARQ-TRAN currently makes transit services available to all Marquette County citizens, providing both fixed-route and demand-response service. MARQ-TRAN operates a fleet of 36 vehicles, 7 days per week, with reduced schedule of operation on weekends (MDOT, 2009). In 2009, MARQ-TRAN logged 48,482 vehicle hours and serviced 298,595 passengers. MARQ-TRAN also provides ticketing for Indian Trails and Greyhound bus services (MDOT, 2009).

Water Transportation

The County of Marquette has two deep-draft harbors in the City of Marquette and a shallow-draft harbor in Big Bay. The two deep-draft harbors, the Lower Harbor and Presque Isle Harbor, provide commercial and recreational docking facilities. The Harbor of Refuge in Big Bay is for recreational purposes only (Marquette County, 2008). The Presque Isle Harbor is the primary harbor for commercial and industrial use, receiving deliveries of coal for the production of electricity at the nearby Presque Isle Power Plant. In addition, the Lake Superior and Ishpeming Railroad (LS&I) railroad delivers iron ore pellets to the Presque Isle Harbor ore dock for off-loading onto commercial vessels (Marquette County, 2008). Coal and limestone are delivered to the Lower Harbor dock (Shiras Power Plant).

Railroads

Historically, railroads were the primary transportation vehicle for forest products. Presently, only two railroads operate in Marquette County. LS&I is a short-haul line from the Tilden Mine to the LS&I Ore Dock in the Presque Isle Harbor in the City of Marquette. The LS&I operates a rail yard at Eagle Mills in Negaunee Township. As of 2010, the primary business of the LS&I remains the transport of iron ore over a 16-mile short line from the Empire-Tilden Mine, operated by Cliffs Natural Resources, located south of Ishpeming, to the ore dock at Presque Isle Harbor.

In 2001, the Canadian National Railroad (CN) purchased the Wisconsin Central Railroad and operates a track from L'Anse to Gladstone, Michigan. CN transports ore from the Empire Mine to its ore dock in Escanaba. In addition, CN transports forest products to locations within the Upper Peninsula (Marquette County, 2008).

MDNR utilizes abandoned railroad rights-of-way for the development of interconnected trail systems throughout the state (Marquette County, 2008).

Airport

In 1999 Marquette County Airport was moved from Negaunee Township to the former K.I. Sawyer Air Force Base. The new airport is now called the Sawyer International Airport. The Sawyer International Airport serviced a total of 133,681 passengers in 2007, an increase of 1,512 passengers, which is slightly more than a 1% increase as compared to 2006 (Marquette County , 2008). The Sawyer International Airport has increased its passenger counts for four consecutive years. Major road improvements to M-553 and M-94 have enhanced access to the airport (Marquette County, 2008).

Trucking

The shipment of raw material by trucks has become more common with the decline of the railroad system, and is expected to increase in importance with the commencement of Eagle Development Project ore mining operations. Estimates in excess of 50 round trips per day of ore trucks will be added to existing traffic volumes on primary county roads and US-41 depending on the selected route of truck traffic to and from the mine.

Other Transportation

An official bicycle route uses the shoulders of CR 550 from the Dead River to Sugar Loaf Mountain.

3.04 Public Perception

Public perception can be the most important consideration in the implementation of transportation infrastructure. Public opposition or support is important in determining design, location, timing, and use of a proposed route.

The Marquette City Commission (MCC) has expressed opposition to additional truck traffic along CR 550 and Wright Street citing noise, emissions, and conflict with school bus routes. Truck traffic has become a concern for residents of the City of Marquette and Big Bay. The MCC has considered placing additional restrictions on truck routes that are not already prohibited in certain historical sections of the City. The City of Marquette was recently awarded Transportation Economic Development Fund (TEDF) Category F grants to construct a half mile of new all-season roadway to create a north-south truck bypass route within the City via McClellan Avenue and improved access from US-41 and M-553 to County Road 550. This project only seeks to improve south-bound traffic on US-41 and would have little effect on the traffic that would be using the CR 550 route to access northwest Marquette County.

In addition, school bus routes for the Marquette Area Schools and Negaunee Public Schools extend onto CR 550. Conflict on those school bus routes between the buses and large trucks may pose a traffic safety concern in light of the projected increase of both large trucks and mining-related secondary vehicles.

Public opposition of the proposed CR 595 route has come from area residents and concerned members of environmental organizations. They have voiced concerns regarding impacts to natural areas, wetlands, and streams as a result of implementing that route.

Public support and endorsement of the CR 595 route has come from area residents also, as well as from area communities and municipalities including the Mayor of the City of Marquette; the Marquette County Board of Commissioners; Marquette City Commission; Marquette Township Board; many residents of the City of Marquette, as well as the Township Boards of Richmond, Republic, Humboldt, Champion, Ely, Michigamme, Ishpeming, Negaunee, and Powell townships. Regional support for CR 595 has come from trade unions, industry, and other governmental agencies as expressed by the various public information workshops and public hearings that have been held by MCRC for this project.

3.05 Level of Service

Level of Service (LOS) is a term used to qualitatively describe the operating conditions of a roadway based on factors such as traffic composition, speed, travel time, maneuverability, delay, and safety. LOS of a facility is designated with a letter, A to F, with A representing the best operating conditions and F the worst (Table 3-6). Perceptions of LOS impacts can be relative to the acclimation of a community to existing traffic conditions. A detailed LOS assessment includes road classification, vehicle composition, road configuration, number of access points, line of sight, signalization, number of lanes, shoulder width, turning movements, and a number of other variables. This type of assessment is necessary to determine whether LOS impact will occur as a result of the projected increase in traffic. In absence of this type of analysis, the opinion of traffic engineers from the local transportation authority is sufficient for this level of analysis.

Table 3-6. Level of Service Classifications for Roadways.

Level of Service	Description
A	Free flow with no delays. Users are virtually unaffected by others in the traffic stream. At signalized intersections, turning movements are easily made and all queues clear in a single signal cycle.
B	Stable traffic. Traffic flows smoothly with few delays. An occasional approach phase is fully utilized. Drivers begin to feel somewhat restricted within platoons of vehicles.
C	Stable flow but the operation of individual users becomes affected by other vehicles. Modest delays. Major approach phases fully utilized. Backups may develop behind turning vehicles.
D	Approaching unstable flow. Operation of individual users becomes significantly affected by other vehicles. Delays may be more than one cycle during peak hours. Queues may develop but dissipate rapidly, without excessive delays.
E	Unstable flow with operating conditions at or near the capacity level. Long delays and vehicle queuing.
F	Forced or breakdown flow that causes reduced capacity. Traffic demand exceeds the capacity. Stop and go traffic conditions. Excessive long delays and vehicle queuing.

Source: Transportation Research Board, Highway Capacity Manual 2000, National Research Council, 2000

MCRC believes that the perception of LOS in the Upper Peninsula is different than what would be found in more densely populated regions of Michigan (MCRC, 2011). The threshold at which LOS impairment may be perceived to occur is likely to be lower (MCRC, 2011). For instance, a local traffic pattern resulting in a “C-rated” LOS in Traverse City may

be perceived as a "D–rated" LOS in the City of Marquette, due to differences in user acclimation to local traffic volumes.

The majority of roadways within the study area exhibit LOS ratings of A and B (MCRC, 2011). The combination of daily and seasonal increases in local traffic can result in deterioration in LOS from B to C along Wright Street and Sugar Loaf Avenue within the City of Marquette (MCRC, 2011).

Based upon the above information, it is possible that a projected increase in traffic, including 293 vehicles of which 104 may be large trucks, could result in deterioration in LOS along Wright Street from C to D within the City of Marquette.

Implementation of the CR 550 route may negatively impact LOS within the City of Marquette. Neither implementation of the CR 510-Red Road-Sleepy Hollow route nor implementation of the CR 595 route will result in a significant LOS impact.

3.06 Safety

Crash statistics were obtained for Michigan and Marquette County from the Michigan State Police Office of Highway Safety Planning document entitled *2009 Michigan Traffic Crash Facts for County/Communities* (MSP, 2009). A total of 871 persons were killed and 70,931 persons injured in 290,978 reported motor vehicle traffic crashes in Michigan during 2009 (Table 3-7). Of those crashes, 806 were fatal, 52,283 were personal injury, and 237,889 were property damage only. Of all fatal crashes, 27.9 percent occurred at intersections. 34.4 percent of all fatal crashes involved at least one drinking operator, bicyclist, or pedestrian. Marquette County experienced a total of three persons killed and 460 persons injured in 2,025 total motor vehicle traffic crashes during 2009. In 2009 in Marquette County, only one fatality was alcohol-related as compared to four being alcohol-related in 2008.

Table 3-7. Total Number of Crashes Recorded in 2009 for the State of Michigan and Marquette County.

Location	Total Crashes	Fatal Crashes	Personal Injury Crashes	Property Damage Crashes	Persons Killed	Persons Injured
Marquette County	2,025	3	348	1,674	3	460
Michigan	290,978	806	52,283	237,889	871	70,931

Source: Michigan State Police Office of Highway Safety Planning document title 2009 Michigan Traffic Crash Facts for County/Communities

The highest numbers of vehicle crashes in Marquette County were associated with primary and local county roads, with the exception of vehicle crashes in construction zones, which were more prevalent on federal highways (Figure 3-3). Three-to-four times more accidents occurred as a result of deer than any other category. The second most frequent type of vehicle traffic crash involved a truck or bus, most of those occurring on primary and local county roads.

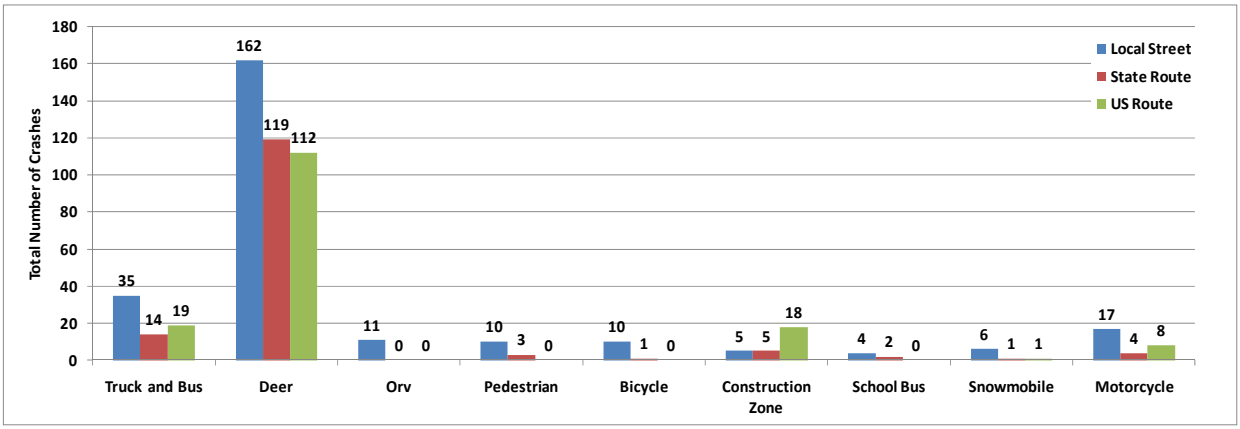


Figure 3-3. Total Number of Crashes for Motor Vehicles in Marquette County by Category and Type of Route.

Source: Statewide Totals for 01/01/2009 through 12/31/2009, Michigan State Police Criminal Justice Information Center, Crash Statistics, Number of Crashes Report

Collisions involving deer generated the highest number of crashes resulting in property damage. Collisions involving a truck or bus generated the second highest number of crashes resulting in property damage (Figure 3-4). Frequency of crashes involving personal injury was highest in collisions involving motorcycles (Figure 3-4). Collisions involving pedestrians, cyclists, construction zones, school buses and snowmobiles exhibited the highest rates of personal injury per crash. Of the three fatalities, one involved an ORV, one a motorcycle, and the third involved a vehicle colliding with a fixed object (please note that the "fixed object" fatality is not shown on figure 3.4).

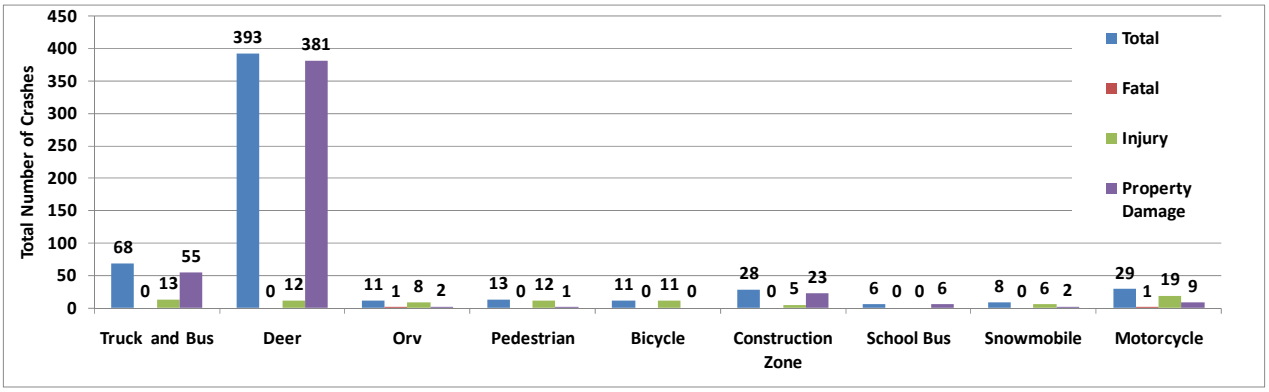


Figure 3-4. The Total Number of Crashes for Motor Vehicles in Marquette County by Category and Type of Injury.

Source: Statewide Totals for 01/01/2009 through 12/31/2009, Michigan State Police Criminal Justice Information Center, Crash Statistics, Number of Crashes Report

Presently the CR 550 route traverses the densest population and the highest traffic volume within the study area. These two factors can increase the probability of vehicular crashes involving pedestrians, bicycles, school buses, and motorcycles. Additional truck traffic associated with the implementation of the CR 550 route may increase the probability of collisions involving trucks and secondary vehicles, including bicycles in the area in proximity to the Dead River, Tourist Park, and Northern Michigan University. Conversely, increases in the number of trucks and secondary vehicles on a route may result in periodic increases in congestion, lower speed, and a corresponding decrease in the probability of collisions involving trucks and secondary vehicles. Rural segments of the CR 550 route may result in

an increased probability of collisions associated with rural and recreational areas, including deer and, to a lesser extent, ORVs and snowmobiles.

Implementation of the CR 510-Red Road-Sleepy Hollow route or the CR 595 route may result in an increased probability of collisions associated with rural and recreational areas including deer, and to a lesser extent ORVs and snowmobiles.

3.07 Service Impact Summary

Transportation service impacts as a result of implementation of any of the other routes may involve changes in travel times, traffic patterns and route selection, vehicle miles traveled, and probability of crashes.

3.07.A. CR 550 Route

The CR 550 route will be subject to short-term increases in traffic. The CR 550 route will serve as a short-term and temporary route for trucks and secondary vehicles during construction of CR 595.

Implementation of the CR 550 route will increase traffic on local and residential streets as commuters avoid the route due to potential decreases in LOS. Avoidance of primary routes may result in increased time of commute and number of vehicle miles per commute. Increase in the number of miles per commute may result in increased fuel costs related to daily transportation.

In Michigan the majority of crashes occur at intersections (MSP, 2009). The CR 550 route exhibits the most intersections of the routes considered in this analysis and therefore may exhibit a higher chance of a crash occurring in comparison to other routes.

3.07.B. CR 510-Red Road-Sleepy Hollow Route

Implementation of the Red Road-Sleepy Hollow route will not result in significant increases in heavy truck traffic and secondary vehicles through Negaunee, Ishpeming and the City of Marquette. The Red Road-Sleepy Hollow route will not negatively impact LOS of existing roadways, except during winter for truck traffic in and around the hairpin curve on CR 510. In addition, there will be adequate capacity on this route to conduct existing and additional traffic without declines in LOS. The CR 510-Red Road-Sleepy Hollow route may result in a potential increase in crashes associated with deer, ORVs and pedestrians accessing existing trail networks and commercial forest lands for recreation. Implementation of the CR 510-Red Road-Sleepy Hollow route will reduce logging truck traffic on CR 550.

3.07.C. CR 595 Route

Implementation of the CR 595 route would mitigate the impact of increased traffic volume associated with mining and timber operations on densely populated areas of Negaunee, Ishpeming, and the City of Marquette. Implementation of CR 595 will not negatively impact LOS for existing roadways as the majority of traffic will consist of mining and logging trucks and secondary vehicular traffic related to mining, commercial forestry, and recreation. In addition, there will be adequate capacity to conduct existing and additional traffic without declines in LOS. The CR 595 route may result in a potential increase in crashes associated with deer, ORVs, snowmobiles, and pedestrians accessing existing trail networks and

commercial forest lands for recreation. Implementation of CR 595 will reduce logging truck traffic on CR 550.

3.08 Summary of Purpose and Need for CR 595

The purpose and need for the proposed CR 595 as demonstrated in this document is summarized in Table 3-8.

Table 3-8. Summary of Purpose and Need for CR 595.

Purpose for the Proposed CR 595	Need for the Proposed CR 595
Provide improved emergency services access to northwest Marquette County.	Present access for emergency services is inadequate and seasonal and has unacceptable response times due to the poor road conditions and distance of travel over circuitous routes from law enforcement, fire, and EMS stations.
Provide a primary county road access for a direct route to northwest Marquette County.	Presently the area is served by only one county road route (Triple A Road from CR 510) and Triple A Road is a seasonal, unimproved road. It is reasonable to assume that Triple A Road could be blocked during a severe weather event, forest fire, or other event that would block the road. CR 595 would provide a more reliable all-season road to serve as a primary access route.
Provide a primary county road to northwest Marquette County that is west of Silver Lake Basin.	Silver Lake Basin is the most upstream hydropower impoundment on the Dead River. In the event of a catastrophic event like 2003 that caused the failure of a bridge and dams, the route upstream of Silver Lake Basin would ensure a more secure access to the northwest part of Marquette County.
Provide a primary county road in a corridor that is needed for the desired spacing of all-season road transportation access in Marquette County.	Primary county roads are needed on a spacing of about eight miles to ensure reliable transportation network to all parts of the county.
Provide a shorter route and all-season paved road that is less costly than existing roads to maintain on an annual basis with limited public funds.	Using the existing CR 510-Triple A Road access to northwest Marquette County for heavy trucking without total reconstruction of these seasonal roads will cause constant maintenance problems to keep the roads in useable condition, including grading, dust control, snow removal, and erosion control. The length of the existing route and condition of the roads adds substantial maintenance cost compared to heavy truck and other traffic using CR 595 as the primary route.
Provide an all-season road that will serve to reduce heavy truck traffic in urbanized areas of Marquette County.	Heavy truck hauling through the City of Marquette, Marquette Township, Negaunee, and Ishpeming has been a matter of concern for many years. With the Eagle Development Project coming on line, the haulage issues are more important and the proposed CR 595 is a public necessity.
Provide improved access for the timber and mining industries in northwest Marquette County.	The timber industry is inadequately served by existing roads. Eagle Development Project requires all-season access to transport ore and people associated with the project.
Provide all-season access to northwest Marquette County.	Northwest Marquette County is inadequately served by Triple A Road which is seasonal and does not meet existing and future needs.
Provide an efficient travel route for commercial activities and the general public in northwest Marquette County.	Accidents increase proportionally with miles travelled. The proposed CR 595 is substantially shorter than the other routes and will provide a safer road for the travelling public.

4.0 ALTERNATIVES EVALUATED FOR THE PROPOSED PROJECT

The analysis of alternatives for CR 595 focuses on the available routes within, or near, the four-mile wide corridor recommended by the Marquette County Board of Commissioners and adopted by MCRC. However, as explained below, additional information from the assessment of a larger study area has been provided in this document to demonstrate and verify to the extent possible the purpose and need for CR 595. The MCRC CR 595 study corridor is shown in the preceding Figure 2-1 and is also shown in Figure 4-1. The larger study area (utilized in the project assessment conducted for KEMC in the evaluation of the alternatives that were considered for the Woodland Road project) is shown in Figure 4-2.

After the withdrawal of the Woodland Road application for permit by the Woodland Road LLC in May of 2010, KEMC and its contractors continued to evaluate potential alternative routes to serve the Eagle Development Project. KEMC initiated a comprehensive evaluation of the CR 510-Red Road-Sleepy Hollow and the CR 550 routes (Figure 4-2). The additional environmental and engineering studies conducted for the CR 510-Red Road-Sleepy Hollow and the CR 550 routes considered in the Woodland Road project are referenced in this document for comparative or informational purposes. The pertinent information gathered by KEMC during its extensive analysis of these routes is provided in Appendix N. These additional studies were initiated in June 2010 and were completed in March 2011.

The CR 510-Red Road-Gold Mine Lake Road and the CR 510-Red Road-Callahan Road routes were also evaluated after the withdrawal of the Woodland Road application for permit, but were determined by MDEQ and EPA to not be feasible and prudent (Appendix F).

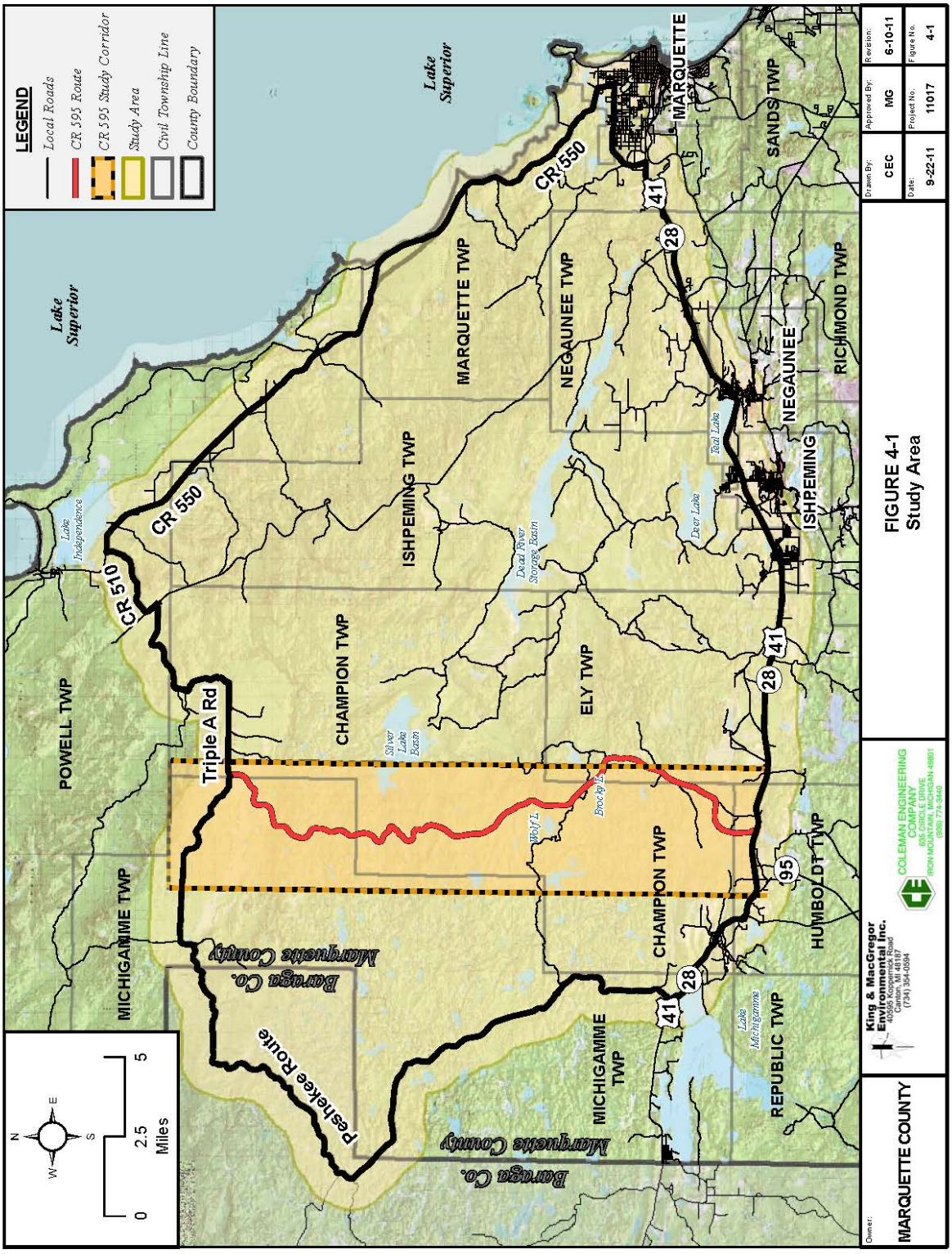
Although the CR 510 route that was evaluated during the Woodland Road application for permit review was not given further study for the CR 595 project assessment, it is also included in this document to provide a full presentation of the routes in the project study area.

Also included in this assessment for CR 595 are the Dishno and Peshekee routes (Figure 4-2). These routes are located west of the Silver Lake Basin and, as such, are located upstream of the dam system on the Dead River, which is an important consideration for the new primary county road as explained previously in this document.

The Mulligan Plains West-Sleepy Hollow and Mulligan Plains East-Sleepy Hollow routes are also included in the CR 595 assessment (Figure 4-2). These routes are located downstream of the Silver Lake Basin, and do not meet the purpose and need for a primary county road upstream of the Silver Lake Basin. The Mulligan Plains West-Sleepy Hollow route has been further assessed to determine whether it is a potentially feasible or prudent alternative route.

The nine routes that are presented in this assessment that are predominantly outside of the four-mile wide road study corridor are:

- Dishno
- Peshekee
- Mulligan Plains East-Sleepy Hollow
- Mulligan Plains West-Sleepy Hollow
- CR 510
- CR 550
- CR 510-Red Road-Sleepy Hollow
- CR 510-Red Road-Gold Mine Lake Road
- CR 510-Red Road-Callahan Road


LEGEND
Local Roads
CR 595 Route
CR 595 Study Corridor
Study Area
Civil Township Line
County Boundary
Lake Superior
Lake Superior
Lake Independence
CR 550
CR 550
CR 510
Triple A Rd
POWELL TWP
MICHIGAMME TWP
CHAMPION TWP
ISHPEMING TWP
MARQUETTE TWP
NEGAUNEE TWP
ELY TWP
CHAMPION TWP
MICHIGAMME TWP
REPUBLIC TWP
HUMBOLDT TWP
RICHMOND TWP
SANDS TWP
MARQUETTE
NEGAUNEE
ISHPEMING
Dead River Storage Basin
Silver Lake Basin
Wolf L
Brocky L
Teal Lake
Deer Lake
Lake Michigamme
Baraga Co.
Alger Co.
Marquette County
Peshekee Route
41
28
95
N
S
E
W
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2.5
5
Miles
Owner:
MARQUETTE COUNTY
King & MacGregor Environmental Inc.
40596 Koppernick Road
Canton, MI 48187
(734) 354-0564
COLEMAN ENGINEERING COMPANY
555 CIRCLE DRIVE
IRON MOUNTAIN, MICHIGAN 49801
(906) 774-3440
FIGURE 4-1
Study Area
Drawn By: CEC
Date: 9-22-11
Approved By: MG
Project No. 11017
Revision: 6-10-11
Figure No. 4-1

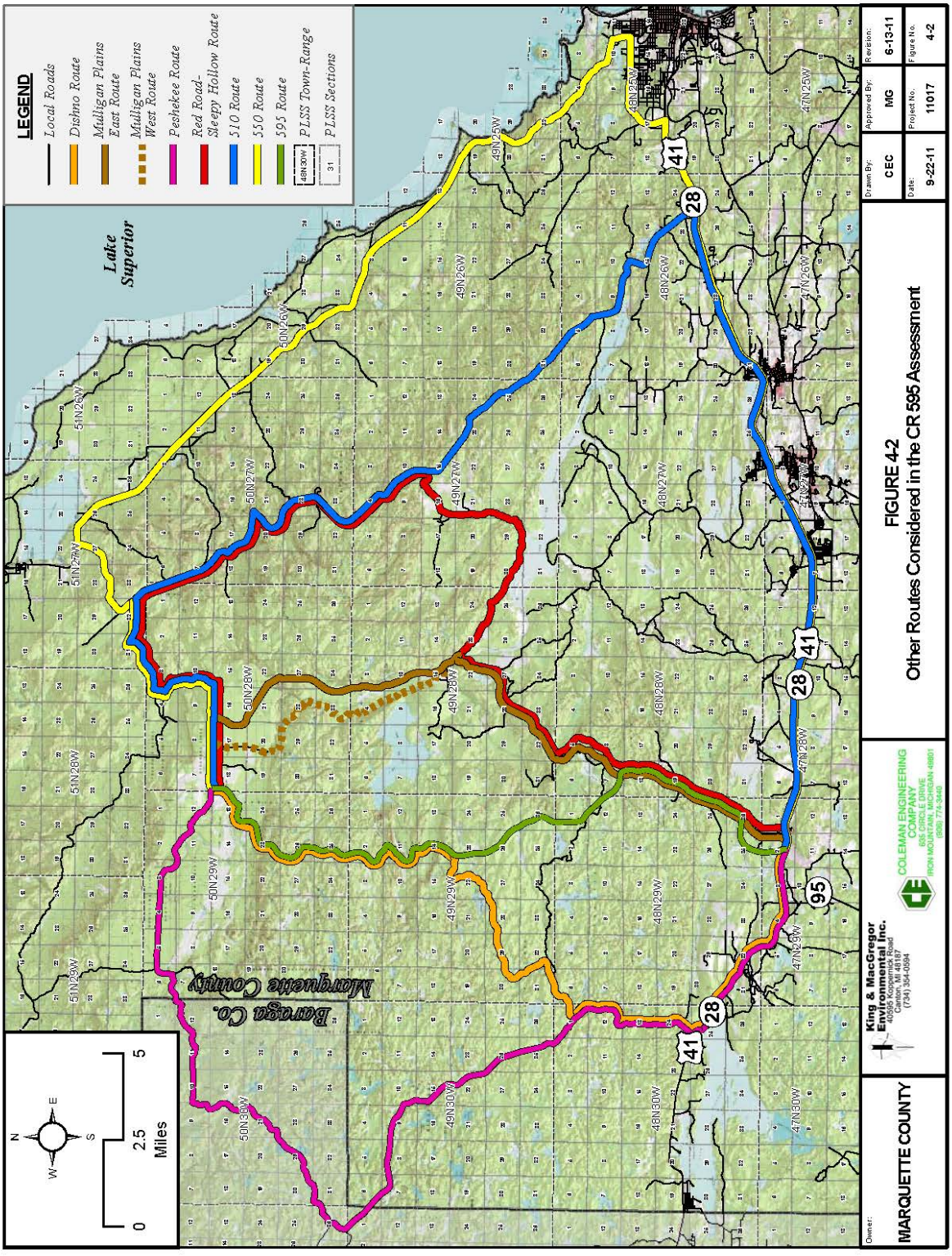


FIGURE 4-2
Other Routes Considered in the CR 595 Assessment

4.01 Evaluation of the Dishno and Peshekee Routes

Two routes that were evaluated during the Woodland Road application for permit were also considered in the CR 595 project assessment. These routes are the Dishno to Peshekee Grade Road (aka CR 607 and also called the Huron Bay Grade) to US-41 (Dishno route); and the Triple A Road west to West Huron River Road to Peshekee Grade Road to US-41 (Peshekee route). These routes are shown on Figure 4-2. These are the only two feasible routes other than CR 595 that would meet the need for a primary county road upstream of the Dead River dams.

Although MDEQ agreed that the Dishno and Peshekee routes were not feasible or prudent during the Woodland Road review, they have been presented in this application for permit to provide a full presentation of routes considered for CR 595. However, due to the Dishno and Peshekee routes not being feasible or prudent according to MCRC as alternatives to CR 595, further detailed studies were not conducted during the preparation of the application for permit for CR 595, other than the Dishno route field review and estimation of cost to construct performed by Coleman Engineering Company (CEC).

Wetland delineations were not done for the Dishno or Peshekee routes. Wetland impacts for these routes as described below were estimated using the Final Wetland Inventory from the Michigan Geographic Data Library. However, in 2011 CEC conducted a general field verification of wetlands along these routes to more accurately define the approximate extent of wetlands that may be impacted by these routes, if upgraded. Stream crossing impacts were calculated using the Michigan Geographic Hydrography Framework that was also obtained from the Michigan Geographic Data Library. Comparison of the Final Wetland Inventory to actual field wetland delineation on the routes where actual wetland delineations have taken place has consistently resulted in more actual wetlands than shown on the Final Wetland Inventory. As such, it is likely that the actual acreage of wetland impact for the Dishno and Peshekee routes would be higher than the acreage estimated.

4.01.A. Dishno Route

The Dishno route utilizes the portion of the proposed CR 595 from the intersection with Triple A Road south to the point where the Dishno Road enters Trail 5 north of Voelkers Creek. Thus, approximately the northern 9.5 miles of the Dishno route is the same as the proposed CR 595. The Dishno route is about 28 miles in length and would have an estimated 47 acres of wetland impact and 29 stream crossings with over 3,000 feet of existing roadway where a stream is located immediately adjacent to the side of the road. This route also has the potential for a substantial amount of stream relocation; for example, the Woodland Road AFP estimated 800 lineal feet of stream relocation on Dishno Creek. The reason for the stream relocation is the presence of a substantial rock outcrop directly adjacent to the existing Dishno Road where it is adjacent to the creek. It is likely that the stream relocation would have to be avoided, necessitating a substantial amount of rock cut (blasting), which would significantly raise the cost of construction of this route.

Utilizing this route would require the reconstruction of the entire route until its confluence with US-41. Widening and revised alignments of the road would be necessary, as determined by preliminary construction plans prepared by A. Lindberg & Sons, Inc. during the Woodland Road planning and as reviewed by CEC during the CR 595 planning.

The road reconstruction may be problematic due to the number of private property owners on this route compared to the proposed route and the presence of Van Riper State Park, through which part of the route is located. The number of land owners involved would likely make obtaining additional right-of-way easements or acquisition for this route very difficult, even considering that MCRC has the power of eminent domain (i.e. condemnation). If key property owners are not willing to provide easements or sell all/part of their property to allow reconstruction of the road, then route planning would be protracted and possibly contentious, both of which MCRC would like to avoid.

Another important consideration with the Dishno route is the length of the road that travels along the Dishno Creek and the Peshekee River. The road was historically located along the streams to take advantage of the flatter terrain. However, upgrading the existing road where the road parallels the streams is determined to be undesirable due to road runoff directly entering the streams, wetland impacts in close proximity to streams that could negatively impact aquatic habitat, and the potential for accidents given the predicted amount of trucking on the route, along with the other traffic expected on the road. Widening the road near streams would also significantly affect the feasibility of this route from a cost perspective due to the presence of bedrock ridges/outcrops in some locations directly adjacent to the existing roads.

The reconstructed road for this alternative would be within 100 feet of the Peshekee River for a total distance of about 13,050 feet in 10 different sections. The sections where the road and river are in this close proximity to each other vary in length from 100 feet to 4,000 feet. The road in this alternative would also be within 100 feet of the Dishno Creek for a total length of about 5,150 feet in eight segments varying in length from 100 feet to 2,200 feet. In total, the Dishno route would be within 100 feet of the Peshekee River and the Dishno Creek for a total of 18,200 feet, or almost 3.5 miles. The impacts to the streams and the aquatic life therein due to the road being in such close proximity is difficult to determine, but the noise, ground vibration, runoff of road salt, dust accumulation, emissions, and stormwater runoff are all likely to be negative effects.

As mentioned above, the Dishno route would either require the relocation of about 800 feet of the Dishno Creek or significant rock cuts in order to allow reconstruction of the road to provide a safe alignment. The presence of substantial areas of bedrock outcrops constrict the road design and necessitate either the stream being relocated or significant rock cuts in three areas in order to reconstruct the road. The estimated lengths of the three areas of potential stream relocations are 335 feet, 425 feet, and 40 feet. Stream relocations can be accomplished with minimal effects if done properly, but some impacts to fish and macroinvertebrates are unavoidable. Both the rock cuts and stream relocations are extremely expensive and would likely raise construction costs to make the route not feasible or prudent.

The Dishno route would not have the level of potential societal impacts associated with the CR 550 and CR 510-Red Road-Sleepy Hollow routes. Development in proximity to the existing road is relatively sparse. Although the Dishno route is approximately 32.5 miles shorter than the CR 550 alternative and approximately 13.3 miles shorter than the CR 510-Red Road-Sleepy Hollow route, there are significant undesirable effects to this route. The most significant detriments to the Dishno route are:

- The natural resources impacts, primarily to wetlands and streams, due to the reconstruction of the Dishno Road and Peshekee Grade Road would be more than other routes;

- Wetland impacts, estimated to be 47 acres, are the most of any available route (Peshekee is more wetland impact but is not available) and are approximately 21.4 acres more than the proposed CR 595 project;

- The number of stream crossings on the Dishno route (29) is more than the proposed CR 595 (22); the location of the Dishno Road and Peshekee Grade Road being within 100 feet of the Peshekee River and Dishno Creek for a distance of about 3.5 miles is a significant detriment; and,

- The need to either relocate about 800 feet of the Dishno Creek or perform significant rock cuts to allow the reconstruction of the road is an important consideration.

Although the Dishno route would provide a north-south access route to connect US-41 to northwest Marquette County, it would be about 6.1 miles longer than the proposed CR 595. More importantly, the intersection with US-41 would be about 3.5 miles further west than the proposed CR 595 intersection with US-41. This lengthens the route for emergency vehicles coming from Ishpeming (e.g. MDNR fire and Bell EMS) responding to northwest Marquette County. The south terminus of the Dishno route with US-41 moves the road too far west to be within the corridor where a new primary county road has been determined to be needed. It is an inefficient and more costly route.

For the reasons stated in the preceding paragraphs, the Dishno route is not feasible or prudent when compared to the proposed CR 595.

4.01.B. Peshekee Route

The Dishno route is the only route available entirely within Marquette County that is located west of the proposed CR 595. However, the Peshekee route was considered even though it extends into Baraga County (Figure 4-2).

The Peshekee route analysis was performed comparable to the analysis conducted for the Dishno route. The Peshekee route is 38.5 miles in length. The wetland impacts for the Peshekee route are estimated to be 68 acres, with an estimated 25 stream crossings. It should also be noted that a majority of the stream impacts on the Peshekee route would be major structures, including seven crossings of the Peshekee River.

Inquiries were made by MCRC to the Baraga County Road Commission (BCRC) about utilizing the Peshekee route. BCRC noted that the road improvements that would be made in Baraga County as a result of the Peshekee route being implemented would not have any physical connection with their existing public road system. It was also noted that significant improvements would have to be made, and right-of-way would have to be obtained to connect this road to the Baraga County road system. These factors make this improvement less than ideal for BCRC. Regardless of the BCRC position, there are also significant detriments to this route, as listed below.

- The Peshekee route, with an estimated 68 acres of wetland impact, is about 42.4 acres more wetland impact than the proposed CR 595;

- The route has three more stream crossing than the proposed CR 595 and involves larger streams;

- The Peshekee route is about 17.1 miles longer than the proposed CR 595 route. The additional road length is not prudent for the MCRC due to the additional construction and maintenance costs.

For these reasons listed above, the Peshekee route is not a feasible or prudent alternative and, in fact, is not desirable because of the disconnect with BCRC's existing public road system.

4.02 Mulligan Plains East-Sleepy Hollow Route and Mulligan Plains West-Sleepy Hollow Route

The Mulligan Plains East and West routes were given preliminary consideration as potential alternatives to the proposed CR 595 route. Due to the potential of these routes to meet the purpose and need for CR 595, the discussion of these routes is included in Section 4.04.K.

4.03 Evaluation of the CR 550 and CR 510 Routes

The other routes that were evaluated as part of the preparation of the application for permit for CR 595 were CR 550 as well as three "CR 510-Red Road" routes: CR 510-Red Road-Sleepy Hollow, CR 510-Red Road-Gold Mine Lake Road, and CR 510-Red Road-Callahan Road.

The CR 550 route has been fully evaluated in a manner similar to the proposed CR 595 route. With respect to the CR 510-Red Road routes, during meetings with MDEQ and EPA following the withdrawal of the application for Woodland Road in May 2010, there were discussions regarding the alternatives that needed to be provided by the applicant in any subsequent application. MDEQ and EPA expressed the need to specifically have the use of the Red Road evaluated in order to determine if one of the several potential routes involving Red Road could be feasible and prudent for the project purpose of Woodland Road. The Red Road route considered for this purpose begins at the north terminus of the project, which is located at the Trail 5-Triple A Road intersection and proceeds easterly on Triple A Road to County Road 510, then southerly to Red Road, then generally westerly until the road crosses the AAO Road bridge over the Dead River. South of the Dead River, three alternative routes for the Red Road were considered, as recommended by MDEQ and EPA. These routes are shown in the document in Appendix E.

One of the three CR 510-Red Road routes, the Triple A Road to CR 510 to Red Road to Sleepy Hollow to Wolf Lake Road to US-41 route (CR 510-Red Road-Sleepy Hollow route) was evaluated in detail by conducting wetland delineations, stream surveys, and preliminary engineering design in order to allow an accurate and generally equal comparison to the proposed CR 595. Sub-alternatives for the CR 510-Red Road-Sleepy Hollow route to minimize wetland impacts and alignment issues were included in the evaluation, as described in this document.

The CR 510-Red Road-Sleepy Hollow route was originally designed to go south from the intersection of Sleepy Hollow Road and Wolf Lake Road, with a reroute to the east of Brocky Lake across what has been termed the "porcupine wetland". The wetland and stream impacts for the CR 510-Red Road-Sleepy Hollow route that are discussed in this document are for this route. If the Sleepy Hollow Road route is implemented for this project, then the location of the southern portion of this route (i.e. to either go westerly to the Kipple Creek reroute west of Brocky Lake or to utilize the original route east of Brocky Lake) will have to be decided.

The other CR 510-Red Road alternative routes, i.e. the Gold Mine Lake Road route and the Callahan Road route, were evaluated using a more cursory evaluation in concurrence with MDEQ and EPA guidance. A report (Appendix E) addressing these routes was submitted to MDEQ for review in the fall of 2010. In a response letter dated November 18, 2010 MDEQ and EPA stated, "…the Sleepy Hollow route appears to be the best of the alternatives included with this evaluation…" (Appendix F). Gold Mine Lake Road and Callahan Road routes were not feasible due to various issues with these routes; primarily land ownership, proximity to a large number of private residences, and environmental concerns such as more potential impacts to wetland resources as compared to the Sleepy Hollow route.

With the advent of MCRC proposing a new primary county road (CR 595) in October 2010, the evaluation of the CR 510-Red Road-Sleepy Hollow route and the CR 550 route did not meet the project purpose and did not fulfill the purpose and need for a new primary county road. However, the results of the extensive amount of work conducted to evaluate these other routes (e.g. various detailed ecological studies, wetland delineation, stream evaluation, and detailed road design engineering plans, etc.) are included in Appendix N of this document for informational purposes and additional discussion is provided in the following sections.

4.03.A. CR 550

In addition to the CR 510-Red Road-Sleepy Hollow route, the CR 550 route has also been fully evaluated in a manner similar to the proposed CR 595 route. The CR 550 route includes a segment of Triple A Road and CR 510. The Triple A Road segment is also common to the CR 510-Red Road-Sleepy Hollow route. CR 510 is utilized from the intersection with Triple A Road north to CR 550.

The CR 550 route is approximately 60 miles in length as measured from the north terminus at the intersection of Trail 5 and Triple A Road to the south terminus at CR FY and US-41. The CR 550 route has only about one acre of wetland impact associated with upgrading the existing roadway, and would require the reconstruction of four existing stream crossings. In addition, a portion of the Triple A Road may be relocated and the three existing crossings of the East Branch Salmon Trout River may be replaced with one new crossing if this route is implemented.

MCRC believes that the CR 550 route is not a feasible and prudent alternative route to the proposed CR 595 and is therefore considered a "no-build" route for the following reasons:

- Although the natural resources impacts are the lowest of all routes, the CR 550 route has significant societal issues related to heavy truck travel. There is substantial public and local governmental opposition to upgrading CR 550 as a truck travel route.

- The CR 550 route is 37.5 miles longer than the proposed CR 595 and is not located in the area where the need for a new primary county road has been determined by the Marquette County Board of Commissioners and MCRC.

- CR 550 would not substantially meet the purpose and need for the proposed CR 595 for a new primary county road as explained in this document, including improving emergency services access, providing a second access route that is upstream of the Dead River dam system, improving recreational access, and improving efficiency of access for large acreage of timber company land holdings in northwest Marquette County.

4.03.B. CR 510-Red Road-Sleepy Hollow

The CR 510-Red Road-Sleepy Hollow route includes a segment of Triple A Road and CR 510. CR 510 is utilized from its intersection with Triple A Road south to Red Road, a distance of 11 miles. The route continues on Red Road along the north side of part of the Hoist Basin to Sleepy Hollow Road, generally westerly to Wolf Lake Road, and south to US-41 on the proposed CR 595 route. The CR 510-Red Road-Sleepy Hollow route is 41.3 miles in length and would have about 13.04 acres of wetland impact and 35 stream crossings. There would be significant stream relocations in portions of the route and relocation of the road in an area of steep terrain and bedrock outcrops in the vicinity of what is commonly called "the hairpin" curve required for the construction of this route, which would add substantial cost to construction of this alternative.

The CR 510-Red Road-Sleepy Hollow route is 19.9 miles longer than the proposed CR 595 route and is not located in the area where the Marquette County Board of Commissioners or MCRC have determined the necessity for a new primary county road. These governmental agencies, along with verification of the need by MDOT and FWHA, are responsible for determining the transportation needs of Marquette County.

CR 510-Red Road-Sleepy Hollow route does not meet the purpose and need for the proposed CR 595 and is therefore is considered to be a "no build" alternative by MCRC for the following reasons:

- The route is in close proximity to CR 550 (i.e. from 3 to 5 miles) down to the point where Red Road intersects with CR 510. To have two paved primary county roads (CR 510 is not paved) in this relatively undeveloped part of Marquette County is not prudent or necessary to serve the transportation needs of the county. The geographical service area where MCRC has determined the need for a new primary county road would remain without suitable county road service.

- The route is 41.3 miles in length, which is 19.9 miles longer than the proposed CR 595 (21.4 miles). For MCRC to maintain this excess length of primary county road through relatively undeveloped country is not prudent, given the tight road maintenance budget that MCRC has to operate under.

- The CR 510-Red Road-Sleepy Hollow route is almost twice as long a route as CR 595. As such, the cost to construct the CR 510-Red Road-Sleepy Hollow route would

likely to be approximately twice as much as CR 595, without the same benefits as CR 595.

- The CR 510-Red Road-Sleepy Hollow route would not substantially meet the purpose and need for a new primary county road as explained in this document, including improving emergency services access, providing a second access route that is upstream of the Dead River dam system, improving recreational access, and improving efficiency of access for large acreage of timber company land holdings.

4.03.C. Summary of MCRC Position on Other Routes

The Dishno, CR 550, and CR 510-Red Road-Sleepy Hollow routes are considered by MCRC to be "no-build" alternatives. The term "no-build" alternative in this application for permit refers to the MCRC analysis and its finding that improvements to existing roads would not meet the purpose and need for the proposed CR 595 as explained in this document. If existing roads are considered for improvement and CR 595 is not constructed, the needs for a new road remain.

In regard to the Eagle Development Project, the only alternatives for mine access and a haul route for ore to be transported to Humboldt Mill are CR 550 through Marquette and CR 510 to US-41 in Negaunee Township. Use of either of both of these routes by KEMC would require many more truck trips, as these routes are not entirely all-season roads and lighter loads would be required during the spring breakup period, which usually lasts about two months.

The timber industry likewise will have no option but to continue to utilize existing routes, many of which are unimproved roads. The opportunity for the timber industry to benefit from the more efficient and reliable all-season access provided by CR 595 would not be realized if existing routes must be used. Excess fuel usage, greenhouse gas emissions, and wear and tear on trucks and other vehicles would be manifested for the timber industry also if CR 595 is not allowed.

Emergency services, public safety, and recreational access to northwest Marquette County would also not be improved if CR 595 is not permitted. Existing routes will not meet the needs expressed in this document for upgrading access for emergency services in the County by EMS, law enforcement, and firefighting agencies.

The excess fuel usage and increased greenhouse gas emissions that would result from using existing routes over time just for the users described above could be minimized by construction of CR 595. In these times of rising fuel costs and public health concerns regarding greenhouse gas emissions identified by EPA, any action that reduces fuel consumption and greenhouse gas emissions should be favorably received. As such, implementation of any of the no-build alternatives would actually result in net negative impacts to air quality as compared to the CR 595 project.

4.04 Evaluation of the Alternatives within the CR 595 Road Study Corridor

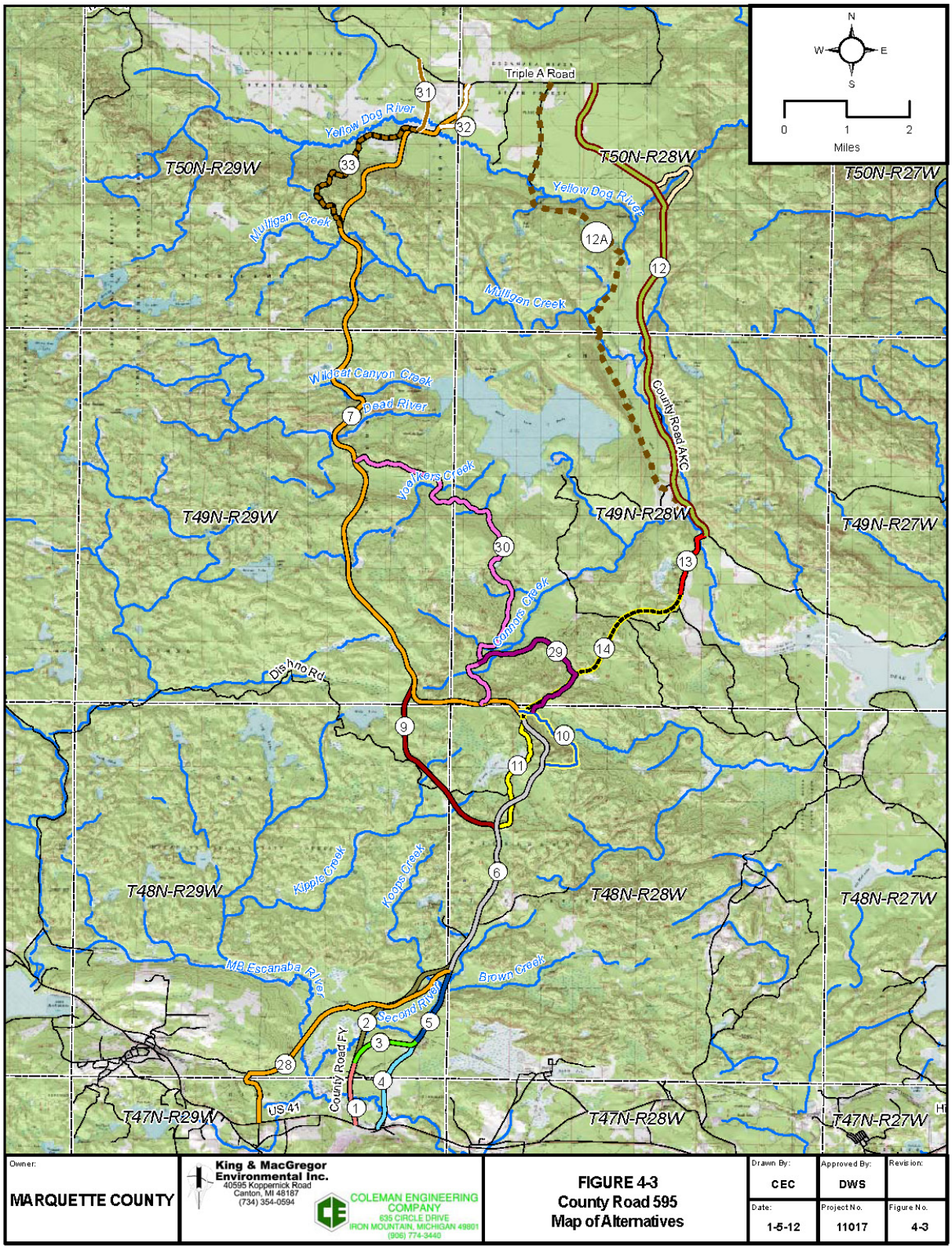
Twenty alternative segments that either are within the four-mile wide by 21.4-mile long road study corridor, or those that are adjacent to the study corridor, were evaluated to determine the location for CR 595 that reduces impacts on wetlands and streams to the greatest extent

practical. These 20 alternative segments are shown on Figure 4-3 and are described in Table 4-1. Note that the alternative segments are not all numbered consecutively in order to avoid confusion with the numbering system that was previously used by the project team over the past months to identify various alternative segments. The segments omitted (Segments 8 and 15-28) are not included in this document because these segments were determined to not meet the project purpose for CR 595.

Table 4-1. Alternative Segments Evaluated for CR 595 Route within the Study Corridor (Revised 1/6/12).

Segment Number	Segment Alternative	Alternative Description
1	CR FY	From US-41 on CR FY and the north extension of CR FY to Wasie Cutoff.
2	Wasie Cutoff to CR AAD	From Wasie Cutoff on CR FY north across Second River and Koops Creek to CR AAD and Wolf Lake Road intersection.
3	Wasie Cutoff	From the north extension of CR FY then east through Wasie property to Wolf Lake Road.
4	Wolf Lake Road South	From US-41 north on Wolf Lake Road to Wasie Cutoff.
5	Wolf Lake Road	Wolf Lake Road from Wasie Cutoff to CR AAD intersection.
6	Wolf Lake Road North	Wolf Lake Road from CR AAD intersection to Sleepy Hollow Road (uses the "porcupine" reroute east around Brocky Lake)
7	Wolf Lake Road/Trail 5	On Wolf Lake Road and Trail 5 from Sleepy Hollow Road to Triple A Road
9	Kipple Creek Reroute	From Wolf Lake Road south and west around Brocky Lake to Trail 5 northeast of Wolf Lake.
10	Brocky Lake East Bypass	From Wolf Lake Road east of Brocky Lake around to the east and north back to Wolf Lake Road.
11	Brocky Lake Road	From just south of the Dishno Road intersection south of Brocky Lake, north on a private road section of what is locally called Wolf Lake Road past the camps on the east side of Brocky Lake.
12	Mulligan Plains East	From Red Road just north of the CR AAO bridge westerly to the Mulligan Plains Truck Trail and northerly across the Yellow Dog River to Triple A Road.
12A	Mulligan Plains West	Generally the same as above, but with a westerly route across the Yellow Dog River.
13	Red Road-Dead River	From Sleepy Hollow Road northerly on Red Road (CR AAO) to just north of the AAO Bridge over the Dead River.
14	Sleepy Hollow	From Wolf Lake Road just north of Brocky Lake on Sleepy Hollow Road then easterly to Red Road (CR AAO).
28	Clowry-Dyno Nobel	From US-41 north on CR FN then on an abandoned railroad grade to CR AAD then east to Wolf Lake Road.
29	Grapevine Road East Bypass	From Wolf Lake Road north of Brocky Lake around to the east, then north and back west to intersect with the Grapevine Alternate segment.
30	Grapevine Road	From Wolf Lake Road north of Brocky Lake northerly and then westerly back to Trail 5 snowmobile trail west of Silver Lake Basin.
31	West Yellow Dog River Crossing	From Trail 5 just south of the Yellow Dog River north across the Yellow Dog River at a new crossing location about 400' upstream of the existing bridge to Triple A Road.
32	Yellow Dog River North	From just north of the Yellow Dog River at the present bridge location on Trail 5, then easterly and then northerly to Triple A Road.
33	North Slope Trail 5	From north of Mulligan Creek on Trail 5 to the Yellow Dog plains ending just westerly of the existing bridge over the Yellow Dog River.

The characteristics and findings regarding each of the 20 alternative segments for the location of the proposed CR 595 within the four-mile wide study corridor are presented in the following sections.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Yellow Dog River
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T50N-R28W
T50N-R27W
Mulligan Creek
Wildcat Canyon Creek
Yellow Dog River
County Road AKC
T49N-R29W
T49N-R28W
T49N-R27W
Yoakers Creek
Connors Creek
Dishno Rd
T48N-R29W
T48N-R28W
T48N-R27W
Kipple Creek
Koops Creek
MB Escanaba River
Brown Creek
Second River
County Road FY
US 41
T47N-R29W
T47N-R28W
T47N-R27W
31
32
33
12A
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14
9
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28
4
1
Owner:
MARQUETTE COUNTY
King & MacGregor Environmental Inc.
40595 Koppernick Road
Canton, MI 48187
(734) 354-0594
COLEMAN ENGINEERING COMPANY
635 CIRCLE DRIVE
IRON MOUNTAIN, MICHIGAN 49801
(906) 774-3440
FIGURE 4-3
County Road 595
Map of Alternatives
Drawn By:
CEC
Approved By:
DWS
Revision:
Date:
1-5-12
Project No.
11017
Figure No.
4-3

4.04.A. Alternative Segment 1. CR FY

The CR FY alternative segment begins at the intersection of CR FY and US-41 and proceeds northerly to the end of CR FY and then continues north across the Middle Branch Escanaba River to the Wasie Cutoff. The proposed road would be entirely within the right-of-way of CR FY where it passes through the Humboldt Wetland Mitigation Bank property. This road segment is 1.02 miles in length.

Alternative Segment 1 Wetland Impacts

Wetland impacts for the CR FY alternative segment have been determined to be 1.31 acres.

Alternative Segment 1 Stream Impacts

There is one stream crossing on the CR FY alternative; a new clear-span bridge over the Middle Branch Escanaba River is proposed.

4.04.B. Alternative Segment 2. Wasie Cutoff to CR AAD

This segment extends from the Wasie Cutoff on the extended CR FY north across Second River and Koops Creek to CR AAD and Wolf Lake Road intersection (this was the proposed Woodland Road route). This alternative segment is 2.5 miles in length.

Alternative Segment 2 Wetland Impacts

Wetland impacts for Alternative Segment 2 have been determined to be 1.35 acres.

Alternative Segment 2 Stream Impacts

Stream impacts in this alternative segment involve two new stream crossings; one over Second River and one over Koops Creek. The Second River crossing would involve substantial wetland fill. The Second River crossing would be a clear-span box beam bridge and the Koops Creek crossing would be a Conspan® bridge and is at a place where the stream often dries up during the summer.

4.04.C. Alternative Segment 3. Wasie Cutoff

This segment extends from the north extension of CR FY east through the Wasie property to Wolf Lake Road. This alternative segment was investigated for the purpose of avoiding the wetland and stream impacts associated with Alternative Segment 2 across Second River and Koops Creek and also to avoid the impacts to the residential area along Wolf Lake Road just north of US-41. The length of the Wasie Cutoff segment is 1.25 miles.

Alternative Segment 3 Wetland Impacts

There are no wetland impacts for the Wasie Cutoff alternative segment.

Alternative Segment 3 Stream Impacts

There are no stream impacts for the Wasie Cutoff alternative segment.

4.04.D. Alternative Segment 4. Wolf Lake Road South

The Wolf Lake Road South (WLRS) alternative segment would begin at the intersection of US-41 and Wolf Lake Road and proceed north on a realignment needed to provide a US-41 intersection design acceptable to MDOT. The realignment would be through a portion of the Humboldt Wetland Preserve property that is not in a Conservation Easement and then back onto the existing Wolf Lake Road south of the Middle Branch Escanaba River. The segment on Wolf Lake Road continues north to a point where the Wasie Cutoff alternate segment intersects Wolf Lake Road. The Wolf Lake Road South alternative segment is 1.7 miles in length.

Alternative Segment 4 Wetland Impacts

Wetland impacts for the WLRS alternative segment have been determined to be 1.55 acres.

Alternative Segment 4 Stream Impacts

The WLRS segment would require the construction of a new bridge over the Middle Branch Escanaba River. Due to the relatively sharp curve in Wolf Lake Road at the river crossing, the alternative alignment would need to be just upstream (west) of the existing bridge to provide a better horizontal alignment of the road. Also, the need to keep the road open to traffic during construction makes the new bridge location a requirement. Two culvert replacements would be required at existing stream crossings of tributaries to the Middle Branch Escanaba River.

4.04.E. Alternative Segment 5. Wolf Lake Road

The Wolf Lake Road alternative segment begins at the intersection of Wolf Lake Road with the Wasie Cutoff segment and extends northerly on Wolf Lake Road to the intersection with CR AAD. This section of Wolf Lake Road is gravel surface. The road crosses Second River in this segment. The length of the Wolf Lake Road alternative segment is 1.3 miles in length.

Alternative Segment 5 Wetland Impacts

Wetland impacts for the Wolf Lake Road alternative segment have been determined to be 4.14 acres.

Alternative Segment 5 Stream Impacts

The Wolf Lake Road alternative segment would require the reconstruction of the existing Wolf Lake Road crossing of Second River, including a realignment of the existing roadway. Presently Wolf Lake Road is located either directly adjacent to Second River or is within a very close distance to the river for a distance of about one mile. The maintenance and operation of the road is assumed to have impacts on Second River and the aquatic organisms in the river. This alternative segment would relocate about 875 feet of Wolf Lake Road further from Second River.

4.04.F. Alternative Segment 6. Wolf Lake Road North

This segment is Wolf Lake Road from CR AAD to Sleepy Hollow Road, using a proposed reroute east around Brocky Lake camps. Wolf Lake Road as a county road ends just south of Brocky Lake at/near the Dishno Road intersection, but the road continues as a private road northerly past Brocky Lake to Wolf Lake and is literally in the back yard of some camps on Brocky Lake. The intent of the reroute to the east of Brocky Lake was to minimize direct and indirect impacts from the proposed CR 595 on the landowners on Brocky Lake. Alternative Segment 11 has more explanation about the existing road. The Wolf Lake Road North segment is 4.7 miles in length.

Alternative Segment 6 Wetland Impacts

Wetland impacts for the Wolf Lake Road North alternative segment have been determined to be 6.40 acres.

Alternative Segment 6 Stream Impacts

The Wolf Lake Road North alternative segment would require a new stream crossing over a tributary to Barnhardt Creek at the outlet of what has been called the "Porcupine Swamp". A 53-foot long clear-span box beam bridge would be proposed at that location to minimize indirect impacts on the wetland groundwater hydrology and allow free passage of wildlife in the wetland. Four other stream crossings would also be required on this route segment.

4.04.G. Alternative Segment 7. Wolf Lake Road/Trail 5

This segment is Wolf Lake Road (as locally called but not a designated county road at this location) from Sleepy Hollow to near Wolf Lake where Trail 5 then courses northerly to Triple A Road. This segment is a combination of existing roads, logging roads, and new routes on the best alignment as discerned by field surveys and evaluation conducted over several years. The Wolf Lake Road/Trail 5 alternative segment is 14.4 miles in length.

Alternative Segment 7 Wetland Impacts

Wetland impacts for the Wolf Lake Road/Trail 5 alternative segment have been determined to be 15.59 acres.

Alternative Segment 7 Stream Impacts

There are 16 stream crossings proposed in the Wolf Lake Road/Trail 5 alternative segment. Only one of the major stream crossings is a new crossing location (Mulligan Creek).

4.04.H. Alternative Segment 9. Kipple Creek Reroute

The Kipple Creek Reroute segment extends from Wolf Lake Road south of the Dishno Road intersection west and north around Brocky Lake to Trail 5 just east of Wolf Lake. This segment was investigated during the application preparation for the Woodland Road as a potential route around Brocky Lake to minimize direct and indirect impacts to camps in that area. The segment is not located entirely on existing roads or trails.

During the public information meetings held by the MCRC on August 30 and 31, 2011, some landowners from the Brocky Lake area expressed a desire to have the proposed CR 595 located west of Brocky Lake. As a result, MCRC authorized the investigation of the potential route with road alignment changes to provide a safe road design and wetland delineation and stream surveys conducted to determine the natural resources impacts. The revised Kipple Creek Reroute segment is 3.4 miles in length.

Alternative Segment 9 Wetland Impacts

Wetland impacts for the revised Kipple Creek Reroute alternative segment have been determined to be 4.50 acres.

Alternative Segment 9 Stream Impacts

The Kipple Creek segment involves four stream crossings; three unnamed tributaries to Kipple Creek and the main stem of Kipple Creek. All of these crossings will be new.

4.04.I. Alternative Segment 10. Brocky Lake East Bypass

The Brocky Lake East Bypass segment is an eastward loop from the proposed CR 595 route east of Brocky Lake and terminates on what is locally called Wolf Lake Road north of Brocky Lake (although the actual county road ends south of Brocky Lake). This segment was evaluated for the purpose of trying to locate a route around areas of steep topography. The Brocky Lake East Bypass segment would move the road location further east and would be located around the base of the hill to reduce grade change in this road location. However, the East Bypass segment was determined to have more horizontal and vertical alignment issues than the proposed CR 595 route and was therefore not selected as the best alternative segment. The East Bypass reroute segment would add 1.2 miles to the route.

Alternative Segment 10 Wetland Impacts

Wetland impacts for the Brocky Lake East Bypass alternative segment have been determined to be 4.30 acres.

Alternative Segment 10 Stream Impacts

There are no stream crossings on the Brocky Lake East Bypass segment.

4.04.J. Alternative Segment 11. Brocky Lake Camps Access Road

The existing segment on what is termed for this document as “Brocky Lake Camps Access Road” (a segment of what is locally called Wolf Lake Road and is located on the east side of Brocky Lake) was evaluated as an alternative segment for this portion of the proposed CR 595. The existing Wolf Lake Road that is a public road ends just south of Brocky Lake at the Dishno Road intersection. The road that continues northerly to Wolf Lake is locally called Wolf Lake Road but the portion of the road along the east side of Brocky Lake is a private road with seven separate parcel owners. Prior contacts with these property owners resulted in one property owner refusing to consider any agreement that would allow Brocky Lake Road to be reconstructed, which at that time was part of the proposed Woodland Road. Due to the fact that permission from the private property owners that own the road is necessary to

utilize this alternative segment unless condemnation is invoked, the alternative segment is not available and was not given further consideration. In addition, the direct and indirect impacts to these property owners on Brocky Lake from a new road is not desirable and can be avoided or minimized with an alternate road location.

Alternative Segment 11 Wetland and Stream Impacts

Due to the lack of feasibility for this alternative segment, the wetland and stream impacts were not determined.

4.04.K. Alternative Segment 12. Mulligan Plains East and Alternative Segment 12A. Mulligan Plains West

Although the Mulligan Plains Segments 12 and 12A extend beyond the road study corridor, they were evaluated in order to determine whether these segments would be acceptable alternative segments for CR 595. The Mulligan Plains East alternative segment is 9.5 miles in length. As shown in Figure 4-2, the segment that would include the Mulligan Plains East alternative begins at the intersection of Wolf Lake Road and US-41, continues to the intersection of Sleepy Hollow Road and Wolf Lake Road, then to Sleepy Hollow Road to Red Road, then north on Red Road across the AAO Bridge over the Dead River, then westerly across Mulligan Creek and then generally northerly through the Mulligan Plains and across the Yellow Dog River to Triple A Road. The Red Road-Dead River and Sleepy Hollow Road alternative segments that are part of this segment are explained in the following sections (i.e. 4.4.L and 4.4.M).

The substantial difficulty with the Mulligan Plains East alternative segment would be an extremely difficult crossing of the Yellow Dog River, requiring a significant amount of bedrock cut and fill over a very deep gorge (i.e. over 200 feet). Such a crossing renders this alternative to not be prudent.

Alternative Segment 12 Wetland and Stream Impacts

The wetland impacts have been estimated for the Mulligan Plains East segment to be about 25.20 acres and stream crossings estimated at 12. Wetland delineation has not been conducted for this segment. Preliminary engineering evaluations have been conducted regarding the crossing location on the Yellow Dog River to determine feasibility and estimated cost for the bridge over the deep gorge.

Alternative Segment 12A, Mulligan Plains West

The Mulligan Plains West Segment 12A would cross the Yellow Dog River about 1.5 miles upstream of Pinnacle Falls. The river crossing would not appear to be a significant issue because there is no deep gorge at this location, but the road segment would pass through an existing Conservation Easement held by The Nature Conservancy. This segment would require a modification of the Conservation Easement to allow the construction of the road.

The Mulligan Plains West Segment 12A evaluation was initiated in September 2011 with preliminary engineering evaluations performed to locate a suitable road alignment. Wetland delineation, stream assessments, MiRAM evaluation, preliminary field surveying, and aerial

topographic mapping were also conducted to obtain information for engineering design. Preliminary engineering of the Mulligan Plains West route has not been completed.

The Mulligan Plains West route meets the project purpose, as indicated in Table 4-3 of the October 6, 2011 AA/PA, however having the new road upstream of Silver Lake Basin to ensure road access during a flood event on the Dead River is a critical road location factor as documented in the Purpose and Need for CR 595 in section 3.0 of the AA/PA. An excellent description of the damage caused by the 2003 Silver Lake Basin berm failure and resultant flood on the Dead River and the public safety, environmental, and economic impacts from the flood was presented by U.S. Senator Carl Levin to the U.S. Senate on September 16, 2003. A copy of Senator Levin's address is provided in Appendix I. Photographs of the washout of the bridge over the Dead River on CR AAO and the washout of the bridge on CR AAT over the Mulligan Creek are provided in Appendix K to depict the power of the flood in 2003.

Being upstream of the uppermost dam on the Dead River is important, but two other factors weigh in against the Mulligan Plains West route. These other two factors are: 1) the route traverses through nearly one mile of a Conservation Easement held by The Nature Conservancy (Appendix O) near and along the Yellow Dog River where the Mulligan Plains West route would have to be located; and, 2) the fact that the road for this route would be located in close proximity (parallel) to the Yellow Dog River for a distance of about one mile. A map is provided in Appendix O that depicts the location of the proposed CR 595, the Mulligan Plains West route, and the location of the Conservation Easement.

The Recitals in the Conservation Easement held by The Nature Conservancy provide some explanation of the natural values of the property. Recital B, Conservation Values, states, in part, *"The Protected Property, in its present state, has significant natural, aesthetic, scientific and educational values as a "relatively natural habitat of fish, wildlife, or plants or similar ecosystem," .....These values are of great importance to the Grantor, to the people of Marquette County, Champion Township, and the people of the State of Michigan."* Recital B goes on to state, *"Over 12 rare plant species have been found in the area including several state rare species of grape ferns or moonworts (Botrychium) on the specific property to be placed under easement."*

On page two of the Conservation Easement, under the Grant of Conservation Easement, item 1 in the Purpose states, *"It is the purpose of this Easement to assure that the Protected Property will be retained forever substantially undisturbed in its natural, scenic, and wild condition and to prevent any use of the Protected Property that will significantly impair or interfere with the Conservation Values of the Protected Property ("Purpose"). Grantor intends that this Easement will confine the use of the Protected Property to activities that are consistent with the Purpose of this Easement."* Roads are listed in the Prohibited Uses/Restrictions on page 2 of the Conservation Easement.

Although the Conservation Easement recognizes on page 9 that the Easement may be extinguished by certain actions (*"….if the restrictions of this Easement are extinguished by judicial proceedings (including, but not limited to, eminent domain proceedings)…."*). MCRC is opposed to initiating eminent domain (i.e. condemnation) proceedings to construct a primary county road on the property within the Conservation Easement. The likely public opposition to such proceedings, and the negative publicity that would result to both MCRC and MDEQ, would likely be substantial.

The importance of having the proposed road upstream of the Dead River dam system cannot be over-emphasized. Admittedly a flood event like that which occurred in May 2003 is a rare event, but dams are not fail-safe and failures are not uncommon. Having a community (Big Bay), county residents, businesses, and a major mining facility isolated from emergency services, law enforcement, access to work, and critical supplies is a significant public concern. The proposed CR 595 would provide a reliable access route during a flood event or other natural catastrophic event. As long as significant private funding is available to build the proposed CR 595, it is prudent to build it in a location that would provide reliable access above the dam system.

The decision to locate the road above the Dead River dam system is a community decision and was based upon public hearings, public meetings, resolutions of local governmental agencies, including the Marquette County Board of Commissioners and Marquette County Road Commission. These agencies are assigned the responsibility to determine the need for county road locations and they followed a public process in making their decisions.

It is the applicant's position, for the reasons stated in the preceding response, that the Mulligan Plains West alternative route meets the project purpose, is feasible to construct, but is <u>not prudent</u>.

Alternative Segment 12A Wetland and Stream Impacts

The wetland impacts for Alternative Segment 12A have not yet been determined, but are estimated to be about 12 acres for the entire route from US-41 to Triple A Road. Preliminary engineering design must be completed in order to determine the wetland impacts and stream crossings for this segment.

<u>4.04.L. Alternative Segment 13. Red Road-Dead River</u>

This alternative segment is the second segment of the Mulligan Plains segments presented above. The Red Road-Dead River alternative segment begins at the intersection of Sleepy Hollow Road and Red Road, then north on Red Road to just north of the AAO Bridge over the Dead River. At this point, the Mulligan Plains Alternative Segments 12 and 12A begin.

The Red Road-Dead River segment is located on the existing improved county gravel roadway and is 1.1 miles in length.

Alternative Segment 13 Wetland Impacts

Wetland impacts for the Red Road-Dead River alternative segment have been determined to be 0.02 acre.

Alternative Segment 13 Stream Impacts

There are no new stream crossings on the Red Road-Dead River alternative segment (the AAO Bridge over the Dead River was reconstructed in 2003 after the Silver Lake dam failure destroyed the bridge).

4.04.M. Alternative Segment 14. Sleepy Hollow

The Sleepy Hollow alternative segment begins with the intersection of Wolf Lake Road and Sleepy Hollow Road and ends at the intersection of Sleepy Hollow Road and Red Road (aka CR AAO). The length of the Sleepy Hollow alternative segment is 3.6 miles. The segment generally follows the existing Sleepy Hollow Road, which is an unimproved road/trail, but some realignment was considered to improve horizontal and vertical alignments and to avoid wetlands.

Alternative Segment 14 Wetland Impacts

Wetland impacts for the Sleepy Hollow alternative segment have been determined to be approximately 0.60 acres.

Alternative Segment 14 Stream Impacts

There are no stream crossings on the Sleepy Hollow alternative segment.

4.04.N. Alternative Segment 28. Clowry-Dyno Nobel

The Clowry-Dyno Nobel alternative segment starts near CR AAD on Alternative Segment 2 (the former Woodland Road route) then proceeds southwesterly past the former location of the Clowry Station on an abandoned railroad grade, then across the Middle Branch Escanaba River to CR FN through the Dyno Nobel property and across the existing railroad to US-41. The segment is 3.9 miles in length. This alternative segment was investigated to avoid crossing Second River and reduce wetland impacts.

The Clowry-Dyno Nobel segment is dependent upon the implementation of the east portion of the CR AAD (Segment 2), which would require a new crossing of Koops Creek. The Clowry segment would also require a new crossing of the Middle Branch Escanaba River. This segment is approximately 1.5 miles longer than the proposed CR 595.

Alternative Segment 28 Wetland Impacts

Approximately 4.40 acres of wetlands would be impacted by the Clowry-Dyno Nobel alternative segment.

Alternative Segment 28 Stream Impacts

There is one stream crossing in Alternative Segment 28; a crossing of the Middle Branch Escanaba River between CR FN and Clowry Station.

4.04.O. Alternative Segment 29. Grapevine Road East Bypass

The Grapevine Road East Bypass alternative segment was an alternative segment investigated for the Grapevine Road segment (Alternative Segment 30) and is 1.1 miles in length. The Grapevine Road East Bypass segment was evaluated in an effort to reduce steep grades present at other locations on the Grapevine alternative segment. The Grapevine Road East Bypass alternative segment begins near Wolf Lake Road north of Brocky Lake and goes east and south around the base of the large hills and intersects the

Grapevine Road alternative segment. While minimizing the vertical grades to some extent, the Grapevine Road East Bypass segment adds a new crossing of Connors Creek, which would also impact wetlands.

Alternative Segment 29 Wetland and Stream Impacts

Due to the lack of feasibility for this alternative segment, the wetland and stream impacts were not determined.

4.04.P. Alternative Segment 30. Grapevine Road

The Grapevine Road alternative segment begins at the intersection of Wolf Lake Road and Grapevine Road north of Brocky Lake and follows Grapevine Road in a northerly and westerly direction to where Grapevine Road joins Trail 5 south of the Dead River. The Grapevine Road alternative segment is 7.0 miles in length. Grapevine Road has substantial vertical grade and horizontal alignment issues which would create problems for heavy trucks and would add about 1.6 miles to the length of the proposed road.

Alternative Segment 30 Wetland Impacts

Wetland delineation for the Grapevine Road alternative was conducted, however due to the difficulties with this segment mentioned in the preceding paragraph, an alignment was not prepared and wetland impacts were not determined.

Alternative Segment 30 Stream Impacts

The Grapevine Road alternative segment has five stream crossings; a crossing of Voelkers Creek, an unnamed creek, and three crossings of Connors Creek or its tributaries.

4.04.Q. Alternative Segment 31. West Yellow Dog River Crossing

This segment begins on Trail 5 just south of the Yellow Dog River and then proceeds north across the Yellow Dog River and associated wetlands about 400 feet upstream of the existing bridge and then north to Triple A Road. This alternative segment was evaluated as a potential segment to avoid private and State of Michigan lands on the north side of the Yellow Dog River to the east of this alternative segment.

Alternative Segment 31 Wetland Impacts

The wetland impacts of the West Yellow Dog River Crossing alternative segment were determined to be 3.50 acres, part of which is a bog. The wetland impacts on the proposed CR 595 in this segment are only 0.60 acre, which is 2.90 acres less than the Alternative Segment 31 impacts and does not impact any bogs or other peatlands.

Alternative Segment 31 Stream Impacts

This alternative segment would have one stream crossing; a new bridge would have to be constructed over the Yellow Dog River.

4.04.R. Alternative Segment 32. Yellow Dog River North

This alternative segment starts at the existing Yellow Dog River Bridge on Trail 5 and then proceeds easterly and northerly to Triple A Road, which is the north end of the proposed CR 595 project. This segment is primarily located on Trail 5 and has no wetland impacts. The crossing of the Yellow Dog River is the only stream crossing. This alternative segment is about 0.9 mile in length.

4.04.S. Alternative Segment 33. North Slope Routes

This segment begins at Mulligan Creek and then proceeds north to Trail 5 south of the Yellow Dog River and is 2.3 miles in length. Various alternatives for traversing the steep grades north of Mulligan Creek down to the Yellow Dog Plains were evaluated to determine the best horizontal and vertical alignment to avoid wetlands and provide a safe road alignment down this very steep grade.

Alternative Segment 33 Wetland Impacts

Wetland impacts for this 2.3-mile long alternative segment are approximately 3.54 acres. The efforts to avoid and minimize wetland impacts in this alternative segment resulted in over one acre of wetland impact reduction.

Alternative Segment 33 Stream Impacts

There are no stream crossings in this alternative segment but there are numerous runoff culverts proposed under the roadway to allow passage of seasonal runoff down the steep grade.

4.05 Evaluation of CR 595 Design Features Implemented to Avoid and Minimize Natural Resources Impacts

In addition to the extensive evaluation of the alternative route segments within/near the four-mile wide road study corridor presented in the preceding section, the design of the proposed CR 595 itself was carefully evaluated. The accepted design standards for a primary county road are either a 40-foot wide or 46-foot wide road section (with guardrail where appropriate and necessary) and 55 mile-per-hour (mph) design speed.

County primary road design standards are specified by American Association of State Highway and Transportation Officials (AASHTO). For example, a primary county road crown section without a guardrail as specified by AASHTO consists of two 12-foot wide paved lanes along with 8-foot wide shoulders with 3 feet paved and 5 feet gravel (40-foot total top width). Road embankment side slopes are specified as 1 on 3 grades or flatter. Crown sections with a guardrail have two 12-foot wide paved lanes along with 8-foot wide paved shoulders up to the guardrail, and 3 feet of gravel shoulder extending beyond the guardrail (46-foot total top width). Side slopes are 1 on 2 grades. These Typical AASHTO sections are provided in Appendix C. In addition, the design for a primary county road is typically performed to safely allow 55 mph speeds.

Given the need to avoid and minimize wetland impacts to the greatest extent practicable, MCRC decided that the design of CR 595 would have to be reduced to provide a 32-foot

road section (as compared to the AASHTO standards) and design speed down to 35 mph where necessary. In addition to the horizontal alignment of the proposed road, the vertical alignment was carefully scrutinized by MCRC and CEC to minimize wetland impacts by reducing the depth of fill in key areas.

One redesign feature of the proposed road that resulted in some increase in wetland impacts is the passing lanes. Passing lanes are recommended in AASHTO standards to allow for the safe flow of traffic around trucks or other slow traffic climbing steep or long grades. On new primary county roads, MCRC requires passing lanes where appropriate; therefore such passing lanes are incorporated on road sections where necessary. In areas of steep or long grades, passing lanes are proposed for safety purposes even though such lanes occasionally result in wetland impacts. MCRC determined that the proposed CR 595 should have passing lanes where appropriate to minimize traffic safety concerns.

Locations where passing lanes are appropriate are determined from MDOT Michigan Road Design Manual, Volume 3, Section 3.09.05(C). The passing lane selection criteria are:

- Long, continuous grade where the length of the passing lane is a minimum of one mile in length;
- Directional spacing of passing lanes of approximately five miles;
- Locate in areas to avoid environmental impacts to the extent feasible;
- Vertical grades are present to enhance passing opportunities between slow and fast traffic.

The net result, when taking into account each of the factors discussed in this section, is that CR 595 will have less wetland impact than a typical, AASHTO-designed, 55 mph, roadway.

4.05.A. Evaluation of Potential Alternative Alignments on the Proposed CR 595.

Safety is the number one design criteria for CR 595, as it is for all roadways. In general, the flatter and straighter a road, the safer it is. Design speed modifications have been made throughout the CR 595 roadway corridor to provide safe travel while minimizing environmental impacts. In designing CR 595, the project engineers analyzed the potential wetland impacts associated with the proposed route and exercised professional engineering judgment in specific areas which in certain instances results in slightly higher wetland impacts in order to provide for greater roadway safety. The location and design of this road has been ongoing for many years and many alternatives, large and small, have been considered. The goal of MCRC is to present a road design that offers an appropriate balance between safety and environmental protection in the CR 595 design methodology

MCRC evaluated sections of the proposed project where the proposed CR 595 deviates from an existing road in order to demonstrate that the realignment either has less wetland impact or provides for a safer road design. MCRC also considered several possible alternative routes over certain stretches of the proposed CR 595 where wetland impacts were notable and further explanation/evaluation was necessary, even though there was not necessarily an existing roadway corridor to evaluate as an alternative.

Specific Design Issues

In this narrative, some of the "micro" road alignment adjustments that were considered for the purpose of avoiding or minimizing wetland and stream impacts within the CR 595 corridor are described.

Horizontal curve radius and the associated design speed are also shown on these drawings. The vertical curves have been designed to meet the horizontal design speed. Where possible and practical, roadway elevations have been designed to minimize wetland impacts. Side slopes in wetlands have been increased in most areas to a 1 on 2 slope (standard road side slopes are 1 on 3) to reduce the roadway footprint in wetlands In accordance with MDOT and MCRC basic design standards, road side slope may not be steeper than 1 on 3 unless guardrail is provided.

Exceptions to the use of 1 on 2 side slopes are fill areas less than 5 feet in depth in wetlands less than 100 feet in length along the roadway. In areas where wetland impact is less than 100 feet along the roadway, side slopes are maintained at 1 on 3 so that short segments of guardrail can be avoided, due to safety concerns. Details of the road side slopes are provided on Sheet D in the plan and profile drawings.

In low-lying areas (typically wetlands), the height of a roadway needs to be raised substantially above existing grade in order to provide positive drainage needed to protect the structure of the roadbed from saturation. If the roadbed is not properly drained, the road will be subject to frost heaving; thereby severely compromising the road structure.

As an example, at Station 333+50 (Plan Sheet 8 – Trembath Lake Outlet, see below), a 30-inch culvert would need to be proposed for cross drainage, with approximately 3½ feet of cover to protect the culvert and to meet the vertical design speed, resulting in a 6-foot overall road height. At this specific location the existing Wolf Lake Road is 28 feet wide. The proposed CR 595 roadway would be 32 feet wide (two 12-foot wide paved lanes plus one foot paved shoulders and three-foot unpaved shoulders per the MCRC specification). This would result in a road footprint at the toe of slope of approximately 60 feet (32-foot wide roadbed plus 28 feet to accommodate the side slopes). In this stretch, wetlands run approximately 700 feet along the sides of the existing roadway. Over this length of roadway, the anticipated necessary construction would impact approximately 19,600 square feet (0.45 acres) of wetlands.

Table 4-2A. Plan Sheet 8 (Trembath Lake Outlet) - between Station 327+00 to 341+00

Road Alignment	Design Speed	Wetland Impact
CR 595	55 mph	0.7 acres
Existing Road Alignment	<30 mph design speed	0.4 acres

Constructing CR 595 along the existing Wolf Lake Road alignment in this area would impact 0.3 acres of wetland less than the proposed CR 595 alignment, but would result in three low-speed curves in a span of about 1,200 feet. One curve would be rated at 30 mph and two of them would be less than 30 mph. The northerly two curves would create an S-curve situation with a very short straight section between them. Creating sharp S-curves in which the road before and after is designed for at least 50 mph for a mile in each direction is a very unsafe condition. This alternative to the proposed CR 595 alignment was therefore not given further consideration by the applicant.

Table 4-2B. Plan Sheet 9 (North Wolf Lake Road) between Station 347+00 to 365+00

Road Alignment	Design Speed	Wetland Impact
CR 595	55 mph	0.4 acres
Existing Road Alignment	<30 mph	0.7 acres

In this stretch of roadway, the proposed CR 595 alignment impacts less wetland area than following the existing Wolf Lake Road. The proposed CR 595 road will provide a safer vertical alignment and will be widened for increased safety. The proposed CR 595 alignment impacts a relatively short distance of Wetland A58 compared to the length of the wetland crossing on the existing Wolf Lake Road. Following the existing Wolf Lake Road includes four horizontal curves, all of them having design speeds less than 30 mph in relatively close proximity to each other, which is considered an unsafe road design. If the existing Wolf Lake Road is widened and the horizontal curves realigned, much more wetland impact would result.

Table 4-2C. Plan Sheet 10 (North Wolf Lake Road) between Station 371+00 to 390+00

Road Alignment	Design Speed	Wetland Impact
CR 595	45 mph	0.4 acres
Existing Road Alignment	<30 mph	0.6 acres

The evaluation of this section of Wolf Lake Road shown on plan sheet 10 shows that the proposed CR 595 alignment impacts less wetlands than following the existing Wolf Lake Road. Constructing CR 595 following the existing Wolf Lake Road as the alignment would include six horizontal curves, all of them having design speeds of 30 mph or less and in relatively close proximity to each other. As in the Station 347 – Station 365 location described above, widening and realigning the curves on Wolf Lake Road would result in even more wetland impact.

The proposed CR 595 alignment minimizes wetland impacts, especially to Wetland A54, and creates a much safer road alignment.

Table 4-2D. Plan Sheet 22 (Voelkers Creek) between Station 1236+00 to 1265+00

Road Alignment	Design Speed	Wetland Impact
CR 595	55 mph	0.8 acres
Reroute to the West	55 mph	0.9 acres

A reroute to the west of the proposed CR 595 alignment was investigated in this area in an attempt to minimize the impact to Wetland E14 at Station 1250+00 by crossing this wetland to the west at a narrow section of the wetland. There are not any substantial topographic features that would make a reroute in this area difficult. The curves for the proposed CR 595 and a potential reroute are both rated for 55 mph. However, the proposed reroute alignment in this area would result in a slight increase in overall wetland impacts even though impacts to Wetland E14 would be reduced.

Table 4-2E. Plan Sheet 24 (Trail 5 South) between Station 1293+00 to 1323+00

Road Alignment	Design Speed	Wetland Impact
CR 595	40 mph	1.4 acres
Existing Trail 5	<30 mph	0.8 acres

A reroute following the existing Trail 5 alignment in this area was investigated. Following the Trail 5 alignment would result in a reduction 0.6 acres of wetland impact as compared to the proposed CR 595 alignment here, but would include six horizontal curves in a span of about 3,000 feet, each having a design speed of less than 35 mph. This location is adjacent to a long, steep hill. The proposed designed road grade of CR 595 at this location is already at the maximum grade of 8% to descend this hill. Having a curve rated at less than 30 mph design speed at the bottom of a hill that is over a mile long, with the last portion of it at maximum grade, is an extremely dangerous situation and was therefore not given further consideration by the applicant.

Table 4-2F. Plan Sheet 29 (Trail 5) between Station 1438+00 to 1465+00

Road Alignment	Design Speed	Wetland Impact
CR 595	55 mph	1.3 acres
Reroute to the West	<30 mph	1.0 acres

A reroute to the west of the proposed CR 595 alignment was investigated in this area. It was hoped that by bypassing Wetland B40 and Wetland BBB1 to the west, it would reduce overall wetland impacts. The potential reroute in this area would result in the reduction of the total wetland impact; however there are safety issues that would make a reroute in this area undesirable. The proposed CR 595 alignment has a horizontal curve that is rated at 55 mph, but two vertical curves in this area are rated at 50 mph, including a crest vertical curve. Moving the alignment to the west where the top of the hill is higher would result in an unsafe hill crest condition. The reroute would also add three horizontal curves; two with design speeds of 40 mph and one with a design speed of less than 30 mph, significantly decreasing the safety of this section of road. Therefore this reroute was not given further consideration by the applicant.

Table 4-2G. Plan Sheet 34 (Trail 5 North) between Station 1600+00 to 1617+00

Road Alignment	Design Speed	Wetland Impact
CR 595 (800' curve)	40 mph	0.5 acres
Reroute to the West (1200' curve)	45 mph	0.6 acres
Reroute to the West (1600' curve)	50 mph	0.7 acres

A reroute to the west of the proposed CR 595 alignment was investigated in this area. The horizontal curve as currently proposed for CR 595 is a radius of 800 feet (40 mph design speed). In evaluating reroute alternatives, the radius of this curve was increased to 1,200 feet and 1,600 feet in hopes of reducing the overall wetland impact. While wetland impact in each of the cases reduced the impact in Wetland M11, increasing the radius of this curve simultaneously increased the impacts of Wetland M9, Wetland M10, and Wetland M200; with the overall wetland impacts increased. Therefore this alternative was not given further consideration by the applicant.

4.05.B. Comparison of the Proposed CR 595 to the Previously Proposed Woodland Road

The proposed CR 595 route was evaluated with the intent of revising the road alignment and design to further reduce wetland impacts from the Woodland Road to the greatest practicable extent. Hundreds of revisions were made to the originally-proposed Woodland Road route

as a result of that evaluation. The major proposed revisions to the CR 595 route as compared to that proposed in the 2009 permit application for Woodland Road include:

- The south end of the proposed route has been relocated to stay on Wolf Lake Road to a point south of Second River in order to avoid new crossings of Second River and Koops Creek and associated wetlands. This segment provides for the replacement of the existing Second River crossing (3 culverts) with a proposed 58 foot span bridge, which will be a needed improvement.

- A new segment (i.e. the "Wasie Cutoff") is located westerly from Wolf Lake Road south of Second River, which allows the proposed road to avoid the residential area along Wolf Lake Road. This segment joins the originally-proposed Woodland Road route just north of the proposed crossing of the Middle Branch Escanaba River.

  The route around Brocky Lake was revised from the eastern (aka "Porcupine") route to a route located west of Brocky Lake. This change was made at the request of landowners in the Brocky Lake area that preferred the proposed road to be west of Brocky Lake so as to not impede recreation access, which is apparently mostly to the east of Brocky Lake.

- The north end of the proposed road between Mulligan Creek and the Yellow Dog River was redesigned to avoid and minimize wetland impacts.

- Overall design of the proposed road was changed to lower the grade of the road where possible in order to minimize the need for borrow pits as well as to minimize wetland and stream impacts.

- Other revisions to the proposed CR 595 for the purpose of avoiding and minimizing wetland impacts involved the following:

  - Lowering the grade of the road in rock cut sections, which reduced the amount of fill needed for the grade of the road in adjacent sections, but increased costs.

  - Increasing certain wetland fill slopes from 1 on 3 to 1 on 2 and proposing guardrail.

  - Designing sharper curves where possible without compromising road design safety standards; i.e. reduced road design speed.

  - Designing reroutes of the proposed road to avoid or minimize wetland impact, even if the reroute involved higher costs, e.g. rock blasting.

4.05.C. Comparison of CR 595 with Woodland Road - Design Considerations Summary

The following is a brief summary of the differences in the alignments of CR 595 and Woodland Road and the resulting wetland fill areas/amounts within the relevant corridor of each alignment. Overall, the CR 595 footprint coincides with all or a portion of the Woodland Road footprint for approximately 12.3 miles (approximately 65,000 lineal feet) and completely deviates from the Woodland Road project footprint for approximately 9.1 miles (approximately 48,000 lineal feet). Wetland impacts of approximately 27.3 acres were

proposed on Woodland Road. The current CR 595 plan would impact approximately 25.45 acres.

Both roads have been designed according to the standards of American Association of State Highway and Transportation Officials (AASHTO), the Michigan Department of Transportation (MDOT), and the Marquette County Road Commission (MCRC). According to those standards, safety is the number one design criteria, with criteria such as roadway radius, sight distance and stopping distance also being given consideration. Marquette County Road Commission desires to maintain a 55 mph design speed throughout the project; however, this is not possible in certain areas within the corridor due to steep grades, the presence of large rock formations, and bodies of water and wetlands. Where the existing topography dictates that a less than 55 mph design speed be used, it is intended that the posted speed along these portions will be also be the design speed. As a function of sound and accepted road engineering practices, long stretches of 55 mph design speeds interrupted by short lengths of a lesser design speed would create unsafe driving conditions due to frequent acceleration and deceleration situations; therefore those situations have been avoided as much as possible in the design of CR 595.

Vertical and horizontal alignment changes have been made on CR 595 (as compared to the original Woodland Road) in order to avoid/minimize wetland impacts while maintaining safe driving conditions. For example, guardrails have been added in selected wetland areas where it was feasible to allow for steeper side slopes in fill sections; these measures result in a smaller footprint and less wetland impact.

The following tables compare CR 595 wetland impacts to formerly proposed Woodland Road wetland impacts as well as provide an explanation of the design factors that were considered in each reference section:

Table 4-3A. US 41 to 4,000 feet north of Middle Branch Escanaba River (approximately 1.2 miles).

Route	*Wetland Impact	Difference
Woodland Road (Station 136+49 to 198+00)	1.3 acres	0 acres
CR 595 (Station 100+00 to 162+00)	1.3 acres	

CR 595 generally follows the same alignment as Woodland Road in this section, with one exception. CR 595 follows the alignment of CR FY near wetland R4 just north of the substation. This results in a curve slower than 55 mph, but since it is near the intersection of US-41, speeds will be slower in this area due to braking for a stop sign for southbound vehicles with northbound vehicles not quite up to full speed out of the intersection. Woodland Road alignment has a larger radius and the result of this shift in alignment for CR 595 is a savings of 0.2 acre of wetland in R4. For the crossing of Middle Branch Escanaba River, guardrails added to CR 595 allow the road to have a smaller footprint with steeper side slopes in fill areas. Overall, the wetland impacts of the proposed Woodland Road and the proposed CR 595 in this section are the same (i.e. 1.3 acres).

Table 4-3B. 4,000 feet north of Middle Branch Escanaba River to the intersection of Wolf Lake Road and CR AAD (approximately 2.3 miles).

Route	*Wetland Impact	Difference
Woodland Road (Station 198+00 to 297+70, 314+15 to 328+00)	1.2 acres	-0.1 acres
CR 595 (Station 162+00 to 283+00)	1.1 acres	

CR 595 diverges from the proposed route of Woodland Road at this southern point of this section. CR 595 veers to the east and connects with Wolf Lake Road north of the railroad grade and south of Second River. The alignment of CR 595 follows Wolf Lake Road until the intersection of CR AAD, where the alignment of Woodland Road meets up with Wolf Lake Road. The CR 595 alignment avoids a new crossing of Second River and a crossing of Koops Creek as was proposed in the Woodland Road project. The CR 595 routing allows the opportunity to improve on the poor existing conditions of the Wolf Lake Road crossing of the Second River with a new 58 foot span bridge, as compared to the existing road crossing which consists of one 66 inch diameter culvert and two 36 inch diameter culverts, all in rather poor condition. Although the alignments between CR 595 and Woodland Road and completely different in this section, due to the elimination of a new Second River crossing and complete elimination of the Koops Creek crossing and their associated floodplains/wetlands, CR 595 would result in approximately 0.1 acres less wetland impact.

Table 4-3C. Intersection of Wolf Lake Road and CR AAD to the intersection of Wolf Lake Road and Kipple Creek Trail (approximately 2.2 miles).

Route	*Wetland Impact	Difference
Woodland Road (Station 328+00 to 445+00)	3.4 acres	-0.4 acres
CR 595 (Station 283+00 to 402+12)	3.0 acres	

CR 595 generally follows the Woodland Road alignment for the most part during this stretch. There are a few areas where the CR 595 alignment has been moved to the east or west to minimize the impacts to wetlands along the route. An example of this is on the north end of wetland A61. The Woodland Road alignment increased the radius on the east side of Wolf Lake Road, resulting in 1.2 acres of wetland disturbance. CR 595's alignment was shifted slightly to the west without compromising the safety of the curves in this location. CR 595 has a wetland disturbance of 0.3 acres in this area. In addition, the shift in alignment allowed a more perpendicular crossing of Trembath Creek Outlet.

Table 4-3D. Intersection of Wolf Lake Road and Kipple Creek Trail to the intersection of Wolf Lake Road and Trail 5 (approximately 3.6 miles).

Route	*Wetland Impact	Difference
Woodland Road (Station 445+00 to 699+50)	3.8 acres	+0.3 acres
CR 595 (Station 402+12/3000+00 Station Break to 3191+57)	4.1 acres	

This section is a new alignment from both the original Woodland Road and from that shown on the August 15, 2001 Draft AA/PA. This route runs west of Brocky Lake to avoid residences, and represents a change made based on public input received by MCRC.

Table 4-3E. Intersection of Wolf Lake Road and Trail 5 to Dead River Crossing (approximately 4.3 miles).

Route	*Wetland Impact	Difference
Woodland Road (Station 699+50 to 760+60, 763+00 to 924+00)	5.5 acres	-1.1 acres
CR 595 (Station 3191+57/1090+00 Station Break to 1352+00)	4.4 acres	

The alignments for CR 595 and Woodland Road for this segment generally follow Trail 5 to avoid large wetland complexes. One location where the alignments are different is near Wetland E21. The proposed CR 595 alignment was shifted approximately 350 feet to the west of the Woodland Road alignment. This shift avoided Wetland E21 completely and reduced the overall wetland impact by 0.6 acres. One other notable CR 595 shift compared to the Woodland Road alignment was just south of the Dead River by Wetland AA8. The Woodland Road alignment has an 800 foot radius curve that impacts a sizable portion of Wetland AA8 (0.8 acres). By changing this curve to a 600-foot radius and moving the alignment to the east, Wetland AA8 was avoided.

Table 4-3F. Dead River Crossing to Mulligan Creek Crossing (approximately 4.0 miles).

Route	*Wetland Impact	Difference
Woodland Road (Station 924+00 to 1007+51, 1008+50 to 1116+47, 1119+50 to 1141+00)	5.9 acres	+1.5 acres
CR 595 (Station 1352+00 to 1563+00)	6.4 acres	

The alignments for CR 595 and Woodland Road for this segment generally follow Trail 5 to avoid large wetland complexes. Some minor deviations from the Woodland Road alignment were explored where possible. Due to the presence of rock formations, extreme grade changes, bodies of water, and wetlands; drastic changes between the proposed CR 595 alignment and the Woodland Road alignment are not feasible. It should be noted that recent reexamination of wetlands throughout this section (A13, A15, BBB1, B37B, B34A, B34B, B31A, B6, B5, and B3) either expanded or delineated new wetlands that did not exist during the time of the Woodland Road design. This resulted in a 0.2 acre increase in impact. Please note that had these newly delineated areas been included in the original Woodland Road impact quantities, the overall impacts in this section would be virtually the same.

Table 4-3G. Mulligan Creek Crossing to Triple A Road (approximately 3.8 miles).

Route	*Wetland Impact	Difference
Woodland Road (Station 1141+00 to 1335+00)	6.2 acres	-1.1 acres
CR 595 (Station 1563+00 to 1762+00)	5.1 acres	

The alignment for CR 595 generally follows the Woodland Road alignment from Mulligan Creek to the bottom of the large hill on the south side of the Yellow Dog Plains. From the bottom of this hill to the Yellow Dog River, the alignment for CR 595 is very different than Woodland Road. Numerous alignments and profile designs were attempted to reduce the wetland impact for Wetland L2 to the extent practicable.

Table 4-3H. Summary of Woodland Road/CR 595 Wetland Impacts

Route	*Wetland Impact	Difference
Woodland Road	27.3 acres	-1.8 acres
CR 595	25.5 acres	

* Rounded to the nearest 0.1 acre

4.06 Comparison of Alternative Segments Evaluated for the Proposed CR 595

The comparison of the 20 alternative segments evaluated for the proposed CR 595 project is provided in Table 4-4. The proposed CR 595 route was determined based upon the assessment of the alternative segments within the four-mile wide road study corridor, but also included the Mulligan Plains East-Red Road-Sleepy Hollow segment and the Mulligan Plains West-Red Road-Sleepy Hollow Road segment that are actually partly outside of the four-mile wide corridor.

Table 4-4. Comparison of Wetland Impacts for the Proposed CR 595 Alternative Segments (Segments selected for the CR 595 route are shaded).

Alternative Number	Alternative Name	Wetland Impacts (Acres)	Reason(s) to Select or Reject Alternative
1	CR FY	1.37	Selected as the start of the proposed CR 595 on the south due to intersection location and low wetland impact.
2	Wasie Cutoff to CR AAD	1.35	Rejected due to two new stream crossings (Second River and Koops Creek); has similar wetland impact as the Wasie Cutoff and Wolf Lake Road alternative segments.
3	Wasie Cutoff to Wolf Lake Road	0.13	Selected due to no wetland impact and no streams.
4	Wolf Lake Road South	1.55	Rejected due to the higher wetland impact than the combination of the CR FY and Wasie Cutoff segment combined (1.0 acre). Also would impact 12 residences on the existing road and would have a less-desirable intersection location on US-41.
5	Wolf Lake Road	3.90	Selected as the segment (combined with the Wasie Cutoff) with less wetland impact for this segment than Alternative 2 but no new stream crossings. The existing Second River crossing will be improved.
6	Wolf Lake Road North	6.40	Not selected as the segment from the AAD intersection with Wolf Lake Road to Sleepy Hollow Road around Brocky Lake. The Kipple Creek reroute was selected by MCRC as the preferred route alignment in this area of the project. This segment has 0.60 acres less wetland impact than the Kipple Creek segment and only one new stream crossing compared to four for the Kipple Creek segment. Landowners in the Brocky Lake area preferred the Kipple Creek route.
7	Wolf Lake Road/Trail 5	15.47*	Selected as the best segment from the north end of the Kipple Creek reroute and north to Triple A Road. Topography is the primary design location challenge in this segment combined with avoiding/minimizing wetland impacts. (This segment also includes Alternative 33 below)
9	Kipple Creek Reroute	4.58	Selected as the segment to bypass Brocky Lake to the west. Wetland impact is only 0.60 acre higher and has four new stream crossings compared to one new crossing on Segment 6 east of Brocky Lake. Overall natural resources impacts are expected to be minimized with the Kipple Creek reroute; construction of a 60-foot span bridge over the Porcupine wetland on the east route around Brocky Lake is avoided.
10	Brocky Lake East Bypass	4.30	Rejected as the segment to bypass Brocky Lake to the east due to substantial horizontal and vertical alignments of the segment, added length of road.
11	Brocky Lake Road	NA	Rejected as not available due to the road being private past the Brocky Lake camps.
12	Mulligan Plains East	25.20	Rejected due to the presence of a conservation easement on property generally west of Pinnacle Falls; the segment east (downstream) of Pinnacle Falls is a very deep gorge that is not feasible or prudent to cross with the roadway.
12A	Mulligan Plains West	NA	At the time of the filing of the application for permit to the MDEQ, Segment 12A was being evaluated. One item to be resolved is the presence of a conservation easement that would have to be revised to allow the construction of the road. The potential road location is more than two miles upstream of Pinnacle Falls where the vertical alignment for crossing of the Yellow Dog River would be feasible.
13	Red Road-Dead River	0.02	Rejected due to the lack of feasibility of the Mulligan Plains segment and the Red Road-CR 510-Triple A Road segment being not meeting the project purpose for a new primary county road.
14	Sleepy Hollow	0.60	Rejected due to the segment being part of the Red Road alternative segment to Mulligan Plains and that segment is not feasible or prudent.

Table 4-4 (continued). Comparison of Wetland Impacts for the Proposed CR 595 Alternative Segments (Segments selected for the CR 595 route are shaded).

Alternative Number	Alternative Name	Wetland Impacts (Acres)	Reason(s) to Select or Reject Alternative
28	Clowry-Dyno Nobel	4.40	Rejected due to higher wetland impacts, the need to construct a new crossing of Koops Creek to implement this segment, and the additional length of road as compared to the selected segment of the CR FY, Wasie Cutoff and Wolf Lake Road alternative segments.
29	Grapevine Road East Bypass	NA	Rejected due to new crossings of Connors Creek and significant horizontal and vertical grade issues with the Grapevine Road alternative, of which this alternative segment would be a part.
30	Grapevine Road	NA	Rejected due to significant horizontal and vertical grade issues and the fact that this segment would add 1.6 miles to the road segment.
31	West Yellow Dog River Crossing	3.50	Rejected due to the increase in wetland impacts compared to the proposed segment (which only has a wetland impact of 0.6 acre to cross the Yellow Dog River and associated wetlands combined with Alternative 32 below) and this alternative crosses the Yellow Dog River in a new location 400 feet upstream of the existing bridge.
32	Existing Yellow Dog River Crossing-West/North Segment.	0	Selected as the segment from the Yellow Dog River to Triple A Road due to no wetland impact or stream crossings.
33	North Slope Segments	3.54*	Selected as a part of the Alternative 7 segment; wetland impacts were avoided and minimized by selecting the alternative segments down the steep slopes from the Mulligan Creek to the base of the hill south of the Yellow Dog Plains. Note that these wetland impacts are included in the 15.59 acres of wetland impacts listed for Alternative 7.
Total Wetland Impacts for CR 595 Segments		25.45	This wetland impact total does not include the Trail 5 relocation impacts or the East Branch Salmon Trout River stream mitigation project wetland impacts. The total wetland impact with these impacts included is 25.81 acres.

*Segment 33 impacts are included in Segment 7 impacts.

4.07 Summary of Routes Evaluated

In addition to the 20 alternative segments evaluated or considered for the proposed CR 595 route, the CR 550, CR 510, CR 510-Red Road-Sleepy Hollow, and Dishno routes were evaluated, even though the first three routes are considered by MCRC as “no-build” routes (Table 4-5). Although the Dishno route is not considered a “no-build” route, the natural resources impacts make this route undesirable compared to CR 595.

Table 4-5. Routes Evaluated or Considered for the Proposed CR 595 Project.

Route Name	Approximate Length of the Route (miles)	Wetland Impacts (acres)	Stream Crossings	Does the Route Meet the Project Purpose?	Primary Reasons the Route Was/Was Not Selected
Proposed CR 595	21.4	25.81	22	Yes	Proposed in 2011 Application for Permit including the Trail 5 relocation impacts and the East Branch Salmon Trout River stream mitigation
CR 550	60	1	4[1]	No	Longest route; does not meet the purpose and need for the proposed CR 595; therefore is a "no-build" alternative.
CR 510	51	29[2]	56	No	Highest level of emissions; wetland and stream impacts are high. Length of route is not prudent; does not meet the purpose and need for the proposed CR 595.
Dishno	28	47	29	Yes	High wetland impacts; estimates of wetland impacts are using NWI and about 10 acres of additional wetland impacts are expected if delineation is done. Lineal feet of stream relocation and other stream impacts are high. DEQ and EPA agreed this alternative should not be further evaluated.
Mulligan Plains East-Red Road-Sleepy Hollow	26.4	25	12	Yes	Environmental sensitivity and very high construction costs for crossing the Yellow Dog River valley downstream of Pinnacle Falls.
Mulligan Plains West-Red Road-Sleepy Hollow	NA	NA	NA	Yes	The Mulligan Plains West route has been determined to be feasible but is not prudent, as explained in section 4.04.K.
CR 510-Red Road-Callahan Road-US-41	44	Not determined.	Not determined.	No	Would directly or indirectly impact many private properties, is likely to have more wetland impact than the proposed alternative based on the wetlands in the corridor evaluated with GIS, and is therefore not feasible or prudent. DEQ and EPA agreed this alternative should not be further evaluated (verified by letter dated 11/18/10).
CR 510-Red Road-Gold Mine Lake Road-US-41	42.5	Not determined.	Not determined.	No	Would directly or indirectly impact many private properties, is likely to have more wetland impact than the proposed alternative based on the wetlands in the corridor evaluated with GIS, and is therefore not feasible or prudent. DEQ and EPA agreed this alternative should not be further evaluated (verified by letter dated 11/18/10).
CR 510-Red Road-Sleepy Hollow-Wolf Lake Road-US-41	41.3	13.04	35	No	Wetland delineation and preliminary design plans were prepared to accurately compare this alternative to the proposed CR 595. The 19.9 miles of additional length make this alternative not feasible or prudent due to excessive capital and maintenance costs.

[1] Denotes the number of existing stream crossings that must be replaced if the CR 550 route is implemented, not including the three East Branch Salmon Trout River crossings on Triple A Road.

[2] Wetland impacts were estimated in the 2009 application for the CR 510 alternative using NWI data.

5.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The following sub-sections of Section 5 present the Affected Environment and Environmental Consequences for pertinent assessment factors for the proposed CR 595 project. References cited in this section that relate to the ecological studies reports are listed in the appendices for the pertinent report. Other references in this section are listed at the end of the document in the References Cited section.

5.01 Affected Environment: Wetlands

According to the NWI Michigan GIS database, there are approximately 300,000 acres of wetland in Marquette County. The county is 1,821 square miles in size; thus wetlands comprise about 25 percent of the total land area of the county. The wetland resource is so predominant on the landscape of Marquette County that planning a 21.4-mile road without impacting any wetlands is essentially impossible. Considering the landscape where CR 595 is proposed, to only impact about one acre of wetland per mile of the proposed road is a testament to the efforts to avoid and minimize wetland impacts. Of the 300,000 acres of wetlands in Marquette County, 239,240 acres are forested (80%), 46,477 acres are scrub-shrub (15%), 9,259 acres are emergent (3%, including aquatic bed and flat), and 3,672 acres are open water (1%).

During 2010, and 2011 CEC and KME conducted wetland evaluations within the study area. These evaluations included the following wetland evaluation methodologies:

- Wetland delineations utilizing the 1987 Corps of Engineers Manual for Wetland Delineation, (Corps, 1987);
- Interim Regional Supplement to the Corps of Engineers Manual for Wetland Delineation: North Central and Northeast Region (Corps, 2009)
- The Michigan Rapid Assessment Method for Wetlands (MiRAM) (MDEQ, 2008).

CEC and KME used a combination of each of these methods to both establish wetland boundaries and to evaluate wetland values and functions within the study area.

KME also conducted additional ecological studies within the proposed study area including frog and toad surveys, bird surveys, and stream/fisheries surveys. KME utilized the data gathered from these studies to establish a baseline of ecological conditions along the proposed routes and to provide information related to the value and function of existing wetland complexes as well as to assess the potential direct and indirect impacts associated with the proposed road construction activities.

5.01.A. Wetland Delineations

CEC and KME conducted wetland delineations within the study area during the 2010 and 2011 growing seasons. The methods used during these wetland delineations are described in the Wetland Delineation Reports submitted with this application for permit (KME, 2011b). Based on GPS mapping, a graphic was then prepared depicting the location of the wetlands within the landscape. This wetland delineation was then incorporated into the project plans and used to determine wetland impacts.

5.01.B. MiRAM

MiRAM was employed during the 2010 and 2011 growing seasons to assess the functional value of the wetlands along the proposed road route. Wetland Functional Value Assessment reports were prepared that provide specifics of this rating system and the scoring of individual wetlands (KME, 2011c) (Appendix M). KME gathered available information in order to define MiRAM wetland evaluation area boundaries according to guidelines specified within the *MiRAM User Manual*. The MiRAM methodology requires that a knowledgeable biologist score each wetland on several different metrics including:

- Wetland size and distribution;
- Upland buffers and intensity of surrounding land uses;
- Hydrology;
- Habitat alteration and habitat structure development;
- Special situations;
- Vegetation interspersion and habitat features;
- Scenic, recreational and cultural value.

KME conducted the MiRAM evaluation on 70 different wetland complexes along the CR 595 corridor. The MiRAM wetland evaluation area sizes ranged from 0.1 acre to 50 acres and MiRAM functional value scores ranged from 30 to 90.5. In the Upper Peninsula, MiRAM scores of less than 40 generally indicate low wetland functional value, MiRAM scores between 41 and 69 generally indicate moderate wetland function and MiRAM scores of 70 and over generally indicate high wetland functional value. The actual scores for each of the wetlands (generally described below) are included in the 2011 KME Wetland Functional Value Assessment using MiRam and 2011 Wetland Functional Value Assessment using MiRam Kipple Creek route (Appendix M) referenced above.

Of the 70 MiRAM wetland evaluation areas that were rated, 34 wetlands scored within the high wetland functional value range (48.5%). Many of the highest rated wetland scoring areas were components of riparian systems, as a host of ecological functions are provided by riparian systems and associated wetlands.

Thirty-three MiRAM wetland evaluation areas scored within the moderate wetland functional value range (47%). The wetlands with these scores appear to have some ecological impairment but remain viable ecological systems. Wetlands in this category have functional values typical of the majority of wetlands that are found throughout Michigan.

Three MiRAM wetland scoring areas were scored within the low functional value range (4.5%). The wetlands with these scores generally have been degraded and generally failed to show significant recovery, with the majority of them being small, isolated pockets that are most susceptible to degradation.

5.02 Environmental Consequences: Wetlands

Construction and operation of the proposed CR 595 will unavoidably impact a variety of wetland types within the study area. The direct impacts to wetlands are mainly associated

with excavation and filling activities. Potential indirect effects to wetlands are associated with sedimentation and changes in the plant communities near CR 595.

An important fact to note in reviewing the amount of wetland proposed to be impacted in this application is that all wetlands (state or federal-regulated or not) have been included in the wetland impact calculations for the CR 595 project; i.e. approximately 0.28 acres of isolated, non-contiguous (and therefore presumably non-regulated) wetlands have been included in the direct wetland impact of 25.81 acres attributed to CR 595. (including Trail 5 reroute and Triple A stream restoration.

Of the 25.81 acres of wetlands proposed to be impacted for CR 595, approximately 19.38 acres are forested, 5.83 acres are emergent, and 0.60 acres are scrub-shrub.

The proposed CR 595 impacts approximately 25.81 acres of wetland over a distance of 21.4 miles, including the wetland impacts associated with the Trail 5 relocation and the East Branch Salmon Trout River stream mitigation aspects of the CR 595 project. Given the presence of large linear wetlands on the landscape, avoidance of these wetlands is not feasible or prudent. However, CR 595 stream crossings have been located and designed to minimize unavoidable wetland impacts to the extent feasible.

Consideration has also been given to minimizing the potential for indirect or secondary wetland impacts that may occur as a result of constructing the proposed CR 595. Mitigation of indirect and secondary impacts has been employed during the design phase of the project and will be implemented during the construction and post-construction phases of the project. Some of the specific mitigation considerations for these types of impacts are addressed in the following subsections.

5.02.A. Disruption of Near-Surface Hydrology

CR 595 construction specifications require the use of MDOT Class III fill in wetlands, which is fill that has good hydraulic conductivity intended to pass groundwater flows at least as easily as the soils that the fill replaces. To more fully ensure that the road fill will not impede groundwater flow, MCRC will incorporate a layer of crushed rock in the fill in order to ensure minimal interruption of groundwater flow at appropriate locations. This mitigating measure is called Groundwater Drainage Layer on the plan and profile drawings and is explained in detail in the Hydrology section of this document.

Additionally, bridges and culverts at riparian wetland crossings have been designed using aspects of Stream Simulation Methodology. As proposed, bridges and culverts have been designed to span the bankfull width of the streams. The design goal is to provide for undisrupted stream flow and an in-structure riparian area, thereby further reducing the potential of near-surface hydrological disruption in riparian wetlands.

5.02.B. Increased Runoff

A subwatershed analysis was conducted by the project team after the general route had been selected for the proposed road. The purpose of this work was to ensure that seasonal overland runoff would follow its normal course and minimize potential for erosion and wetland/stream impacts. The detailed analysis of the runoff patterns is presented in Section 5.55 of this document.

Using existing topographic maps, project civil engineers determined the areas of subwatersheds that drain to (or across) the proposed road, as well as the flow direction and runoff volumes to be expected from each subwatershed, both before and after the proposed CR 595 is constructed. Although the MDOT Design Manual indicates that designing for the 25-year frequency storm events is appropriate for managing runoff in undeveloped areas, the 100-year frequency event was used for the CR 595 design to provide an extra measure of protection.

5.02.C. Pollution Related to Winter Road Maintenance

CR 595 will be maintained during the winter months to minimize hazardous driving conditions to the extent practicable using normal ice and snow removal methods and materials. CR 595 has been designed to ensure that road runoff does not discharge directly to wetland and streams and to properly detain runoff to allow pollutants to settle out according to Stormwater Runoff BMPs. Other road maintenance protocols will be implemented by MCRC as required by MDEQ.

5.02.D. Introduction of Secondary Development in Wetlands

Any secondary development in wetlands as a result of the construction of CR 595 is considered to be limited, primarily due to existing wetland regulations that require wetland impact avoidance and consideration of alternative construction methodology to minimize wetland impacts. Thus, wetlands are unlikely to suffer significant secondary effects from development associated with the construction of CR 595. Land ownership patterns will also serve to limit secondary impacts to wetlands (i.e. large timber company ownership).

With the exception of some parcels of land on Wolf Lake Road (an existing county road) south of Brocky Lake near the south end of the project, most of the proposed CR 595 is located on timber company property owned by Plum Creek Timber Company (formerly Mead Paper Company), J.M. Longyear LLC, GMO (formerly International Paper Company), and on land owned by KEMC. The timber company landowners own land for the purpose of growing and harvesting a continuing supply of the type and quality of timber needed for their markets and mills. Introduction of any substantial amount of development that would impact streams or wetlands by these landowners as a result of CR 595 is highly unlikely in the foreseeable future.

Many timber company properties are enrolled in the CFA, first enacted as Public Act 94 of 1925, for the purpose of obtaining reduction in property taxes for property being used to grow and harvest timber. Development or sale of CFA lands may result in tax penalties on the present owner, which is a strong incentive for the timber companies to not develop the land.

5.02.E. Introduction of Invasive Species to Wetlands Bordering the Proposed CR 595

Introduction of invasive species by seeds or plant parts carried by vehicles to wetlands along the proposed CR 595 is possible. Post-construction monitoring to identify and eradicate any invasive species that may become established is a mitigation task that will be implemented as the situation warrants.

5.02.F. Potential Secondary Effects as a Result of Road/Trail Construction

The general area to be served by CR 595 has a well-developed system of county roads, logging roads, and trail roads. Figure 5-1 shows some of the existing road network in the area adjacent to the proposed CR 595. A GIS analysis by CEC found that 99% of the proposed CR 595 is located within 500 feet of an existing road or trail.

The networks of trails and logging roads that connect to the county roads have been constructed over the years for timber harvest. Due primarily to the cost of construction, the timber companies only construct logging roads when necessary to access timber that is ready for harvest and no road access exists. There is only very minimal road construction for access to camps or for recreation; most of this access is on existing logging roads and trails. For these reasons additional road construction connecting to the proposed CR 595 is not expected. Therefore, secondary effects on upland habitats and unregulated wetlands caused by additional road building as a result of CR 595 should be minimal, because impacts proposed to regulated wetlands would require a permit from the MDEQ. However, it is acknowledged that CR 595 may result in the construction of additional temporary logging roads/trails to facilitate timber harvest in areas adjacent to CR 595. While such road construction is an activity that is unregulated by Parts 301 and 303, as part of any mitigation requirement associated with an issued permit, KEMC and MCRC are committed to providing appropriate compensatory mitigation for impacts that result from such roads during any permit monitoring period. In the alternative, KEMC and MCRC are willing to consider an agreement with the MDEQ to address any potential and/or anticipated impacts from the construction of unregulated logging roads.

5.02.G. Other Potential Impacts to Remnant Wetlands

In addition to other secondary impacts to wetlands that could result from the construction of CR 595, there is a potential impact to wetlands that are partially filled or excavated for the road construction where there would be a small remnant area of wetland, typically on one side or another of the proposed CR 595. For purposes of this portion of the evaluation, 2,100 square feet (0.05 acres) was selected to be the cutoff for wetlands so likely to be impacted that installing equalization culverts was probably not warranted and that wetland impacts would be acknowledged.

Equalization (or stream) culverts are being proposed on all other wetlands where there is more than 2,100 square feet of wetland remaining. Therefore, using the 2,100 square foot criteria, 17 wetlands have been identified where it appears excavation or filling for CR 595 would impact an additional 0.4 acres of the remnant wetlands (above and beyond the direct impact of these 17 wetlands). This acreage of wetland impacts could be simply added to the final wetland mitigation plans. Another approach to this issue would be to consider some portion of the restoration of the 3.78 acres of wetlands by the removal of road segments to be abandoned as a part of the CR 595 project as described in section 8.1 as mitigation for the potential 0.4 acres of secondary wetland impacts. The 17 remnant wetlands and the total impacts that may result are listed in Table 5-1.

5.02.H Removal and Backfill of Organic or Other Unstable Soils

It is anticipated that during construction of CR 595, areas of organic or other unstable soils will be encountered. The road construction method used in these areas will be to first

remove the unstable soils and then replace them with MDOT Class III fill to establish a sound road base. Sheet E of the CR 595 plan and profile drawings depicts a typical cross-section of this anticipated construction method. In situations where the depth of unstable soil (depending on soil characteristics and topography) exceeds about seven feet, the necessary excavation may extend outside of the slope stake line. In the situation where such excavation is necessary outside of the slope stake line, the wetland impacts will be temporary, in that the wetland will be restored to original grade and a minimum of one foot of wetland soil will be placed over the excavation area and seeded to re-establish wetland conditions. These temporary wetland impacts have not been quantified due to the variability of soil conditions, and mitigation for these potential temporary wetland impacts has not been proposed. MCRC is committed to mitigating these temporary wetland impacts as needed.

5.02.I. Temporary Haul Roads or Construction Pads

During construction, temporary roads or pads may be necessary to provide access to the road construction area through wetlands or other regulated features. At this time only one crossing, that being a temporary road at the Second River, has been identified. The details of that crossing are included in this permit application. In the event that another temporary access road or construction pad is necessary at another location, prior approval of the MDEQ will be obtained. Design of these temporary structures will be guided by Part 301 and Part 303 minor project and/or general permit criteria..

5.02.J. Dewatering

Dewatering of accumulated surface water or groundwater may be necessary within areas of construction. The dewatering methods used will be consistent with Part 301 and Part 303 minor project and/or general permit criteria and will also be consistent with Best Management Practices for soil erosion and sedimentation control.


N
W
E
S
0 1 2
Miles
T52N-R29W
T52N-R28W
T52N-R27W
Lake Superior
Huron Mountain Club Rd
Lighthouse
Dam
Lake Independence
T51N-R29W
T51N-R28W
T51N-R27W
Northwestern Rd
Ford Rd
Billiard's
CR 510
Camp Rd
Triple A Rd
CR 55
T50N-R29W
T50N-R28W
T50N-R27W
CR AAB
CR AAR
CR AAC
CR GGI
BARAGA COUNTY
Silver Lake Basin
CR AKC
T49N-R30W
T49N-R29W
T49N-R28W
T49N-R27W
Huron Bay Glade
CR 607
Dishno Rd
Wolf L.
Red Rd
CR AAD
CR AAP
Dead River Storage Basin
CR CCO
CR 573
Brocky L.
T48N-R30W
T48N-R29W
T48N-R28W
T48N-R27W
CR CVV
CR CY
Wolf Lake Rd
CR AAD
Deer Lake
Lake Michigamme
US 41
CR 496
41
28
95
LEGEND
Proposed CR 595
US and State Hwy
Local Road
Logging Road
Active Railroad
Township Line
CR 595 Study Corridor
Owner:
MARQUETTE COUNTY
King & MacGregor Environmental Inc.
40595 Koppernick Road
Canton, MI 48187
(734) 354-0594
COLEMAN ENGINEERING COMPANY
635 CIRCLE DRIVE
IRON MOUNTAIN, MICHIGAN 49801
(906) 774-3440
FIGURE 5-1
Existing Road and Trail Network
in the CR 595 Study Corridor
Drawn By: CEC
Approved By: DWS
Revision: 6-10-11
Date: 9-22-11
Project No. 11017
Figure No. 5-1

Table 5-1. Potential Impacts to Remnant Wetlands

Wetland Impacted	Approx. Station	Watershed	Wetland Type	Area Sq. Ft.	Plan Sheet #
*BB6 (East Side)	142+00	Escanaba	EM	100	2
*A57 (West Side)	368+25	Escanaba	FO/EM	800	9
KM3 (East Side)	551+00	Dead	EM	600	16
L9 (West Side)	1154+00	Michigamme	FO	1,600	19
A15A (West Side)	1407+00	Dead	FO/SS	2,000	27
A17 (North Side)	1426+00	Dead	FO/SS	600	28
B42 (West Side)	1435+50	Dead	FO	2,100	28
B40 (East Side)	1447+00	Dead	EM/SS	500	29
BBB1 (West Side)	1451+00	Dead	FO	600	29
BBB1 (East Side)	1452+00	Dead	FO	2,000	29
BBB1 (East Side)	1453+00	Dead	FO	1,200	29
B38 (West Side)	1464+00	Dead	FO	2,100	29
B37B (West Side)	1472+00	Dead	FO/EM	50	30
B34B (West Side)	1485+00	Dead	FO	200	30
B8 (East Side)	1540+75	Dead	FO/SS	100	32
B6 (East Side)	1545+50	Dead	FO/SS	1,800	32
M9 (West Side)	1604+00	Yellow Dog	EM	400	34
	TOTAL = 0.4 Acres			16,750	

*Non regulated wetland but still included in wetland impacts.

5.03 Wetland Mitigation

The following measures will be implemented to ensure that the functional attributes of the wetlands in each watershed will be maintained and that secondary effects of the project will be addressed.

- Most of the MiRAM wetlands that scored within the high functional value range within the project corridor have either a complex hydrologic regime (e.g., riparian and/or groundwater) or a hydrologic system that is delicately balanced and therefore susceptible to perturbation. Many of these wetlands are functioning at a relatively high ecological level due primarily to complex hydrology and wide, protective buffers which exist due to the lack of development within the project area. The biggest threats to these systems are potential hydrologic changes that can ultimately degrade the ecologic condition of these wetlands. For example, diverting stormwater to a bog or muskeg may cause this relatively uncommon habitat type to be replaced by a common habitat type (e.g., cattail marsh). The project engineers have placed a particular emphasis on avoiding bogs or muskeg during project design in order to prevent secondary impacts to these wetland types as a result of the project.

- Invasive species monitoring will be implemented following construction as the situation warrants.

- Compensatory wetland mitigation is proposed to help offset the direct wetland resource impacts associated with this project. Compensatory mitigation will be accomplished in the form of creation of a minimum of 48.41 acres of new wetland. This proposed wetland mitigation is described in more detail in other sections of this document.

- MDOT Class III fill will be placed as road base to ensure that wetland hydrology that may be dependent upon groundwater flow is not altered. A layer of stone will be placed in 15 wetland fill locations to ensure the free flow of groundwater through the road embankment to avoid any detrimental changes to groundwater levels or flow. These rock layers are called Groundwater Drainage Layers. The locations are specified on the plan and profile drawings and a detail is shown on Sheet K of the plan and profile drawings.

- Bridges and culverts have been designed to minimize hydrologic changes within riparian wetlands and to allow for wildlife species movement along stream edges.

- The road has been designed to ensure that runoff is properly detained and does not discharge directly to wetland and streams. Stormwater management BMPs and other road maintenance protocols will be implemented.

- Erosion and sedimentation problems that are often associated with hydrologic modifications can provide opportunity for highly-invasive plant species (e.g., reed canary grass and giant reed) to gain a foothold within wetland systems that might otherwise be resistant to invasion. BMPs will be implemented during road construction to maintain natural hydrological regimes and minimize substrate disturbance near wetland interfaces.

- For potentially vulnerable nexus habitats, BMPs will be utilized to minimize potential habitat connectivity issues and avoid/minimize impacts to other wetlands that currently exhibit high functional value.

5.04 Summary: Wetlands

Marquette County contains significant areas of wetland (an estimated 300,000 acres), with about 25 percent of the county's land area being classified as wetlands. The majority of these wetlands (approximately 80 percent) are forested; the remaining wetlands are scrub/shrub and emergent habitat. The wetland delineations conducted within the CR 595 corridor found a similar wetland habitat configuration. Approximately 48.5 percent of the wetland complexes evaluated using MiRAM were found to hold high function values and 47 percent were found to hold moderate functional values. The high functional value wetlands are typically associated with riparian corridors and those wetlands that support rare plant communities.

The proposed CR 595 alignment has been designed to avoid wetland impacts to the greatest extent possible. The 25.81 acres of unavoidable wetland impacts will be mitigated by design and construction methodologies that reduce direct and secondary wetland impacts and the creation of a minimum of 48.41 acres of wetland.

Secondary impacts on wetlands from the construction and operation of CR 595 have been described in this section. Additional impacts on regulated wetlands are not anticipated due to the MDEQ having regulatory jurisdiction over these areas and permits are required to impact these wetlands, other than logging roads which could be addressed individually with an agreement with KEMC and MCRC. The possibility of other potential secondary effects such as disruption of wetland hydrology, introduction of invasive species, and fragmentation of wetland habitats are acknowledged and will be minimized to the extent practical, and additionally mitigated as may be required by MDEQ.

5.05 Affected Environment: Rivers and Streams on CR 595

There are a total of 22 river and stream crossings of the proposed CR 595 road corridor resulting in new, expanded and improved road crossings via the installation of new bridges and culverts at those locations. Of the 22 proposed stream crossings, 15 will be replacement bridges or box culverts and 7 will be new stream crossings Characterization of the streams within the CR 595 corridor provides beneficial information regarding the existing health, quality and biological potential of streams. MDNR has collected stream data for many streams in Marquette County, but recent MDNR surveys are few and what surveys may have been done were not conducted in the locations where the proposed CR 595 will cross the rivers and streams. Therefore, in order to obtain current stream data, KME collected baseline stream data including macroinvertebrate community sampling, electro-fishing to sample fish populations, and habitat characterization as part of the stream surveys at 13 locations within the CR 595 corridor to assess stream quality, habitat quality and fish populations in the various watercourses. KME methods and detailed data are presented in the 2008 Ecological Surveys Report and its 2010 Addendums.

CR 595 crosses the following 22 rivers and/or streams:

Yellow Dog River
Mulligan Creek (plus five tributaries)
Wildcat Canyon Creek (three crossings plus on tributary)
Dead River
Voelkers Creek (plus one tributary)
Dishno Creek Tributary
Kipple Creek (plus three tributaries)
Unnamed stream (Kipple Creek watershed)
Trembath Lake Outlet
Second River
Middle Branch Escanaba River

KME conducted field evaluations in June and October of 2008. In 2010, Second River at the proposed Wolf Lake Road crossing location was also evaluated. These evaluations were conducted to assess stream ecological conditions at or near each of the proposed CR 595 stream crossing sites, using MDEQ Great Lakes and Environmental Assessment Section (GLEAS) Procedure #51 (P-51) guidelines (MDEQ, 1997; MDEQ, 2002). Thirteen of the 22 stream crossing sites were assessed. Of those 13 sites, eight are perennial streams and five are seasonal (intermittent) streams. The perennial streams were surveyed in June and October of 2008, while the intermittent streams were only surveyed in June 2008. The locations where stream surveys were conducted are presented in Table 5-2. The remaining two streams, Connors Creek was not sampled during the 2008 surveys because it was determined to be intermittent and/or not physically large enough to survey.

Table 5-2 Stream Survey Locations for the Proposed CR 595.

Stream Name	Township and Range	Section	Wetland ID *
Yellow Dog River	50N-29W	13	D3
Mulligan Creek	50N-29W	26	B1
Tributary #1 to Mulligan Creek	50N-29W	35	B31
Tributary #2 to Mulligan Creek	50N-29W	35	B32
Wildcat Canyon Creek**	49N-29W	2	B43
Wildcat Canyon Creek	49N-29W	2	A17
Wildcat Canyon Creek	49N-29W	2	A16
Wildcat Canyon Creek	49N-29W	11	A15
Dead River	49N-29W	11	A10
Voelkers Creek	49N-29W	23	E17
Tributary to Second River	48N-28W	19	A61
Second River***	48N-29W	25	C3
Middle Branch Escanaba River	47N-29W	2	R1

*Stream location can be cross-referenced to Wetland ID labeled in CR 595 project plans.
**Originally designated as "Dead River Tributary" in 2008 Ecological Survey report.
***Stream survey conducted in 2010 (different location than 2008).

Included in Table 5-3 for each stream surveyed is the stream classification (i.e. perennial or intermittent), P-51 biological integrity rating, P-51 habitat characterization rating, and the presence/absence of brook trout. Intermittent streams were not electro-fished.

Table 5-3 Results of the Stream Surveys for the Proposed CR 595.

Stream Name	Stream Type*	Biological Integrity	Habitat Classification	Presence of Brook Trout
		Upstream/Downstream		
Yellow Dog River	Perennial	Acc**/Acc	Exc/Exc	Yes (21)/Yes (32)
Mulligan Creek	Perennial	Acc/Acc	Good/Good	No/No
Trib. #1 to Mulligan Creek	Intermittent	- /Exc	- /Exc	No fish survey
Trib. #2 to Mulligan Creek	Intermittent	Exc/Exc	Exc/Exc	No fish survey
Wildcat Canyon Creek	Intermittent	Acc/Exc	Good/Exc	No fish survey
Wildcat Canyon Creek	Intermittent	Acc/Exc	Good/Exc	No fish survey
Wildcat Canyon Creek	Intermittent	- /Acc	- /Good	No fish survey
Wildcat Canyon Creek	Perennial	Acc/Exc	Good/Exc	No/No
Dead River	Perennial	Acc/Acc	Good/Good	No/Yes (1)
Voelkers Creek	Perennial	Acc/Acc	Good/Good	No/No
Trib. to Second River	Perennial	Acc/Acc	Good/Good	Yes (1)/Yes (2)
Second River	Perennial	Acc/Acc	Good/Good	Yes (2)/Yes (1) [roadside (1)]
Middle Branch Escanaba River	Perennial	Acc/Acc	Mar/Good	No/No

***** Intermittent stream results are from the June 2008 survey. Perennial stream results area from the October 2008 survey, except for Second River results which are from the October 2010 survey.
**** Acc**=Acceptable; **Exc**=Excellent; **Mar**=Marginal

On the Dead River, one brook trout was found in the downstream survey section during the October 24, 2008 survey and one was found in the upstream survey section. On the tributary to Second River (Trembath Lake Outlet), two brook trout were found in the downstream survey section during the July 1, 2008 survey. Four brook trout were found at the Second River sampling locations during the October 4, 2010 survey.

On the Yellow Dog River, a total of 21 brook trout were found in the upstream survey section and 32 in the downstream survey section during the October 22, 2008 survey at the existing bridge crossing. All of the trout caught at the existing Yellow Dog River Bridge during the October 2008 sampling event were within the three-inch to five-inch size class, which is a common hatchery release size. Some of these trout lacked fully-developed pectoral fins, which often occurs within crowded hatchery conditions. A search of the MDNR *Fish Stocking*

Database revealed that 3,600 brook trout had been stocked near this location in early May 2008. Average length of the trout stocked at that time was 4.4 inches. This evidence suggests that most, if not all, of the brook trout caught at the Yellow Dog River bridge location in the October 2008 stream survey were hatchery-raised brook trout.

There were no brook trout present in four of the eight perennial streams sampled. This absence of native brook trout in those perennial streams sampled may be attributed to the presence of beaver impoundments in the vicinity of many of the stream survey sites. These impoundments have likely slowed stream velocities, causing burial of complex benthic substrates, lowered dissolved oxygen, warmed the water above tolerance thresholds (especially in late summer months), and are impediments to brook trout dispersal. Brook trout survival may also be inhibited by the natural acidic conditions in several of the streams. For example, a pH of 4.34 (highly acidic) was measured in Wildcat Canyon Creek during the October 2008 assessment. Several small tributary streams have many habitat characteristics favorable to trout; however flows appear to cease within these streams during dry summers (as observed for example in August 2008).

A biological integrity measurement using the metrics in P51 is composed of stream macroinvertebrate community metric analysis. Habitat quality is a measurement composed of several metrics that represent physical/geomorphologic parameters, as well as riparian vegetation characteristics. The biological integrity was determined to be “acceptable” in 22 of the 30 sample reaches of the streams surveyed, while the eight remaining sample reaches were considered “excellent”. Habitat quality was determined during KME surveys to be “good” at 19 locations and “excellent” at 10 locations, while the upstream sample reach at the Middle Branch Escanaba River was determined to be marginal.

5.06 Environmental Consequences: Rivers and Streams on CR 595

The potential for fish mortality and sediment loss will exist during the construction or reconstruction of road crossings over streams. Stormwater runoff from impervious surfaces is increased after construction. If not effectively dissipated, the increased runoff volume can increase localized flooding and stream channel scouring, thereby altering the stream ecosystem. Each segment of the proposed CR 595 has been studied by civil engineers at CEC. The CEC engineering design features will be implemented to ensure runoff patterns do not cause hydrologic changes on the landscape. These engineering design mitigating measures are explained in the hydrology section of this assessment.

If bridge or culvert crossings are not appropriately designed, the resulting geomorphologic and hydraulic alterations to the stream can result in increased erosion and down-cutting. Undersized culverts can inhibit the migration of fish to upstream reaches while increased erosion and downstream sediment deposition can be detrimental to fish, macroinvertebrates and aquatic plants. Implementation of aspects of Stream Simulation Methodology in the design and installation of the proposed bridges and culverts on the proposed CR 595 will ensure that the structures are properly sized; and implementation of soil erosion BMPs will protect the streams from sedimentation to the extent possible. Temporary coffer dams will be employed to all

The opportunity exists to improve existing road/trail stream crossings with the construction of a new road. Concerted efforts have been made in the project design to locate the new road alignment on existing roads and trails in order to minimize the number of new stream

crossings needed for the project, as well as to provide the opportunity to replace inadequate bridges and culverts with properly designed structures. Placement of bridges and culverts properly designed for each specific stream and thereby eliminating the existing and persistent sediment/erosion issues at/near some of the existing crossings would be a benefit to stream quality.

In addition to sediment, the following contaminants can be attributed to roads: exhaust emissions, oils and grease, road salts, and pesticides. Exhaust from vehicles deposit hydrocarbons comprised of heavy metals on roadways and compounds such as carbon dioxide (CO_2), oxides of nitrogen (NOx), and sulfur dioxide (SO_2) are released into the atmosphere. While hydrocarbon fuel emissions are thought to contribute to global warming, the more important factors associated with emissions is the impact on stormwater runoff and air quality. The emissions associated with CR 595 and other routes are described in more detail in the air quality section of this assessment.

Oil and grease are deposited on roads by vehicles, especially older vehicles. The impact of oil and grease on roads and parking lots can be observed by the dark staining and the sheen on runoff during storm events. Directing runoff to outlets away from streams and other bodies of water is the best mitigating measure to protect water quality where outlets are necessary, but maintaining sheet flow off roads where possible is the best way to ensure that oil or grease runoff is not discharged into streams.

Salt (NaCl) is used to de-ice roads in winter to maintain safe vehicular travel because salt is available at lower cost than any other de-icing agent and assists road commissions and other agencies charged with maintaining public roads in winter to control tight budgets. Use of road salt has been discussed in this assessment as it may relate to wildlife impacts and vegetation. The impacts of road salt use on streams and other bodies of water adjacent to the proposed CR 595 can be mitigated by directing runoff from roads as explained in the previous paragraph.

Pesticides will not be used in the maintenance of roadside vegetation on the proposed CR 595. Growth of roadside vegetation that becomes a safety or wildlife use/visibility concern on CR 595 will be maintained by once per year mowing to take place in late July or August after the nesting season.

Best management practices for road construction and design will be used throughout the proposed CR 595 project in order to minimize impacts on fish and aquatic life. Implementation of a Storm Water Pollution Prevention Plan (SWPPP) and approved soil erosion control measures will effectively minimize the potential for impacts as a result of the construction and operation of the proposed road. Consideration of hydraulic and bankfull characteristics of each of the streams at the crossing locations is more fully described in the stream mitigation section. The following sections describe threatened or endangered fish species, water quality protection, and sedimentation control measures associated with the proposed CR 595.

5.06.A. Threatened or Endangered Fish Species

There are no known federally-listed fish species in Marquette County. The only Michigan-listed Threatened, Endangered, or Special Concern fish species known to occur in Marquette

County are the lake herring (*Coregonus artedi)* and the Ives lake cisco (*Coregonus hubbsi*). These two fish species have similar habitat requirements, preferring deep inland lakes and the Great Lakes (MNFI, 2007). As expected, these species were not encountered during the KME stream surveys. No lake habitats will be directly impacted by the proposed CR 595 project.

5.06.B. Water Quality Protection

The protection of stream habitat as described will serve to protect fish and other aquatic organisms. The two most important measures that will be implemented to protect fish and aquatic life in the streams are: 1.) keeping sediment from being introduced into the streams, both during and after construction and, 2.) maintaining the natural stream bottom.

5.06.C. Stormwater and Sedimentation

Most streams are located in valleys with the road approach on each side coming downhill to the stream. To control stormwater runoff, including snowmelt, and to prevent the introduction of sediment into the streams crossed with the proposed CR 595, the following measures have been implemented in the design of the road:

- Diversion of stormwater from roadside ditches into the adjacent uplands on more than one location on the slopes, which will result in less volume of water at the bottom of the slope thereby resulting in less sediment transport and erosion;

- Implementation of BMPs to control erosion and sedimentation, such as rock riprap check dams, rock-lined runoff channels, geotextile fence, slope seeding, and mulching;

- Storm drains will not be located on the bridges or on the large bottomless culverts, thus preventing sediment from being introduced directly into the streams. Some road runoff may still enter streams directly from bridges or culverts, but the sediment volume would be minimal. Road grades leading up to stream crossings will drain water off the roadway in order to keep sediment out of the streams.

Temporary erosion control measures will be implemented during the construction of the road and will be detailed for the Soil Erosion and Sedimentation Control Part (Part 91) permit administered by Marquette County as well as the SWPPP and Notice of Intent to be filed with the MDEQ administered under Part 31 and the Federal Water Pollution Control Act.

5.07 Affected Environment: Rivers and Streams on CR 510-Red Road-Sleepy Hollow Route

Two additional routes using primarily existing roads were evaluated by KEMC prior to the time that the MCRC became involved as the lead public agency to seek a permit for the construction of the proposed CR 595. Those two routes are the CR 510-Red Road-Sleepy Hollow route and the CR 550 route. The impacts to streams with those two routes are presented in this document to provide a comparison to the proposed CR 595. This section assesses the CR 510-Red Road-Sleepy Hollow route.

The CR 510-Red Road-Sleepy Hollow route would require reconstruction of Triple A Road, a portion of CR 510, Red Road, Sleepy Hollow Road and a portion of Wolf Lake Road. The rivers and streams crossed by this route that were surveyed are listed in Table 5-4 and the results of the stream surveys are provided in Table 5-5.

Table 5-4. 2010 and 2011 Stream Survey Locations: CR 510-Red Road-Sleepy Hollow Route.

Stream Name	Town-Range	Section
East Branch Salmon Trout River	50N-28W	4
Lost Creek	50N-27W	7
Yellow Dog River	50N-27W	17
Big Pup Creek	50N-27W	20
Little Pup Creek	50N-27W	28
Big Garlic River	49N-27W	4
Clark Creek	49N-27W	29
Deer Creek	49N-27W	28
Second River*	48N-29W	25
Middle Branch Escanaba River*	47N-29W	2

***Same crossings as CR 595 route.

Table 5-5. Results of the 2010 and 2011 CR 510-Red Road-Sleepy Hollow Route Stream Surveys.

Stream Name	Stream Type	Biological Integrity	Habitat Classification	Presence of Brook Trout
		Upstream/Downstream		
East Branch Salmon Trout River	Perennial	Exc*/Exc	Exc/Good	Yes (11)/Yes (9) [roadside (13)]
Lost Creek	Perennial	Exc/Exc	Good/Good	Yes (6)/Yes (8)
Yellow Dog River	Perennial	Exc/Acc*	Exc/Good	Yes (11)/Yes (12)
Big Pup Creek	Perennial	Acc/Acc	Exc/Good	Yes (22)/Yes (24)
Little Pup Creek	Perennial	Exc/Exc	Exc/Exc	Yes (24)/Yes (24) [roadside (18)]
Big Garlic River	Perennial	Exc/Exc	Exc/Exc	Yes (17)/Yes (19) [roadside (28)]
Clark Creek	Perennial	No surv /Acc	No surv /Good	No survey/Yes (5)
Deer Creek	Perennial	Exc/ No surv	Exc/ No survey	Yes(22)/No survey
Second River**	Perennial	Acc/Acc	Good/Good	Yes (2)/Yes (1) [roadside (1)]
Middle Branch Escanaba River**	Perennial	Acc/Acc	Mar*/Good	No/No

* **Acc**=Acceptable; **Exc**=Excellent; **Mar**=Marginal

**Same crossing as the proposed CR 595 route.

The biological integrity was determined to be “acceptable” in eight of the 18 sample reaches of the streams sampled (44%), while ten sample reaches were considered “excellent” (56%). Habitat quality was determined during KME surveys to be “good” at nine locations (50%) and “excellent” at eight locations (44%), while the upstream sample reach at the Middle Branch Escanaba River was determined to be marginal.

For these streams, the data shows generally high biological integrity and habitat quality along with an abundance of brook trout which are all indicators of high-quality streams. It is important to note that the 2010 KME survey results indicate that brook trout are much more common and in greater numbers in the streams on the CR 510-Red Road-Sleepy Hollow route as compared to streams along the proposed CR 595 route.

5.08 Environmental Consequences: Rivers and Streams on CR 510-Red Road-Sleepy Hollow Route

The East Branch Salmon Trout River, Little Pup Creek, Big Garlic River, and Second River all have significant segments that are immediately adjacent to roads (i.e. Triple A Road , CR 510 and Wolf Lake Road). The existing road alignment in these locations has resulted in a more channelized flow regime as well as increased sediment loss from direct runoff from the road. Construction of a new road along this route would likely improve these road crossings and possibly relocate the streams away from the roadway, or vice versa. Installation of bridges or culverts that are adequately designed for the stream crossing, thereby eliminating the persistent sedimentation and erosion issues at/near the existing crossings, would be a potential benefit to stream habitat quality.

Sedimentation is a concern where the streams are located adjacent to roadways. This condition is exacerbated at the existing Triple A Road crossings of the East Branch Salmon Trout River. This stream crosses under Triple A Road in three locations and flows immediately adjacent to the road for a distance of about 700 feet. Soil erosion control measures are currently in place at the East Branch locations along Triple A Road to filter and serve to divert runoff away from this high-quality stream, but sediment impacts cannot be avoided. Constructing a new road in this area with a permanent paved surface with stormwater control would reduce sedimentation to the stream.

5.09 Affected Environment: Rivers and Streams on CR 550 Route

The CR 550 route would require reconstruction of Triple A Road and CR 510 segments, which would include widening, horizontal and vertical re-alignments, and upgraded stream crossings. Only one stream is crossed by this route on Triple A Road – the East Branch Salmon Trout River (three crossings). The East Branch Salmon Trout River location that was surveyed is located in Township 50N-Range 28W, Section 4.

The utilization of CR 550 for expanded heavy truck traffic would also require the reconstruction of four existing bridges. The streams involved are Alder Creek, Harlow Creek, Big Garlic River, and Little Garlic River.

KME stream survey results for the East Branch Salmon Trout River are shown in Table 5.7-6. The biological integrity of this stream is rated as excellent both upstream and downstream of the existing road crossings, while the habitat was characterized as excellent upstream and

good downstream. A total of 33 brook trout were counted during the field surveys at the upstream, downstream and roadside sample reaches.

P-51 Stream surveys were not conducted on the existing stream crossings on CR 550.

5.10 Environmental Consequences: Rivers and Streams on CR 550 Route

The environmental consequences of construction and runoff associated with roads and specifically the East Branch Salmon Trout River were previously described in the CR 510-Red Road-Sleepy Hollow Road route discussion. Other than impacts to the streams during construction, the replacement of the existing bridges on CR 550 is not expected to have any additional impacts to streams than presently exist.

5.11 Stream Mitigation

An extensive amount of stream evaluation has been performed in order to determine the least impacting design of the road crossings of each stream for the proposed CR 595. In addition, mitigation measures have been proposed as a part of the project design in an effort to ensure that the proposed stream crossings have minimal negative effects on stream resources. These evaluation and stream mitigation efforts include:

- Stream surveys were conducted to determine baseline ecological conditions and fisheries resources in the streams.

- Surveys were conducted to ensure that flow velocities are acceptable for all structures, even during flood events.

- HEC-RAS modeling was conducted to ensure that flood waters are adequately passed through structures during runoff events up to the 100-year frequency flood event for those stream crossings with two square miles or more of upstream drainage area.

- Streams were analyzed using aspects of Stream Simulation Methodology to determine the size of stream crossing structures and their placement to ensure that the structure has minimal impact on the streambed, on stream flow, and provides area in-structure to allow certain wildlife species as well as fish to pass through the structure.

- Clear span bridges are proposed over the five largest streams to ensure that there are no direct impacts from the crossing of those streams.

- Four existing stream crossings that are in portions of the existing roads that will be abandoned as a result of the construction of CR 595 are proposed to be removed, and stream banks restored as a component of the stream mitigation plan.

- Sixteen existing stream crossing structures at proposed crossings on CR 595 will be removed; many of which are currently inadequately-sized and therefore negatively impact the streams. These bridges and culverts will be replaced with properly-sized and designed structures.

- The length of culverts and bridges will be minimized where possible by the use of headwalls and wing walls that will serve to minimize the length of stream enclosed in the stream-crossing structures.

- Stream relocations have been avoided, except for some minor entrance channel construction to facilitate the best possible installation alignment of the new structures.

5.12 Summary: Rivers and Streams

Comprehensive stream surveys have been conducted to document the existing habitat conditions and the species of fish that may be present in each stream. This baseline data set will be valuable for future reference if post-road construction surveys are conducted.

Aspects of Stream Simulation Methodology were used to ensure that the design of the proposed 22 stream crossings minimizes any negative effects of the crossing. The Stream Simulation Methodology data was utilized in the sizing of the proposed culverts or bridges based on the bankfull width determination. This methodology prescribes the slope and bury depth of each culvert. In addition, pebble count surveys will be conducted in each stream during the preparation of the final construction plans so that the proper size and composition of stream substrate material for creating the new streambed within the culverts and in the area of construction disturbance will be provided.

Four existing stream crossing structures and road embankments will be removed (and the streambed restored) at locations where CR 595 will result in the abandonment of the existing road. Most of the existing culverts and bridges are inadequately sized, negatively impacting streams or impeding flood flows. Removal and replacement of 15 other existing structures as part of the CR 595 project will benefit the streams in the long-term.

Stream mitigation is proposed as a part of the CR 595 project, as described in the preceding section. The proposed stream mitigation is intended to compensate for the unavoidable impacts to the streams crossed for this road project. The proposed mitigation project on the East Branch Salmon Trout River where it crosses under Triple A Road at three locations, although it is not located on the CR 595 project, will substantially improve the existing situation. By the relocation of a portion of Triple A Road with one clear-span stream crossing structure, the East Branch Salmon Trout River will not be subjected to periodic introduction of sediment and the stream flow will be unimpeded.

5.13 Affected Environment: Habitat Fragmentation

The purpose of this habitat fragmentation analysis is to identify potential direct and indirect habitat fragmentation impacts from the proposed CR 595 roadway within a four-mile wide north-south corridor in northwest Marquette County. The proposed road would have an average right-of-way width of 66 feet, spanning approximately 21.4 miles, running from Triple A Road in the northern portion of the project corridor, south to US-41 at the CR FY intersection (Figure 5-2).

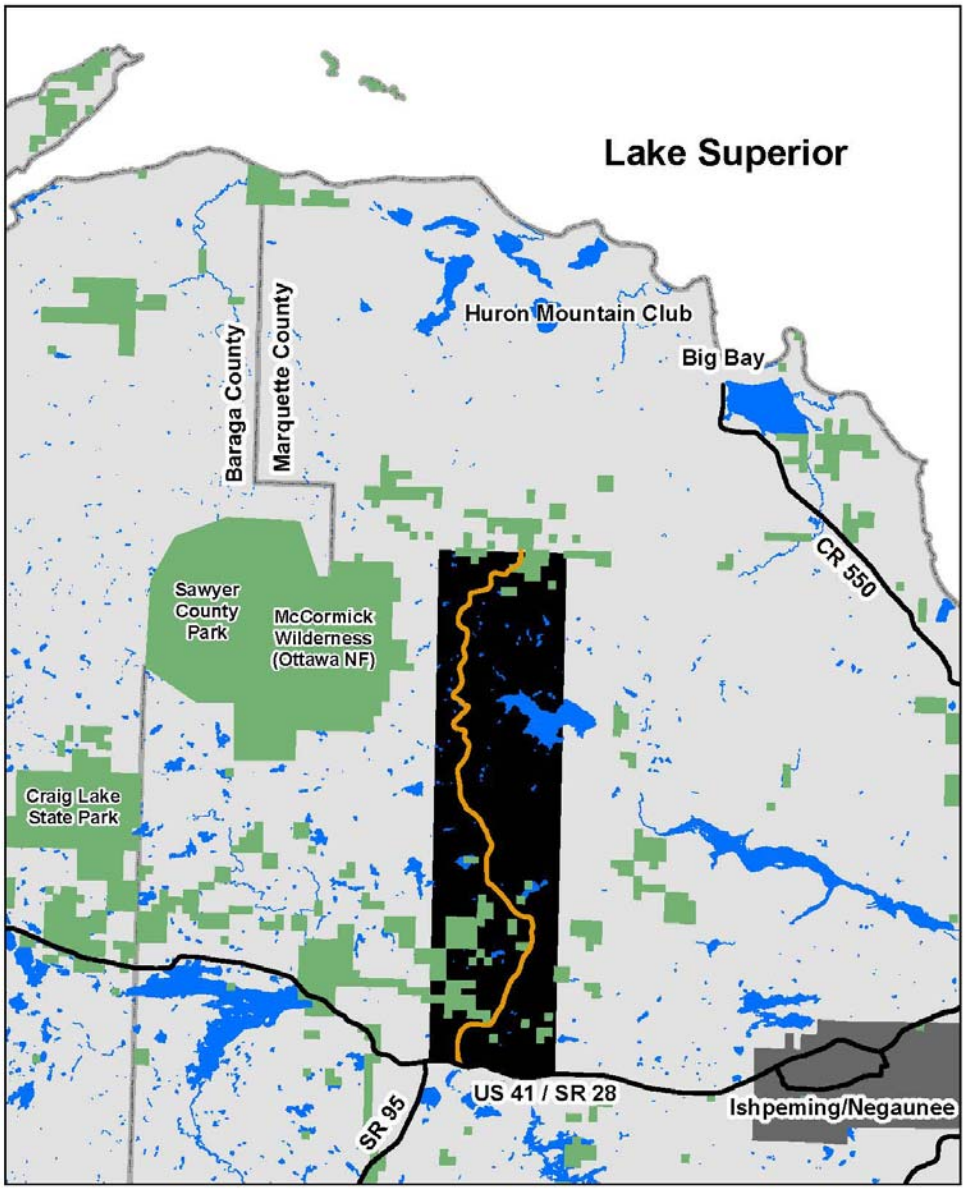


Figure 5-2. Overview of regional northern Marquette County / eastern Baraga County regional study area.

Habitat fragmentation is a complex issue, as are most ecological assessments, and evaluation of specific impacts from a roadway is difficult. In general terms, although a roadway may be a relatively narrow corridor across the landscape, it will have impacts on some species of existing plants and animals indigenous to the areas adjacent to the road. The landscape and habitats that would likely be affected by the proposed CR 595 are described in this document and assumptions and conclusions are made regarding potential impacts of the proposed road. It is anticipated that potential mitigation of unavoidable fragmentation impacts can then be derived from this analysis.

The literature pertaining to the effects of habitat fragmentation is extensive. It is also highly varied, with different authors measuring habitat fragmentation in different ways and, as a consequence, often drawing different conclusions regarding both the magnitude and direction of its effects (Fahrig 2003, Franklin et al. 2002). Habitat fragmentation is often defined as a process during which habitat utilized by a particular species is transformed into a number of smaller patches of smaller total area, isolated from each to some degree by a matrix (i.e. habitat or landscape type) that is unlike the original habitat (Wilcove et al.1986).

At one end of the spectrum, habitat fragmentation may simply be considered analogous to vegetative landscape heterogeneity that may be caused by human-associated processes. The *fragmentation-as-landscape-heterogeneity* concept may be useful when studying the effects on species that utilize late-seral habitats such as old-growth forest interiors.

Often though – and as is the case of the CR 595 corridor – a vegetated landscape may consist of various intermingled, successional land cover types with none or only few functioning as a truly *harsh matrix*, (i.e., a landscape feature that significantly inhibits connectivity of habitat patches).

A forested landscape such as that in the CR 595 corridor supports a mosaic of different vegetation communities at different successional stages. Such habitat is not ecologically analogous to a landscape containing isolated patches of forest surrounded by row crop agricultural or urban areas (Askins 1995). A vegetation community characterized by a specific successional stage provides habitat that varies in suitability for any particular species as it moves through the landscape. Research shows that regional biodiversity may not be negatively affected by the type of landscape heterogeneity found in the CR 595 corridor, as a majority of species utilize more than one type of land cover type and can easily move among habitat components within a relatively benign matrix environment (Franklin et al. 2002).

A useful definition of habitat fragmentation for purposes of analyzing the CR 595 corridor would be one that emphasizes the degree of harshness of the matrix environment among habitat patches, as well as the effect of that particular matrix on habitat/landscape connectivity, habitat quality, and ultimately biodiversity. The actual degree of habitat isolation caused by a particular matrix depends on matrix type, matrix width, and the configuration of the matrix within the landscape. For example, dense urban development, an impenetrable fence or wall, a busy expressway, intensely-cropped farmland, or a recent clear-cut would all fragment the land cover and habitat within a natural landscape to some degree, but the actual effects of each type of relatively harsh matrix on biodiversity and a particular species could be very different. The harsher the matrix that separates habitat patches, the less likely species will be able to effectively utilize other habitat components or patches within a home range (defined as the area where an animal lives or travels within) or be able to effectively immigrate to other locations within its population range (defined as the area of the country or

world where a species exists). CR 595 may not function as a harsh matrix for most species that are present within the region.

Habitat fragmentation is nearly always related to habitat loss, i.e., the matrix directly displaces at least some habitat. Habitat fragmentation can also be indirectly related to habitat loss when habitat is degraded (and effectively lost) via such impacts as edge effects (Laurence and Yensen 1991, Saunders et al. 1991). Edge effects are highly variable phenomena that depend greatly on matrix type, habitat type, and species' habitat requirements. In extreme circumstances, edge effects can reduce the viability of quality habitat throughout edge effect zones that may extend greater than 1,000 feet into a habitat patch from the edge of the matrix (Forman and Alexander 1998).

Smaller, isolated habitat patches typically have less biodiversity per unit area than larger patches (MacArthur and Wilson 1967, Saunders et al. 1991). If a habitat patch size falls below a minimum viability threshold for a given species, that species may become locally extinct if inter-patch immigration is reduced or prevented by a harsh matrix environment. If habitat fragmentation becomes serious enough, regional biodiversity can be negatively affected and gene flow among meta-populations of some species may diminish. Loss of genetic diversity may eventually promote regional extinctions of some species. There is no reason to think this will be the case with the proposed CR 595.

5.13.A. Regional Landscape of Northwestern Marquette County and Eastern Baraga County

The regional landscape surrounding the proposed CR 595 project is predominantly comprised of private lands owned by large timber companies and managed for timber production. Those lands are generally open to public recreation. There are also State Parks (e.g., Van Riper State Park, Craig Lake State Park) and portions of the Escanaba River State Forest scattered within the region, outside of the CR 595 corridor.

To the west of the CR 595 corridor is the 17,000-acre McCormick Tract wilderness area, which is part of the Ottawa National Forest and managed by the U.S. Forest Service as a "roadless" area. In such a landscape comprised of private and public lands that have been primarily dedicated to timber production for over 150 years, a degree of habitat fragmentation in the form of landscape heterogeneity is ongoing (Figure 5-2). The only significant old-growth forestland remaining within the region is 4,000 acres of primeval forest owned by the Huron Mountain Club, several miles west of the town of Big Bay.

Regionally, as well as within the proposed CR 595 corridor, forest habitats change as timber is managed, matures, and is harvested. Depending on whether the lands are clear-cut, selectively harvested, or cut in some other management prescription, the harvest will affect the character of the new habitat accordingly. Timber typically harvested for pulp such as red pine, jack pine, or aspen, are usually clear-cut, whereas hardwood stands are usually selectively harvested. Regional land cover generally reflects the landscape heterogeneity caused by ongoing timber management practices (Figure 5-3). The wildlife species assemblages that utilize the regional landscape change according to the alterations of the habitat. Many of the wildlife species that inhabit this portion of the Upper Peninsula have adapted to over a century of this type of ever-changing land cover and habitat. Some important species such as white-tailed deer (*Odocoileus virginianus*), moose (*Alces alces*), and ruffed grouse (*Bonasa umbellus*) are dependent upon this type of habitat alteration (to early-successional stages) in order to prosper within the region.

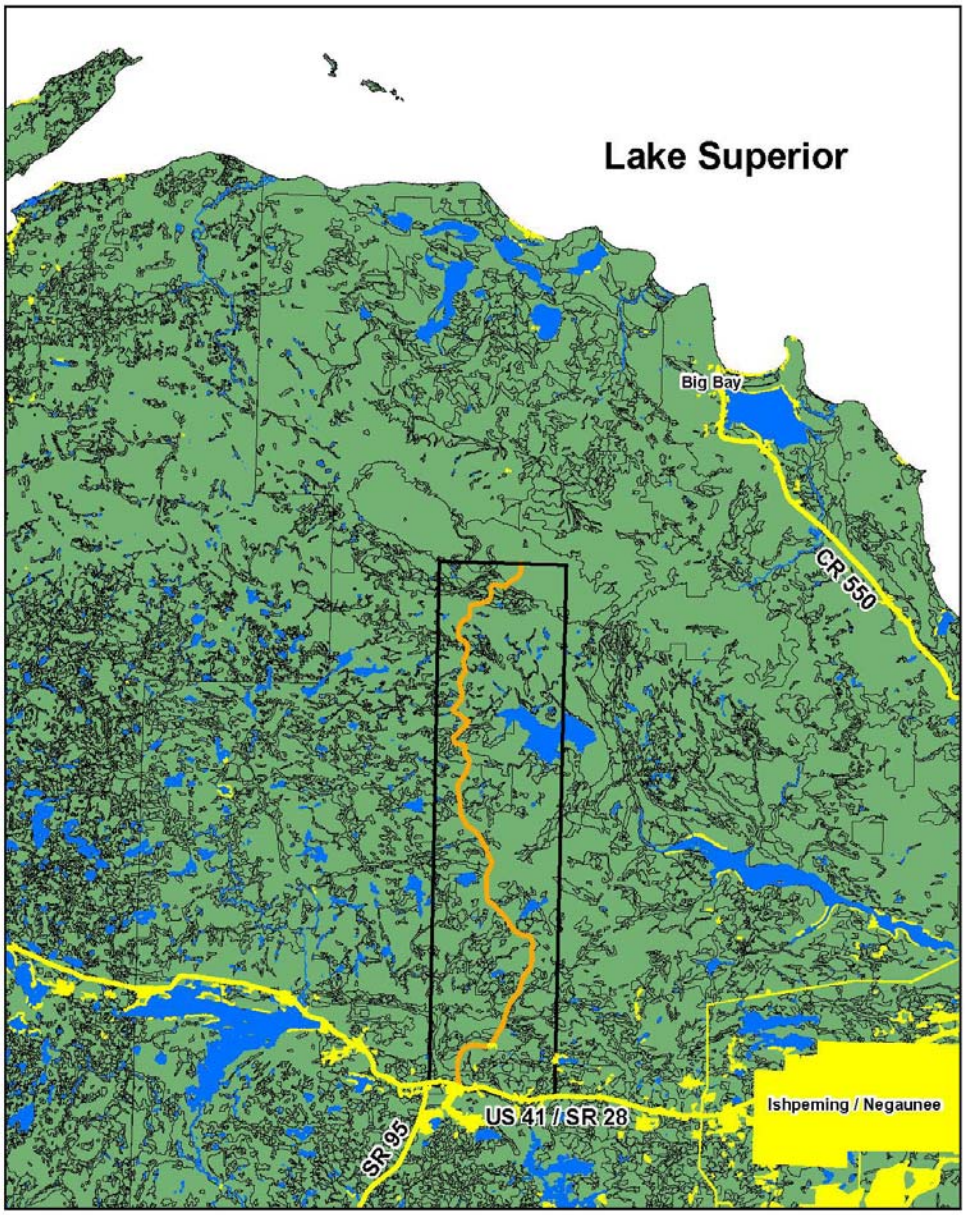


Figure 5-3. Regional land cover/use and habitat heterogeneity; yellow indicates non-habitat matrix areas primarily consisiting of urban development, primary roads, and mineral extraction sites.

5.13.B. The Local Landscape within the Project Corridor

Michigan Resource Information System (MIRIS) land cover categories (MDIT 2011) were used for the purpose of generally mapping the land cover types that are major components of habitat within the proposed CR 595 corridor (Figure 5-4). These land cover type categories are general, in that each may encompass more than one subtype of vegetation community as defined by the MNFI (Kost et al. 2007). Field observations from year-2008 spring, summer, and late summer vegetation surveys provided further detail regarding plant community structure in specific habitats along the proposed route (KME 2009).

Below are summary descriptions of the land cover types and vegetation communities that occur along the proposed road route as well as additional information pertaining to animal species that are known to utilize these communities as habitat (Kost et al. 2007). The natural communities that occur along the proposed CR 595 route are characteristic of much of the western Upper Peninsula, including northern Marquette County and eastern Baraga County.

5.13.C. Emergent Wetland

Within the emergent wetland land cover category, northern wet meadow is the principal community type represented along the proposed road route. Northern wet meadow is an open, groundwater-influenced, sedge and grass-dominated wetland that typically borders streams but is also found at pond and lake margins and near beaver ponds. This sedge-dominated wetland type typically has 100 percent vegetative cover in the ground layer. Northern wet meadows contribute significantly to the overall biodiversity of northern Michigan. Late-blooming composite flowers provide an important food source for insects, which in turn support passerine birds. The typical hummocky micro-topography is utilized as nesting habitat for some wetland birds.

Another emergent wetland community type found to a much lesser extent within the corridor is emergent marsh. This is a shallow-water wetland community typically located along the shores of lakes, ponds, and streams. Emergent marshes are typically dominated by a diversity of herbaceous plants and provide habitat for a broad diversity of aquatic invertebrates, many of which occupy and feed on decomposing vegetation. The invertebrates support numerous species of fish, amphibians, reptiles, waterfowl, water birds, and wetland mammals like muskrat (*Ondatra zibethicus*) and beaver (*Castor canadensis*). Emergent marshes flood seasonally, especially in the spring, providing temporary habitat and spawning grounds for fish such as northern pike (*Esox lucius*), and many other organisms such as those listed above.

5.13.D. Lowland Conifer

The lowland conifer land cover category encompasses several vegetation communities along the proposed road route. Rich conifer swamp is a groundwater-influenced, minerotrophic, forested wetland dominated by northern white-cedar (*Thuja occidentalis*) that occurs on organic soils. Hardwood-conifer swamp is a minerotrophic forested wetland dominated by a mixture of lowland hardwoods and conifers, occurring on organic and poorly-drained mineral soils over a variety of landforms and often associated with headwater streams and areas of groundwater discharge. Poor conifer swamp is a nutrient-poor, forested peatland characterized by acidic, saturated peat, and the prevalence of coniferous trees, sphagnum

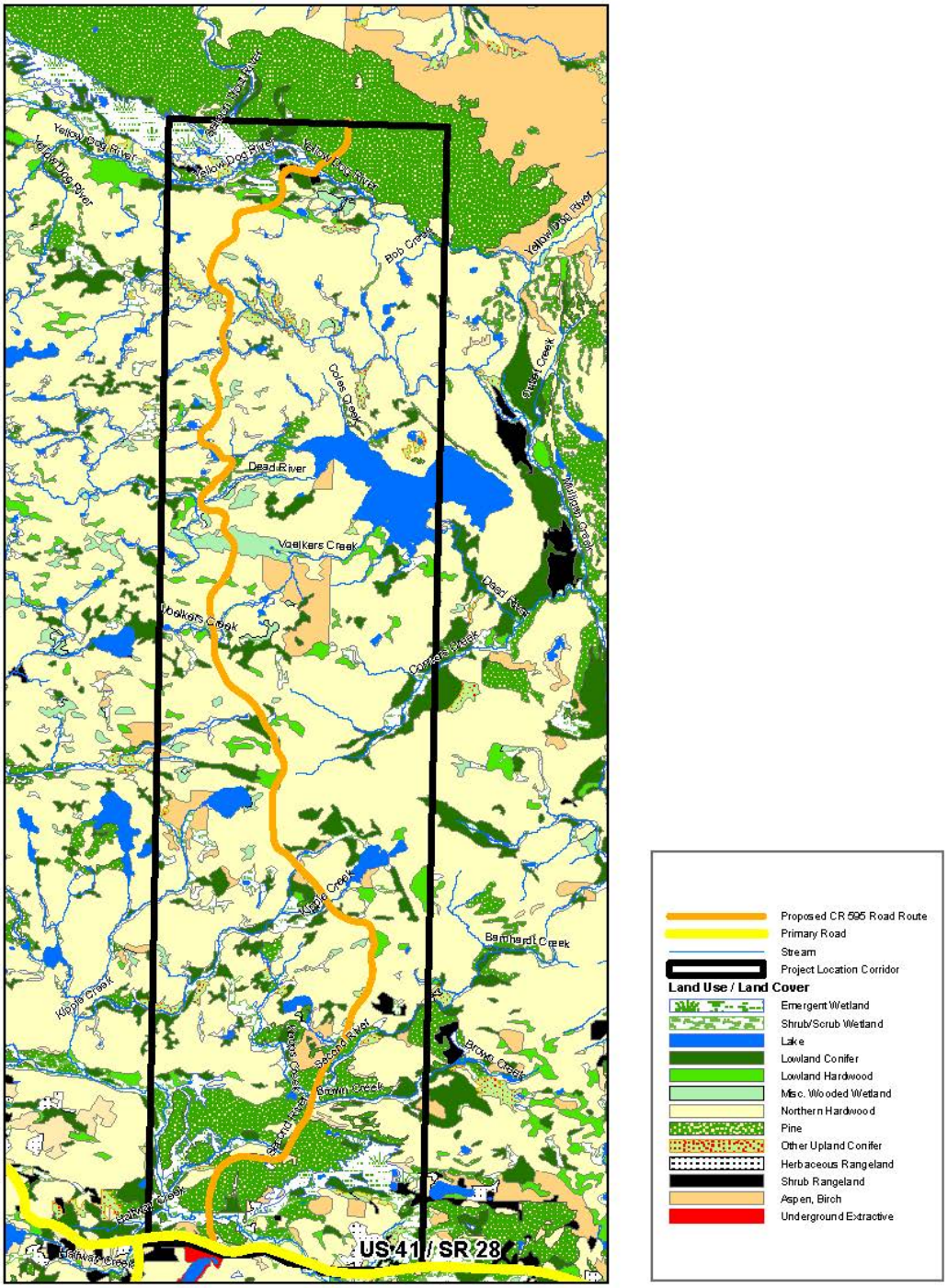


Figure 5-4. Land cover types within the project corridor.

mosses, and ericaceous shrubs. Poor conifer swamps are much more common than other lowland conifer community types along the proposed route.

Muskegs are nutrient-poor peatland communities characterized by scattered or clumped, stunted conifer trees set in a matrix of sphagnum mosses and ericaceous shrubs. Black spruce (*Picea mariana*) and tamarack (*Larix laricina*) are typically the most prevalent tree species within muskegs. Muskegs occur primarily within large depressions and can persist for hundreds of years. Floristically, muskegs are homogenous and of limited diversity, exhibiting remarkably uniform structure and composition across their wide range. In general, animal diversity is low in poor conifer swamps and muskegs because of the low productivity of peatland plants and the unpalatable nature of the vegetation. Conifer swamps provide critical winter habitat for deer and snowshoe hare. Muskegs provide important habitat for small mammals such as short-tailed shrew (*Blarina brevicauda*), beaver, meadow vole (*Microtus pennsylvanicus*), mink (*Mustela vison*), muskrat (*Ondatra zibethicus*), and masked shrew (*Sorex cinereus*).

5.13.E. Lowland Hardwood

Northern hardwood swamp is a seasonally inundated, deciduous swamp forest community dominated by black ash (*Fraxinus nigra*) that occurs on neutral to slightly acidic hydric mineral soils and shallow muck over mineral soils. Northern hardwood swamps are found in diverse landscape settings within the road corridor, including shallow basins, groundwater seeps, low, level terrain near rivers, lakes, or wetlands, and small depressions around edges of peatlands. Maples (*Acer spp.)* typically dominate hardwood swamps where black ash is not prevalent. Hardwood swamp tree seeds are an important food source for game birds, songbirds, and small mammals, and the leaves provide browse for deer and moose.

5.13.F. Northern Hardwood

The northern hardwood vegetation category is equivalent to the mesic northern forest plant community (Kost et al. 2007). Mesic northern forest is the most common community along the proposed road route. It occurs on moist to dry-mesic sites and is typically characterized by the dominance of upland northern hardwoods, particularly sugar maple (*Acer saccharum*) and American beech (*Fagus grandifolia*). Conifers such as hemlock (*Tsuga canadensis*) and white pine (*Pinus strobus*) are frequently important canopy associates.

This community type breaks into two broad classes: northern hardwood forest and hemlock-hardwood forest. Typical subcanopy species include balsam fir (*Abies balsamea*), ironwood (*Ostrya virginiana*), and American elm (*Ulmus americana*). Although the majority of these stands have been harvested repeatedly for over a century within the region, scattered large trees typically remain within the maturing overstory, providing important habitat components for cavity nesters. Species associated with detritus-based food webs, canopy-dwelling species, and interior forest obligates, including numerous neotropical migrants, such as black-throated blue warbler (*Dendroica caerulescens*), black-throated green warbler (*Dendroica virens*), scarlet tanager (*Piranga olivacea*), and ovenbird (*Seiurus aurocapillus*) utilize habitat associated with northern hardwood forest.

5.13.G. Pine

The pine vegetation category is represented along the road route by the dry northern forest plant community (Kost et al. 2007). Dry northern forest is a pine- or pine-hardwood-dominated forest type that occurs on dry sandy sites lying mostly north of the climatic tension zone. Two distinct variants are included within this community type, one dominated by jack pine (*Pinus banksiana*) or jack pine and hardwoods, and the other dominated by red pine (*P. resinosa*). Low sweet blueberry (*Vaccinium angustifolium*), bush honeysuckle (*Diervilla lonicera*), and sweetfern (*Comptonia peregrina*) are typically prevalent in the shrub layer. The ground layer is dominated by Pennsylvania sedge (*Carex pensylvanica*) and bracken fern (*Pteridium aquilinum*). Many sites formerly occupied by natural pine forest were planted to pines in the 1920s and 1930s and have been maintained as plantations.

5.13.H. Shrub-scrub Wetland

The most common type of shrub-scrub wetland community along the proposed road route is northern shrub thicket. Northern shrub thicket is a shrub-dominated wetland typically occurring along streams north of the climatic tension zone, but also adjacent to lakes and beaver floodings. Northern shrub thickets are associated with saturated, nutrient-rich, organic soils and are overwhelmingly dominated by tag alder (*Alnus rugosa*). The northern shrub thicket community is present at nearly all stream crossings along the proposed road route.

Some alder swamps along the road route contain young white cedar, and appear to be succeeding to or reestablishing themselves as white cedar swamps. The leaves and twigs of alder provide important food resources for a wide array of mammals including moose, muskrat, beaver, cottontail rabbit (*Sylvilagus floridanus*), and snowshoe hare (*Lepus americanus*). Beaver build dams and lodges with tag alder twigs. The buds and seeds of alder are eaten by a diversity of birds. Some passerine bird species feed on alder seeds, and American woodcock (*Philohela minor*) and ruffed grouse eat the buds and catkins. Thickets of alder provide important cover for mammals such as white-tailed deer, river otter (*Lutra canadensis*), and mink (*Mustela vison*). Gray wolves (*Canis lupus*) also utilize shrub thickets as habitat components.

Another kind of shrub-scrub community occasionally encountered along the proposed road route is poor fen. Poor fen is a sedge-dominated wetland found on strongly acidic, saturated peat that is moderately influenced by groundwater. This community occurs in kettle depressions and in flat areas or mild glacial depressions. Poor fens have a unique flora characterized by a graminoid-dominated herbaceous layer of low to moderate diversity that is intermediate between northern fen and bog. While sedges remain dominant, many poor fens also support a continuous carpet of sphagnum mosses and widely scattered, slightly raised peat ridges or mounds with low ericaceous, evergreen shrubs and stunted conifer trees. Poor fens provide important habitat for small mammals such as short-tailed shrew, beaver, meadow vole, mink, muskrat, and masked shrew. Numerous butterfly and moth species are restricted to fens because their food plants occur within these open peatland systems.

5.13.I. Shrub Rangeland

Shrub Rangeland is a catch-all category for an open or semi-open sandy upland such as might be created by fire or clear-cutting. Such areas occur sporadically along the proposed

road route. In most cases they will eventually revert to whatever plant community existed previously. Dominant species typically include those from the pine vegetation category.

5.13.J. Wooded Wetland

Wooded wetland is a catch-all category for forested wetlands that were not MIRIS-mapped to a specific cover type (e.g., lowland hardwood or lowland conifer).

5.14 Environmental Consequences: Habitat Fragmentation

The research on habitat fragmentation effects associated with roads is highly variable. Road size, vehicle frequency, and road configuration within a given landscape are all important variables. All new roads result in a direct loss of some habitat, as does any development creating impervious surfaces. Research often indicates there may be a reduction in the quality of certain adjacent habitats associated with new roads (Foreman 2000). Vehicles using the road are vectors for the accidental introduction of invasive plant species along the edges of roadways.

While roads can often disrupt natural hydrological patterns, causing some habitats to change dramatically, specific care has been taken in the design of CR 595 to minimize the hydrologic impacts. In addition, erosion and sedimentation associated with roads can affect adjacent wetlands and streams unless properly managed with state-of-the-art Best Management Practices (BMPs). De-icing salt that may accumulate along the proposed CR 595 roadway may be marginally detrimental to some species of plants and animals. The existence of a road through a natural (or naturalized) landscape often coincides with increased hunting/poaching pressure (Wisdom et al. 2000, Switalski 2008).

The existing two-tracks and logging roads within the region and CR 595 corridor are typically at the low end of the impact continuum according to habitat fragmentation research. These road types are narrow and lightly traveled, and are generally considered to be a relatively benign form of matrix in road ecology research because they typically have only a negligible effect on a landscape's habitat connectivity and biodiversity. Because vehicle frequency and speeds are low, some animal species utilize these types of roadways as travel corridors; however, if these roadways are utilized by off-road recreational vehicles (e.g., ORVs or snowmobiles), machine noise may have a negative impact on some wildlife species using adjacent habitats. Some animal species will avoid habitat adjacent to any type of loud roadway, including two-tracks and logging roads (Forman and Alexander 1998).

The wider a road, there is typically a bigger environmental footprint and ecological disturbance (Forman et al. 2002). The proposed CR 595 will have direct impacts to habitat. Existing habitat will be directly lost to grading, including road shoulders and banks; new or disturbed substrate may provide areas for invasive plant species to potentially become established. Direct mortality of wildlife associated with vehicle collisions may impact some species attempting to move between habitat patches. Edge effects into the adjacent habitat may indirectly cause some habitat degradation and displacement of some sensitive species. As compared to CR 595, any interstate highway would be an example of extreme habitat fragmentation because interstate highways are wide, busy, loud, and often fenced or walled-off from the landscape. Land animal meta-populations are nearly severed by this type of harsh matrix roadway. Edge effects such as those associated with interstate highways can

modify and degrade adjacent habitats for native plants and nesting birds. However, CR 595 would be only ¼ the width of an interstate highway and will have no physical barriers to species movement, so comparison of those types of impacts is generally not relevant.

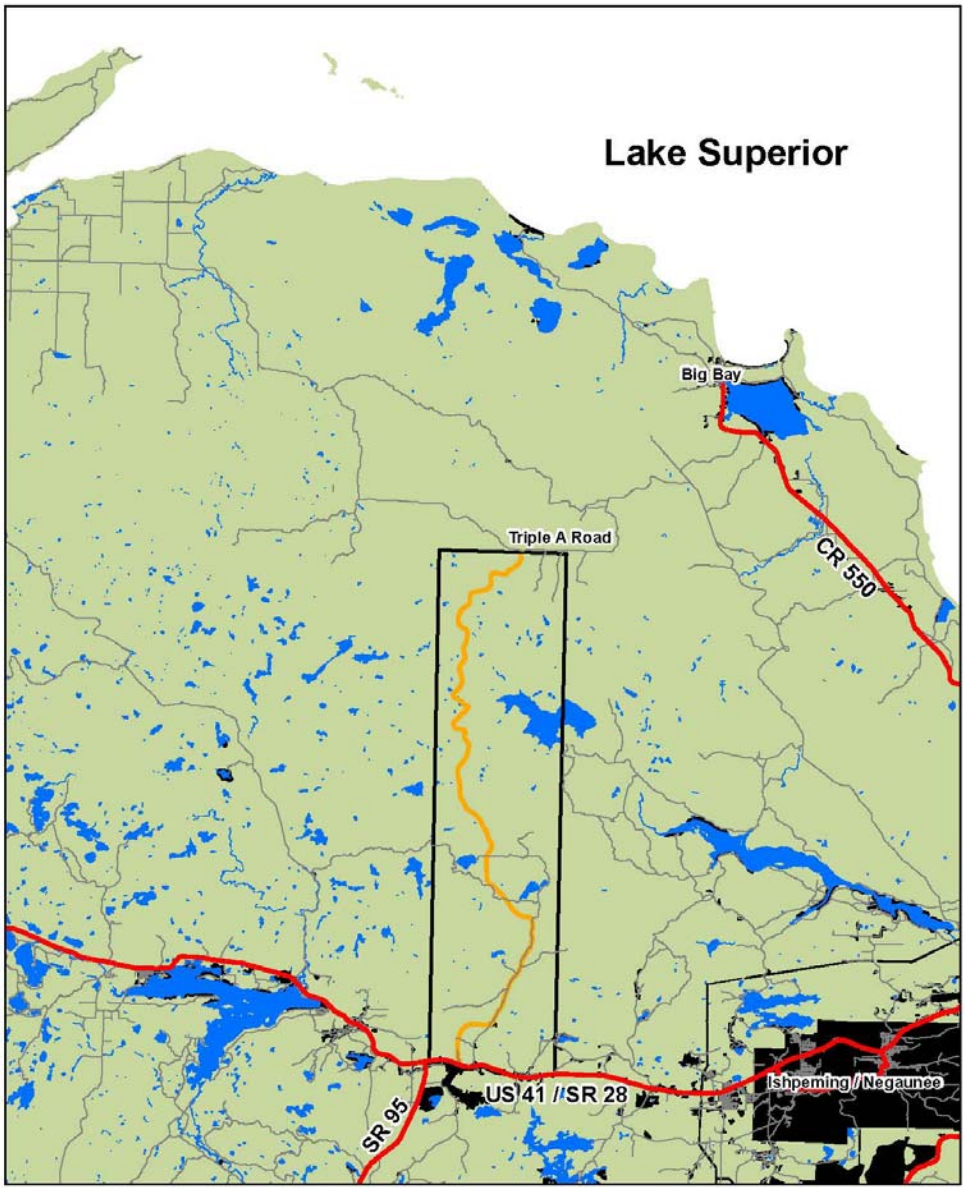
The potential ecological effects of a new road on adjacent habitats depend greatly on the types and configuration of other roads already present within the landscape. Generally, as road size, configuration, and density increases within a landscape, viable habitat patches tend to become smaller, degraded, and less connected. By comparison, the regional road network within northern Marquette County and eastern Baraga County is dominated by a network of logging roads, unimproved county roads, and two-tracks. The majority of these existing roadways are used for timber extraction and recreational access, and they are likely to have only marginal impact on habitat connectivity and habitat quality.

Seasonal, unimproved county secondary roads are widely scattered throughout the region. Average density of these roadway types within the western, northern, and eastern portions of the region appear to generally be less than one linear mile of road or trail per square mile, except where closer to the Ishpeming-Negaunee-Marquette metro area (Figure 5-5). Most county roads are sand or gravel surface, have relatively low traffic volume, and generally follow natural topographic relief. An exception is CR 550, which is a primary county road that runs from the City of Marquette northwest to the town of Big Bay, generally parallel to the Lake Superior shoreline. CR 550 is a two-lane 55-mph road that has a truck climbing lane that was constructed in recent years. US-41 bounds the southern portion of the region and is a four/five-lane busy highway that could be classified as an existing, relatively harsh matrix that interrupts or diminishes habitat connectivity and is likely associated with deleterious edge effects on some species. CR 595, by comparison, would have much less impact by any standard.

5.14.A. Overview of Regional Biodiversity and Potential Fragmentation Effects of CR 595

Ecological studies performed over the past few years associated with the proposed road project have identified a diverse array of wildlife species within the project corridor. The diversity of wildlife species is likely due to the land cover heterogeneity, topographic heterogeneity, the existence of a network of high-quality riparian wetlands and other wetland habitats, and low urban/industrial development pressure in the region.

Most of the species found in the project corridor are common throughout the Upper Midwest as well as southern Ontario (Brewer et al. 1991, Kurta 1995). Although biodiversity may be considered to be moderate-to-high within the region, animal density and biomass appear to be relatively low compared to more southern regions within Michigan and Wisconsin. This relative lack of animal density and biomass is likely primarily due to a short, near-boreal growing season, heavy lake-effect snowpack that typically occurs from late autumn through mid-spring, and other climate-related factors. The region does contain some specialized habitat where rare and legally-protected plant and animal species exist (Brewer et al. 1991, Kost et al. 2007), as documented by ecological surveys conducted for the proposed road project. The only legally-protected species that have been found within the project corridor are narrow-leaved gentian and gray wolf (KME 2009).


Lake Superior
Big Bay
Triple A Road
CR 550
US 41 / SR 28
SR 95
Ishpeming / Negaunee
Figure 5-5. Road network within the regional study area.
0 1.25 2.5 5 7.5 10 Miles
King & MacGregor Environmental, Inc.
Proposed CR 595 Road Route
Primary Road
County Secondary Road (seasonal or non-seasonal)
Urban and Extractive
Project Location Corridor
Lake

The proposed CR 595 will impact the heterogeneous, mostly-forested landscape to some extent; it will cause some minimal habitat loss that may affect a few species currently present within the region. The amount of the direct loss of habitat throughout the approximately 21.4-mile route, if habitat removal is considered to be at least 66 feet in width, would be approximately 170 acres.

Indirect habitat loss and habitat impacts are difficult to calculate and predict, as such calculations and predictions depend on the type of habitat/land cover and edge effect interactions with each individual species. In a general habitat fragmentation context, if proper mitigation measures are implemented, the proposed CR 595 is not likely to function as a harsh matrix that prevents or significantly diminishes overall regional landscape connectivity to any measurable extent and is unlikely to reduce biodiversity on a regional scale or within the project corridor (Figures 5-3 and 5-4). The actual degree of potential habitat disconnectivity along the route is highly dependent on types and sizes of habitat/land cover that would potentially be fragmented, and the habitat requirements of individual species that are currently present.

The potential effects of habitat fragmentation as discussed in this document are hypotheses based upon literature review and knowledge of species of plants and animals known to exist in the project area. The actual effects of habitat fragmentation, if any, will not be known until after CR 595 is constructed, and then only after ecological studies and surveys were conducted.

5.14.B. Potential Effects on Gray Wolf

The gray wolf is an important apex predator species that is found throughout much of the Upper Peninsula and also known to occur within the project corridor. Although currently Michigan-listed as Threatened and Federal-listed as Endangered, the Michigan population of gray wolf currently appears to be stable or slightly growing. Gray wolves have no specific habitat requirements, other than minimal disturbance from humans and an adequate mammal prey base (MDNR 1997). In Michigan, areas of approximately 100 square miles with road densities less than one mile of linear road per square mile are typically suitable wolf habitat (Thiel 1985, Mech et al. 1988, Mech 1989, MNFI 2011).

Wolves may move far throughout a highly varied landscape, across many unfavorable areas (i.e., relatively harsh matrix environments), but establishment success is restricted to higher quality habitat (Mladenoff et al. 1995, 1999). Except for the minimal but direct danger to wolves from collisions with vehicles on busy roads, the primary threat of roads to wolves comes from the accessibility that roads allow humans who deliberately, accidentally, or incidentally kill wolves (Berg and Kuen 1982).

The proposed CR 595 may act as a deterrent to wolves, depending on traffic volume and other human activity, but wolves will likely adapt to the road's presence and cross it as necessary with little or no impact to their population viability. The proposed road will bisect a large area generally consisting of relatively low road densities (Figure 5-5). Because of the enormity of the wolf habitat that currently exists on either side of the proposed road, it is unlikely CR 595 would have any deleterious effects to regional wolf populations. The road will likely be a relatively benign matrix that will not significantly affect wolf habitat connectivity. Some wolves will avoid the road corridor, there may be road-killed wolves occasionally, and

there may be increased poaching pressure (Berg and Kuen 1982), but the regional wolf population will not likely be significantly affected (Hammill 2010).

5.14.C. Potential Effects on Moose

The moose (*Alces alces*) population in Michigan is apparently secure (MNFI 2011). However, the species currently has a status of Special Concern in Michigan because these large ungulates are relatively uncommon. The heterogeneous wetlands and upland forest stands of mixed age structure that are common within the region and occur within the CR 595 corridor are utilized by a moose population that has slowly expanded throughout Upper Peninsula since reintroduction occurred in the 1980s (Kurta 1995).

Although seldom seen within the proposed road corridor, moose have been occasionally sighted within the local area (KME 2009). Moose often move through a landscape with little regard to human activity, especially in areas where they have not been hunted (Forman and Deblinger 2000). In the instance of CR 595, moose may be subjected to occasional road kill and increased potential for poaching activity, but the interconnectivity of moose habitat and the stability of the moose population within the region is not likely to be negatively affected by CR 595. However, if hunting is legalized in the future and moose become more wary of human activities, an edge effect zone on both sides of road may be consistently avoided by moose, effectively diminishing some habitat that would otherwise be available (Bennett 1991, Colescott and Gillingham 1998).

5.14.D. Potential Effects on Black Bear

Michigan black bear (*Ursus americanus*) males prefer home range sizes of about 100 square miles, while females typically live in smaller areas of 10 to 20 square miles. However, home range size is variable and is affected by food availability, the number of other bear in an area, and habitat fragmentation (MDNR 2004). Generally, as human population and density of road networks expand the quality of bear habitat declines. Where black bears are hunted, they show a general pattern of road avoidance – including small logging roads that are open to public access (Brocke et al. 1989, Brody and Pelton 1989, Forman et al. 1997). In the case of CR 595, because black bears are hunted throughout the region, the edge effect zone on both sides of road may be consistently avoided by black bear, effectively somewhat diminishing its present habitat.

5.14.E. Potential Effects on Small Mammals

A review of literature does not uncover a strong link between direct mortality associated with roads and decline of small local or regional mammal populations, except in areas containing vulnerable populations of Threatened/Endangered small mammal species (Forman and Alexander 1998). The relatively high fecundity and adaptability of most small mammal species within the region suggests that the direct loss and alteration of some habitat will not significantly impact local or regional populations.

Snowshoe hare (*Lepus americanus*) is an example of a typical small mammal species that occurs throughout the heterogeneous, mostly-forested regional landscape. This species will have occurrences of direct mortality associated with the proposed road, but its relatively high

fecundity and tolerance of moderate road network densities and road-forest edges will likely allow local populations to remain viable (Ruggiero et al. 2000).

5.14.F. Potential Effects on Raptors

There is a general lack of consensus of how sensitive northern Michigan forest raptors are to a linear type of habitat matrix (i.e., the proposed road). Some raptor species are sensitive to road noise and other edge effects often associated with busy roads (Reijnen et al. 1995). Raptor scavenger (and crow/raven) populations will likely increase locally, as a result of the road (Lambertucci et al. 2009). Regionally common, adaptable raptor species such as red-tailed hawk (*Buteo jamaicensis*) may benefit from edge effects associated with the road. Other forest raptor species diversity may remain constant while some may decline within edge effect zones associated with the road because of habitat modification, increased nest predation, and noise-induced stress (Bosakowski and Smith 1997, Bautista et al. 2004, Benitez-Lopez et al. 2010).

While no evidence has been found that red-shouldered hawks (*Buteo lineatus*) occur within the CR 595 corridor, this Michigan-listed Threatened raptor species is known to be negatively affected by habitat loss. Potential red-shouldered hawk habitat exists in the CR 595 corridor. They will nest in a variety of habitats but their nests typically are closely associated with contiguous blocks of mature, mesic forest canopy, wet meadows, swamps, and stream bottomland (Bosakowski et al. 1992, Palmer 1988). As mentioned above, habitat loss apparently contributed to the historic decline of this species' populations (Cooper 1999). The primary threat to the red-shouldered hawk in Michigan is habitat alteration and destruction of the array of ecological processes needed by this raptor species (Evers 1994, Graham et al. 1994). Habitat manipulation directly impacts this species by alteration of suitable structure around the nest site and indirectly impacts this species by influencing the abundance, distribution, and vulnerability of prey species. Red-shouldered hawks need large tracts of high-quality core habitat for individual home ranges (Dykstra et al. 2001) and tend to avoid buildings and roads when possible (Bednarz and Dinsmore 1982).

Fragmentation of forest stands and the creation of larger openings favors competitors and predators such as the red-tailed hawk (*Buteo jamaicensis*) and great-horned owl (*Bubo virginianus*) (Bednarz and Dinsmore 1982, Bryant 1986). It is important to note that red-shouldered hawks are not known to occur in Marquette County; however, in efforts to thoroughly assess the effect of CR 595 on this particular species, a raptor "call-response" survey was conducted in the spring of 2011. No red-shouldered hawks were found during the survey.

5.14.G. Potential Effects on Neotropical Passerine Birds

Many interior forest nesting neotropical passerine bird species are sensitive to road noise and other edge effects associated with busy roads to the point where habitat within a road's edge effect zone is abandoned or utilized less successfully (Wilcove 1985, Temple and Cary 1988, Rich et al. 1994, Robinson et al. 1995, Goodwin and Shriver 2011). For example, scarlet tanager is an interior forest nesting neotropical species that is relatively common within the region, but is experiencing population declines throughout its range because of habitat loss and degradation. It is not listed by MDNR as a species of concern, but is potentially susceptible to edge effects associated with roads bisecting large, forested tracts.

Specifically, local scarlet tanager populations may be affected by the relative increase of competitors that commonly utilize edge habitats (e.g. American robin), small predators often associated with edge habitats (e.g., crows, jays, skunks, raccoons, and opossums), and the brood parasitical brown-headed cowbird (*Molothrus ater*) (Rosenberg et al. 1999).

5.14.H. Potential Effects on Reptiles and Amphibians

There is substantial research documenting the fact that many reptiles and amphibian species populations have been negatively affected by roads and other types of habitat fragmentation (DeMaynadier and Hunter 1995, Fahrig et al. 1995, Ashley and Robinson 1996). In some regions, the greatest transportation impact on reptiles and amphibians is attributed to direct road mortality (Fahrig et al.1995).

In the case of CR 595 the wood turtle (*Glyptemys insculpta*) would appear to be the most susceptible reptile to habitat fragmentation if it occurs, since the wood turtle may occupy some of the riparian wetland systems that will be crossed by the proposed road. However to-date there is no documentation of this Michigan-listed Special Concern species in northern Marquette County, although wood turtles have been sighted recently in the southern part of the County.

Wood turtles are characterized by slow growth, late sexual maturity (12 to 20 years), and typically low reproductive success (Harding 1997). Given these wood turtle life history traits and its tendency to slowly wander across roads and deposit eggs in sandy road banks, wood turtle populations in Michigan and other parts of its range have declined significantly over the past 20 to 30 years (Harding 1997). CR 595 stream crossings have been designed in accordance with aspects of Stream Simulation Methodology and will provide adequate stream bank at the stream crossing site for reptiles and amphibians to pass under the roadway in those critical locations.

5.14.I. Potential Effects on Fish

Some fish species are highly susceptible to fragmentation effects that may be associated with any road construction. Most of the fish species that inhabit the streams that would be crossed by the proposed CR 595 are relatively weak swimmers that are not capable of swimming up steep gradients or ascending a culvert-end plunge (waterfall) of more than a couple inches (Hubbs and Lagler 1964). Stream crossing bridges and culverts have been properly sized using aspects of Stream Simulation Method and will be installed properly to avoid negative long-term effects, such as the downstream end of the culvert becoming perched above the stream or become impassible in some other way. These negative effects can effectively sever upstream habitat connectivity and impair gene flow for many fish species (Clay 1995). Therefore, implementation of aspects of Stream Simulation Methodology will be an important mitigation component of the design of CR 595 as it relates to fish passage.

5.14.J. Potential Effects on Threatened or Endangered Plants

The most serious road-related habitat fragmentation issues for Threatened or Endangered plants are typically direct habitat loss, indirect habitat loss/degradation through edge effects (including introduction of invasive species), and changes in hydrology (Maheu-Giroux and deBois 2007, Jodoin 2008). Narrow-leaved gentian (*Gentiana linearis*) was the only

protected plant species identified within the CR 595 corridor (KME 2009). Where this species does occur, these plants are typically associated with high-quality habitat types (e.g. large riparian wetlands). A request for permit to relocate narrow-leaved gentian that would be impacted by CR 595 will be submitted to the MDNR Wildlife Division.

5.14.K. CR 595 Potential Fragmentation Effects on High-Quality Habitats

While the majority of the habitat/land cover adjacent to and within the CR 595 project corridor is a mostly-vegetated mosaic consisting of pine plantations, sugar maple-dominated or conifer-dominated upland forest tracts, typical wetlands, and recent clear-cut forest openings, some types of habitats along the proposed CR 595 route have been identified by KME as having relatively high ecological functional value.

Wetlands rated by the Michigan Rapid Assessment Method for Wetlands (MiRAM) as having high functional value typically includes provision of high habitat value (MDNRE 2010, KME 2011c). Within the project corridor, these include all of the riparian wetland systems crossed by the proposed road and several other non-riparian wetland communities (Figure 5-6). These riparian wetlands and other wetland systems generally have higher biodiversity than the typical upland habitat/land cover and generally have a higher probability of harboring ecologically sensitive species. Further, because hydrology is a major driver within these systems, these wetlands can be significantly fragmented, altered, and degraded by road construction if appropriate measures are not taken to maintain pre-existing wetland and stream hydrology. For example, if road fill were to alter the hydrologic flow in a mature rich conifer swamp, the vegetation community may change drastically, affecting the wildlife community that the habitat would normally support. Therefore, road construction measures to minimize detrimental effects have been proposed in sensitive wetlands along the CR 595 route; for example Groundwater Drainage Rock Layers will be used in 15 wetland fill areas where maintaining the wetland hydrology is especially important.

Both fish and various forms of wildlife that depend upon riparian corridors may experience habitat connectivity issues (e.g., bottlenecks, physical barriers) if the new bridges or culverts were to be under-sized or placed improperly. In addition, since hydrological and substrate disturbance often associated with wetlands near roads can promote the introduction of highly-invasive plant species (e.g. *Phragmites australis*), care should be taken to reduce the opportunities for highly-invasive species to occur. Invasive species monitoring should be instituted after road construction in an effort to preserve the ecological functional value of wetlands within the project corridor.

5.15 Mitigation of Anticipated Habitat Fragmentation Effects

Figure 5-6 shows “potentially vulnerable ecological nexus” areas within high-quality wetland habitats. Mitigation efforts will be concentrated within these areas, so that disconnectivity of these high-quality habitats can be minimized or avoided. This mitigation includes the following:

- Placing rock fill under portions of the road fill to ensure free passage of groundwater as occurred prior to the road construction (i.e. Groundwater Drainage Rock Layer).

- Sizing the proposed stream crossing bridges and culverts to ensure that the natural flow of the stream will not cause short- or long-term degradation of the stream habitat or to fish movements.

- Placing wetland equalization culverts in the road embankment to provide for free flow of surface water in the wetland and possibly provide a travel corridor for some small wildlife species.

- Properly sizing bridges and over-sizing box culverts that span significant portions of streams, so that fish and wildlife species utilizing the riparian corridors are minimally disrupted.

- If wood turtles are found to be present (although none have been found to date), fencing will be installed in an effort to funnel turtles under bridges and through wide culverts at appropriate locations.

- Inspect/clean construction machinery for invasive plants debris. On-going monitoring and spraying as necessary will be instituted for invasive plant species identified for five years after CR 595 construction.

- De-icing salt usage will be limited on CR 595 to only the amount necessary to maintain a safe roadway during winter weather conditions.

5.16 Conclusion: Habitat Fragmentation

With the utilization of reasonable mitigation procedures, environmentally sensitive road and culvert design and implementation of BMPs to enable free movement of fish, wildlife and hydrology, CR 595 crossings can be constructed with minimal impacts to important habitats. However, construction of CR 595 suggests that future transportation planning should respectfully consider the region's ecology. Additional road building could cause an eventual decline in habitat and biodiversity if not well thought-out and planned in cooperation with resource-protection agencies.

5.17 Affected Environment: Vegetative Communities

KME conducted botanical surveys along the alignment of the proposed CR 595 located within portions of Michigamme Township, Champion Township, Ely Township, and Humboldt Township in Marquette County. The purpose of the botanical surveys was to generally characterize the vegetative communities within the study area, to identify the location of threatened or endangered plants, and to identify any plant communities that may contain rare plant species.

The study area was approximately 300 feet in width (150 feet on either side of the proposed road centerline) and approximately 21.4 miles in length. The proposed CR 595 alignment follows existing logging roads and trails for the majority of its length.

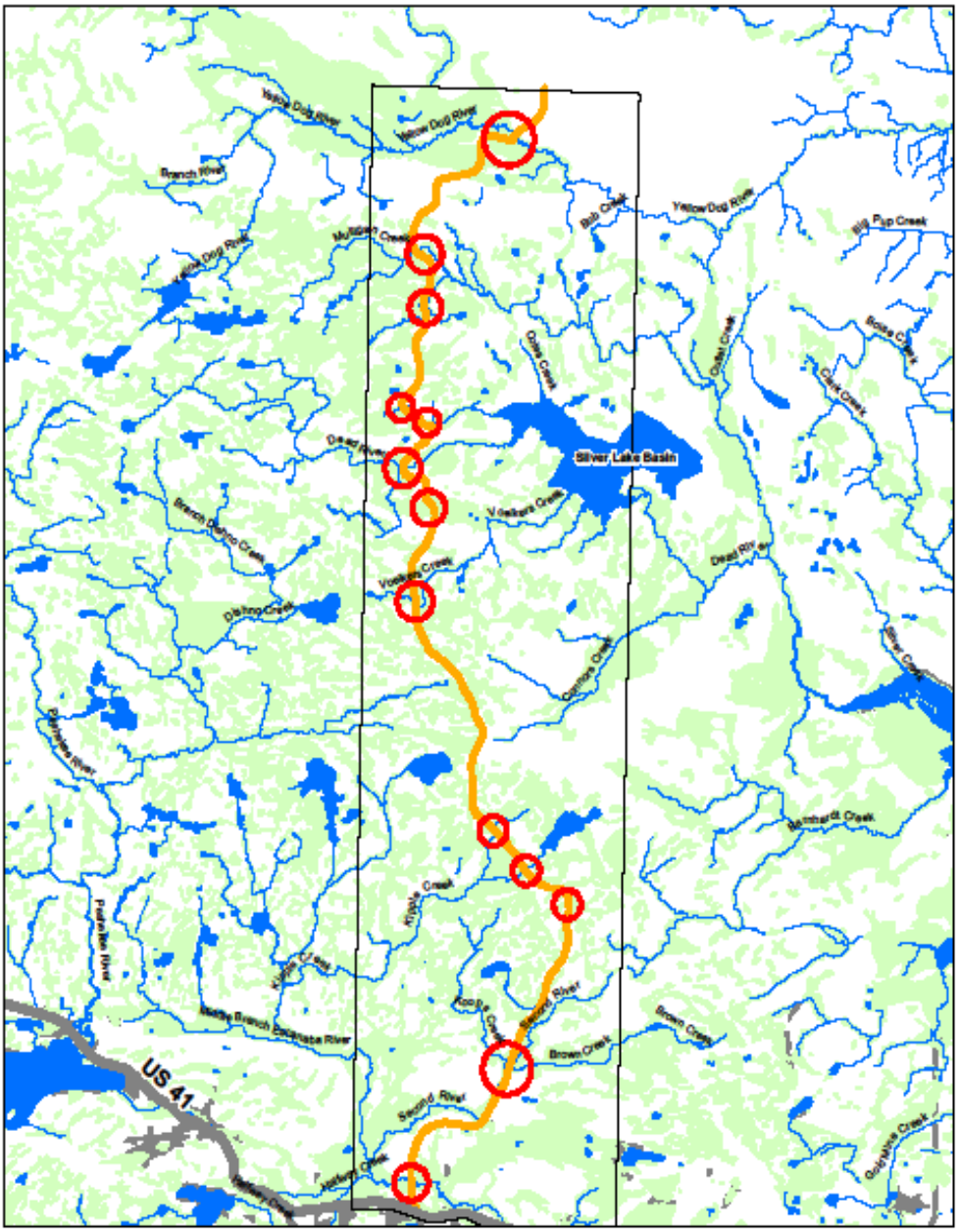


Figure 5-6. Potentially vulnerable ecological nexus areas within high-quality wetland habitats.

Prior to conducting field investigations, KME reviewed available information regarding plant communities, natural habitats and other important land features within the study area, including available aerial photographs, the Marquette County Soils Survey, U.S. Fish and Wildlife Service National Wetland Inventory Mapping, and Michigan Resource Information System (MIRIS) land cover mapping. The *Guidelines for Conducting Endangered and Threatened Species Surveys* (MDNR, 2001) was used to develop the botanical survey protocol. A search of the Michigan Natural Features Inventory (MNFI) was conducted to identify any known occurrences of threatened or endangered species within the study area.

Based on interpretation of aerial photographs and MIRIS mapping, vegetative communities were identified within the study area. A meander survey was conducted by experienced KME botanists in each representative vegetative community to characterize the plant species present and to evaluate the potential for the community to contain threatened or endangered species.

Botanical surveys were conducted on October 5-6, 2005, September 12-14, 2007 and October 9-10, 2007. The proposed road route has undergone a number of changes since the 2007 field work. Surveys for Endangered, Threatened, and Special Concern plant species were conducted along the entire proposed CR 595 route on June 10-12, 2008, July 23-25, 2008, August 21-23, 2008, and September 11-12, 2008. The findings of those botanical surveys are presented in detail in a 2008 Ecological Surveys report (KME, 2009). Rare plant surveys were also conducted in 2010 for alternative routes (KME, 2011a). The Kipple Creek segment was evaluated on August 28-29, 2011 for late summer species only.

The MIRIS land cover descriptions are used to describe the land cover along the proposed route. The MIRIS categories that are the most relevant categories to the proposed CR 595 are Upland Forest and Wetlands. Each of these categories is further subdivided; e.g., the category of Wetlands is subdivided into Forested Wetlands and Non-Forested Wetlands. These categories are in-turn subdivided into several types of wetlands, which correspond broadly to what are generally termed “plant communities”.

The landscape along the CR 595 route is a mixture of upland and wetland habitats. The upland habitats have all been logged at some point in time or converted to pine plantations, whereas most of the wetlands are relatively undisturbed. The upland plant communities include sandy flats dominated by species such as jack pine, as well as hillsides dominated by species such as sugar maple. The wetlands range from open habitats such as sedge meadows and bogs, to forested habitats such as conifer swamps and alder/willow swamps. The wide range of habitats contributes to relatively high plant diversity.

In the course of the 2008 botanical surveys, a total of 210 plant species were identified. All but four of these were native to Michigan. The four non-native species were European swamp thistle (*Cirsium palustre*), Canada bluegrass (*Poa compressa*), purple-osier willow (*Salix purpurea*), and apothecary’s speedwell (*Veronica officinalis*).

The most abundant tree species along the CR 595 route is sugar maple (*Acer saccharum*), followed by balsam fir (*Abies balsamea*), yellow birch (*Betula alleghaniensis*), and red maple (*Acer rubrum*). Less common are paper birch (*Betula papyrifera*), northern white cedar (*Thuja occidentalis*), hemlock (*Tsuga canadensis*), black spruce (*Picea mariana*), white spruce (*Picea glauca*), quaking aspen (*Populus tremuloides*), black cherry (*Prunus serotina*), red oak (*Quercus rubra*), white pine (*Pinus strobus*), jack pine (*Pinus banksiana*), and basswood (*Tilia americana*).

The most common shrub in the wetlands along the CR 595 route is speckled alder (*Alnus incana*). Also common in wetlands are shrub willows (*Salix* spp.), leatherleaf (*Chamaedaphne calyculata*), Labrador tea (*Ledum groenlandicum*), sweet gale (*Myrica gale*), and mountain holly (*Nemopanthus mucronatus*). In the upland habitats, blueberries (*Vaccinium* spp.) are very common. Other frequently encountered upland shrubs are beaked hazelnut (*Corylus cornuta*), choke cherry (*Prunus virginiana*), and bush honeysuckle (*Diervilla lonicera*).

Among the most common herbaceous plants along the CR 595 route are bracken fern (*Pteridium aquilinum*), sensitive fern (*Onoclea sensibilis*), various sedges (especially *Carex gynandra*), lady fern (*Athyrium filix-femina*), red raspberry (*Rubus strigosus*), bulrushes (especially *Scirpus cyperinus*), and water-horehound (*Lycopus uniflorus*).

Much of the land through which the proposed CR 595 passes is owned by timber companies. Pine plantations are common on these lands. Such plantations fall under the MIRIS category of Upland Forest/Coniferous/Pine. These plantations are managed like crops and herbicides may be used within them to reduce competition. Such habitats are unlikely to host any rare plants.

Wetlands along the proposed road include the forested wetland categories of Lowland Conifer and Mixed Forested Wetland, as well as the non-forested wetlands such as Shrub/Scrub and Emergent. The most common trees in Lowland Conifer habitats are black spruce (*Picea mariana*), balsam fir, and white cedar (*Thuja occidentalis*). The most common trees in Mixed Forested Wetland are red maple, black spruce, yellow birch (*Betula alleghaniensis*), balsam fir, and black ash (*Fraxinus nigra*). Shrub/Scrub wetlands are dominated by speckled alder (*Alnus rugosa*). Emergent wetlands are characterized by such species as cattails (*Typha sp.*), bulrushes (*Scirpus sp.*), and blue-joint grass (*Calamagrostis canadensis*). These wetlands are largely free of invasive species.

Rocky outcrops occur in a few places along the proposed CR 595 route. Since they are thinly wooded, they fall under the MIRIS category of Upland Forest/Mixed Deciduous-Coniferous. The most notable outcrop occurs about a mile south of Mulligan Creek. The rocks host an abundance of mosses, liverworts, and ferns. A characteristic fern is common polypody (*Polypodium virginianum*). Mountain maple (*Acer spicatum*) is another species that frequently occurs on rock outcrops. KME botanists noted no rare plants on any of the outcrops or ledges.

To summarize the botanical survey findings, most of the land cover along the CR 595 route consists of plant communities that are common in the Upper Peninsula. All of the upland forest communities have been repeatedly logged; clear-cuts are common. Many areas are in early stages of succession, while other areas have been converted to pine plantations. The plant communities that have suffered the least human disturbance are those that occur in wetlands.

5.17.A. Threatened, Endangered and Special Concern Species

The MNFI web database search for Marquette County provided a list of 44 State Endangered, Threatened, and Special Concern plant species. Of these, six species are Endangered, 18 are Threatened, and 20 are Special Concern. These Marquette County element data are periodically updated, and the list used in this report was current as of December 10, 2010 (MNFI, 2010). Only Endangered and Threatened plants are afforded

legal protection under Michigan's Endangered Species Act, Part 365 of 1994 Public Act 451, as amended. Special Concern species are not afforded legal protection under Part 365. No element occurrences of federally protected species were reported in the database search.

Most Endangered or Threatened plants occur in specialized and uncommon habitats. If the habitat for a species is absent, the plants will not grow there. Since the proposed CR 595 will not be impacting lacustrine habitats, limestone substrates, or Lake Superior shoreline, listed species confined to such habitats were eliminated from consideration for the botanical surveys. When the list of 44 plants was reduced to those species that could occur in the habitats along the CR 595 route, the 31 species listed in Table 1 may be present.

The species listed in Table 5-6 were surveyed for during the botanical surveys. Of the 31 species listed, only one – narrow-leaved gentian (*Gentiana linearis)* – is presently known to occur in the general vicinity of the proposed CR 595.

Some of these species are conspicuous throughout the growing season, and therefore are more easily located. Examples are purple clematis (*Clematis occidentalis)*, male fern (*Dryopteris filix-mas)*, fragrant cliff woodfern (*Dryopteris fragrans)*, fir clubmoss (*Huperzia selago)*, fragile prickly pear (*Opuntia fragilis)*, pine drops (*Pterospora andromedea)*, and dwarf bilberry (V*accinium cespitosum)*. Other species are inconspicuous, even when in bloom. Examples of these would be Canada rice grass (*Oryzopsis canadensis)* and Clinton's bulrush (*Scirpus clintonii)*. Still others closely resemble much more common species. Falling into this category are Northern oak fern (*Gymnocarpium jessoense)*, New England violet (*Viola novae-angliae)*, and Laurentian fragile fern (*Cystopteris laurentiana).*

In 2010, a search for element occurrences in the seven townships which contain a portion of the proposed CR 595 corridor was made of the MNFI Web Database (MNFI, 2010). Five plant species were included in the search results as having been previously identified near the proposed road or near streams adjacent to the project. These were dwarf bilberry (Mulligan Creek), Clinton's bulrush (Mulligan Creek), Laurentian fragile fern (Mulligan Creek), Farwell's water-milfoil (Mulligan Creek, Wildcat Canyon Creek) and narrow-leaved gentian (Mulligan Creek, Yellow Dog Plains). The dwarf bilberry, Clinton's bulrush, and Laurentian fragile fern were located several miles downstream of the project along Mulligan Creek; none of these plants were identified during KME surveys conducted in 2008. Farwell's water-milfoil was found along Mulligan Creek and Wildcat Canyon Creek in the same section as the proposed CR 595 route. It prefers shallow water areas of lakes, ponds and marshes (MNFI, 2007). Farwell's water-milfoil was not identified during KME surveys conducted in 2008. Narrow-leaved gentian was located in the Yellow Dog Plains and identified in several other locations during KME surveys.

Table 5-6. Listed Plant Species that May be Present in the CR 595 Corridor.

Scientific Name	Common Name	Status
Adlumia fungosa	climbing fumitory	Special Concern
Amerorchis rotundifolia	small round-leaved orchis	Endangered
Armoracia lacustris	lake cress	Threatened
Calypso bulbosa	calypso or fairy-slipper	Threatened
Calamagrostis lacustris	northern reedgrass	Threatened
Clematis occidentalis	purple clematis	Special Concern
Collinsia parviflora	small blue-eyed Mary	Threatened
Crategus douglasii	Douglas hawthorn	Special Concern
Cypripedium arietinum	ram's-head lady's slipper	Special Concern
Cystopteris laurentiana	Laurentian fragile fern	Special Concern
Danthonia intermedia	wild oat-grass	Special Concern
Draba arabisans	rock whitlow-grass	Special Concern
Dryopteris filx-mas	male fern	Special Concern
Dryopteris fragrans	fragrant cliff woodfern	Special Concern
Gentiana linearis	narrow-leaved gentian	Threatened
Gymnocarpium jessoense	northern oak fern	Endangered
Huperzia selago	fir clubmoss	Special Concern
Juncus stygius	moor rush	Threatened
Moehringia macrophylla	big-leaf sandwort	Threatened
Myrriophyllum alterniflorum	alternate-flower water-milfoil	Special Concern
Myriophyllum farwellii	Farwell's water-milfoil	Threatened
Nuphar pumila	small yellow pond lily	Endangered
Opuntia fragilis	fragile prickly-pear	Endangered
Oryzopsis canadensis	Canada rice grass	Threatened
Pterospora andromedea	pine-drops	Threatened
Ribes oxyacanthoides	northern gooseberry	Special Concern
Rumex occidentalis	western dock	Endangered
Salix pellita	satiny willow	Special Concern
Scirpus clintonii	Clinton's bulrush	Special Concern
Vaccinium cespitosum	dwarf bilberry	Threatened
Viola novae-angliae	New England violet	Threatened

The MNFI list of rare plants and animals for Marquette County includes a list of natural communities. Of the communities listed, the following occur on or near the proposed CR 595: Granite Bedrock Glade, Northern Shrub Thicket, Mesic Northern Forest, Hardwood-Conifer Swamp, Poor Conifer Swamp, Northern Wet Meadow and Rich Conifer Swamp. The proposed road is located near some MNFI communities not on the Marquette County list such as Rich Tamarack Swamp, Bog, Muskeg, and Pine Barrens. Emergent Marsh, another MNFI community not on the Marquette County list, is impacted by the proposed CR 595. The description of all these natural communities is to be found in *Natural Communities of Michigan: Classification and Description* (Kost et al, 2007).

5.17.B. Threatened, Endangered and Special Concern Species Surveys

Proposed CR 595 Route

As described above, during botanical surveys conducted in 2008 and 2011, the narrow-leaved gentian (Threatened) was the only Threatened or Endangered species listed by the State of Michigan that was found on the CR 595 route.

CR 510-Red Road-Sleepy Hollow and CR 550 Routes

Plant surveys for the CR 510-Red Road-Sleepy Hollow and CR 550 routes occurred during July 13-25, July 20-22, and August 31-September 2, 2010. These surveys were conducted for KEMC as part of the continued study of alternatives for the formerly proposed Woodland Road. The survey findings for these routes have been provided here but these routes are not alternatives being considered for CR 595.

In the course of these surveys, one State-threatened plant species, the narrow-leaved gentian (*Gentiana linearis*), was identified on the stream banks both upstream and downstream where Red Road crosses Clark Creek (T49N, R27W, SE ¼ Section 29). The gentians occurred as individual flowering and non-flowering stems as well as with multiple stems or in small groups. Two State-Special Concern species, Northern gooseberry (*Ribes oxyacanthoides*) and male fern (*Dryopteris filix-mas*), were also identified. Northern gooseberry was found at two locations. The first location was a granite outcrop adjoining the west side of CR 510 just north of the intersection with CR GGI (T50N, R27W NE ¼ Section 18). The second location was on another granite outcrop several hundred feet northwest of the CR 510 crossing of Big Pup Creek (T50N, R27W, SE ¼ Section 20). In this same location, the male fern was also identified. The 2010 rare plant surveys are more fully explained in an addendum to the 2008 Ecological Surveys report (KME, 2011a).

The habitats where listed plants are considered most likely to be encountered are streams, bogs, bog lakes, rock outcrops, black ash swamps, semi-open cedar swamps, and large sedge meadows. However, with the exception of streams, these habitats are uncommon along the CR 510-Red Road-Sleepy Hollow and CR 550 routes. Overall, three listed plant species were encountered along the CR 510-Red Road-Sleepy Hollow route during KME plant surveys. They were the State Threatened narrow-leaved gentian and the State Special Concern northern gooseberry and male fern.

5.18 Environmental Consequences: Vegetative Communities

5.18.A. Listed Species

The narrow-leaved gentian (State Threatened) was the only Michigan or federal-listed species identified along the proposed CR 595 corridor. This plant is known to occur along the northern portion of the CR 595 route. Impacts to the narrow-leaved gentian will be reviewed by the MDNR through its permit process to determine the impacts allowed and mitigation measures that may be required.

Farwell's water milfoil is described in the MNFI database as being previously identified in the same sections as the proposed CR 595 along Mulligan Creek and Wildcat Canyon Creek. However, it was not identified during KME surveys. If present along Mulligan Creek, this aquatic plant is not anticipated to be directly impacted by road construction because a clear span bridge is proposed for the Mulligan Creek crossing.

5.18.B. Invasive Species

Non-native (invasive or exotic) plants were introduced from other areas and therefore did not evolve and do not have any natural enemies. Invasive species grow rapidly and can out-compete native plants. They can also have high reproduction and dispersal rates. The four non-native species indentified during KME botanical surveys conducted in 2008 were European swamp thistle, Canada bluegrass, purple-osier willow, and apothecary's speedwell. Other incidental observations of invasive plants were noted in the area during the KME surveys including spotted knapweed (*Centaurea biebersteinii*), garlic mustard *(Alliaria petiolata*), and reed canary grass (*Phalaris arundinacea*).

The Upper Peninsula Invasives Council maintains a list of its "Top Twenty" invasive plant species including garlic mustard, purple loosestrife (*Lythrum salicaria)*, glossy buckthorn (*Rhamnus alnus*), spotted knapweed, white sweet clover, Japanese knotweed, Eurasian watermilfoil, reed canary grass, common reed (*Phragmites australis)*, Japanese barberry (*Berberis thunbergii*), non-native bush honeysuckles, leafy spurge (*Euphorbia esula*), autumn olive (*Elaeagnus umbellata*), non-native marsh thistle (*Cirsium palustre*), giant hogweed (*Heracleum mantegazzianum*), wild parsnip (*Pastinaca sativa*), St. Johnswort (*Hypericum perforatum*), baby's breath (*Gypsophila paniculata*), common forget-me-not (*Myosotis scorpoides*), and Norway maple (*Acer plantanoides*) (UPIC, 2011).

The three invasive wetland species of primary concern are common reed, reed canary grass, and purple loosestrife. Garlic mustard is typically rated as high priority upland invasive. These and other exotic or invasive species can be spread in three ways: (1) providing habitat by altering conditions; (2) making invasion more likely by stressing or removing native species; and (3) allowing easier movement by wild or human vectors (Trombulak and Frissell, 2000).

Road construction will result in land disturbance and bare soil conditions that can encourage invasive plants to colonize and become established. Road salt applied for road maintenance during the winter season can alter roadside soil chemistry, allowing hardier invasive plants to become established. Construction equipment can be a source of seed dispersal during earthmoving and grading activities. Mud-containing-seed can be transferred from one construction site to another. Following road construction, ore hauling trucks as well as

private cars/trucks will frequent the road corridor with recreational equipment in tow including boats and off-road vehicles. These also can be sources of invasive species seed picked up during off-site use.

Exotic shrub or tree seeds will typically be dispersed via wind or animals. Efforts to quickly stabilize the site following disturbance will help limit the establishment of these invasive shrubs, trees, and upland herbaceous vegetation.

5.18.C. Mitigation Measures for Narrow-Leaved Gentian

The following measures will be implemented for the purpose of mitigating unavoidable impacts to narrow-leaved gentian and to protect the integrity of the natural plant communities in the study area:

1. Apply for and obtain an MDNR Threatened/Endangered Species permit to determine narrow-leaved gentian impacts allowed and mitigation measures that may be required.

2. Place only straw mulch that has been certified weed-free by the Michigan Crop Improvement Association and proof of such certification submitted to the MCRC. Field inspection will be conducted by environmental consultants to verify compliance with this important specification.

3. Minimize the length of time between site disturbance and seeding. Seed mixes shall consist of only native species. Inspection of bag tags will be performed prior to seed being applied and all bag tags and seed invoices will be required to be submitted to the MCRC for verification of compliance with the use of native seed.

5.19 Summary: Vegetation

Botanical surveys were conducted in 2005, 2007, 2008, 2010 and 2011 in the area near and along the proposed CR 595 route with an emphasis on identification of threatened and endangered species. The route consists mainly of common upland forest and wetland communities. Most threatened and endangered species are found in specialized or uncommon communities that are not encountered frequently along the proposed route. The only State Threatened species identified during these investigations was the narrow-leaved gentian. Any impacts to the narrow-leaved gentian will be mitigated to the extent possible via the MDNR permitting program. No State Endangered species were found, nor were any federally-listed species found.

The spread of invasive plant species along the road corridor is a concern during and following construction. Efforts to maintain natural plant communities will include applying native seed mixes and certified weed-free mulch.

5.20 Affected Environment: Wildlife

Road construction and operation can have impacts to local wildlife individuals and populations. Direct impact might occur as mortality during construction or as road kills. Other impacts to wildlife include noise, barrier effects, and habitat fragmentation. Habitat fragmentation, due to its complexity, will be addressed separately in this document.

Discussion of wildlife species within the CR 595 corridor and surrounding areas in Marquette County is provided in this section, along with the potential ecological consequences related to the road construction. Wildlife, for the purposes of this assessment, have been divided into the following groups: birds, mammals (large and small), and reptiles and amphibians.

5.21 Affected Environment: Birds

In September of 2007, in order to determine the species of birds present in the vicinity of the proposed road corridor (area of investigation), and to determine if any listed (i.e. Threatened, Endangered or Special Concern) bird species were present, KME established a bird survey plan and began implementation of a bird survey. A detailed discussion of the bird survey methods is provided in the KME 2008 Ecological Surveys Report.

The 2007 KME bird surveys resulted in the observation of 1,924 birds representing 41 species. No presently listed Michigan or federal Endangered or Threatened species were observed or heard during these surveys. KME identified four Michigan species of Special Concern in 2007; a northern goshawk (*Accipiter gentilis*) near survey point N13 on September 26; an American bittern (*Botaurus lentiginosus*) near survey point S60 on September 27; a spruce grouse (*Falcipennis canadensis*) near survey point N1 on September 27; and a bald eagle (*Haliaeetus leucocephalus*) near survey point W7 on September 26[c].

In 2008 KME conducted spring migration and breeding bird surveys to determine the species of birds in the proposed road corridor. The spring bird migration survey was conducted during the period of May 12-16, 2008 and the breeding bird survey was conducted from June 8-14, 2008. The May 2008 bird surveys resulted in observations of 580 birds representing 70 species. KME observed a total of 593 birds representing 65 species during the June 2008 bird surveys. Complete results of the KME bird surveys are presented in the 2008 Ecological Surveys report.

Kirtland's Warbler Surveys

On May 20, 2008 and June 13, 2008, KME conducted investigations (meander surveys) within several areas of potential Kirtland's warbler (*Dendroica kirtlandii*) habitat within and/or adjacent to the proposed road corridor. The Kirtland's warbler investigation was conducted both in the northern portion of the proposed road corridor (Section 13, T50N-R29W; Section 18, T50N-R28W) and in the southern portion of the proposed road corridor (Section 35, T48N-R29W; Section 2, T47N-R29W). Kirtland's warbler is a Michigan and federal-listed endangered species (USF&WS 2010). No Kirtland's warblers were heard or seen during these meander surveys.

2010 Bird Surveys

In June 2010 KME conducted bird surveys along additional routes. Those additional routes included parts of the proposed CR 595, as well as the CR 510-Red Road-Sleepy Hollow route and the CR 550 route. A detailed discussion of Methods and Results is provided in the 2010 Bird Survey Report. The 2010 bird surveys resulted in observations of 2,434 birds representing 83 species. The relatively large variety of birds identified can be attributed to the diversity of habitats available within the large area of investigation. The majority of bird species that were identified are typical species found in the habitats within the area of

investigation, and occur throughout much of Marquette County and the Upper Peninsula. Common loon was the only Michigan-listed (Threatened) bird species that was sighted or heard within the area of investigation during the 2010 bird survey. KME identified two common loons, one each on two separate days and locations. No Kirtland's warblers were found during the 2010 investigations of potential nesting habitat. No federally-listed species were encountered during the 2010 bird survey.

2011 Raptor Surveys

During the review of the 2009 Woodland Road application for permit, concerns were expressed by MDNR about the potential for red-shouldered hawk and merlin to exist within the project area. Both red-shouldered hawk (*Buteo lineatus*) and merlin (*Falco columbarius*) are Michigan-listed as Threatened (legally protected). In order to determine if either of these species was present, KME conducted call-response surveys in May 2011. The methods and results are described in this section.

Prior to conducting field assessments KME biologists reviewed published information pertaining to the potential presence of red-shouldered hawk or merlin within the northwestern Upper Peninsula (Brewer et al. 1991, Cooper 1999, Cuthrell 2002). A MNFI database query was conducted to identify locations within the region where either species may have been previously documented. Landscape features within the area of investigation were reviewed using Michigan Geographic Data Library aerial photography and other digital mapping data (MDIT 2011). KME adapted a call-response survey method based upon the protocol developed by the Wisconsin Bird Conservation Initiative that is used annually and successfully throughout northern Wisconsin. The survey protocol was within the guidelines specified by the MNFI for locating nesting sites of red-shouldered hawk and merlin.

The first round of the red-shouldered hawk call-response breeding/nesting survey was conducted by two KME biologists on April 26-28, 2011 at each of 39 survey point locations aligned along the entire length of the proposed CR 595 route. Locations were typically spaced approximately 0.5 miles from each other within a variety of habitats. All survey points had been established during general breeding/migratory bird surveys conducted in previous years. A handheld Foxpro Spitfire® digital caller was utilized to broadcast a series of non-specific territorial calls in multiple directions at each survey point. Each series of raptor calls was followed by a quiet listening period. Temperature and wind speed were measured at each survey point using hand-held digital weather instruments. Time, date, weather conditions, and presence of incidental non-target raptor species were recorded.

The second round of the 2011 red-shouldered hawk call-response survey was conducted during May 17, 2011. Eight red-shouldered hawk call-response survey points were selected from the original 39 bird survey points. These points were located in areas that appeared to be potentially suitable nesting habitat for this species.

Seven call-response survey points were selected for merlin in areas that were potentially suitable merlin nesting habitat. Potentially suitable habitat for either species was located primarily north of the Dead River, although areas near Second River were also surveyed. The first round of the merlin call-response survey was conducted on May 17, 2011 and the second round was conducted in reverse order on May 18, 2011.

No red-shouldered hawks or merlins were detected along the proposed CR 595 route during the 2011 call-response breeding/nesting surveys. Five other raptor species were incidentally sighted along the route. These were: (1) bald eagle (*Haliaeetus leucocephalus*), (1) barred owl (*Strix varia***)**, (1) broad-winged hawk (*Buteo platypterus*), (1) Coopers hawk (*Accipiter cooperii*), (3) northern harrier (*Circus cyaneus*), and (1) sharp-shinned hawk (*Accipiter striatus*). No raptor nests associated with any species were detected. The apparent lack of nesting red-shouldered hawks or merlin near the proposed CR 595 route may be at least partly explained by the fact that the region is located at the edge of the geographic range for both species (Cooper 1999, Cuthrell 2002).

Special Concern, Threatened and Endangered Species

Based on review of both the Michigan Natural Features Inventory and The Atlas of Breeding Birds (Brewer 1991), along with input from staff of the MDNR, KME developed a list of seventeen special concern, threatened or endangered bird species that are known or have the potential to occur within Marquette County. Those bird species are as follows:

Special Concern
Northern harrier (*Circus cyaneus)*
Northern goshawk (*Accipiter gentilis*)
Bald eagle (*Haliacetus leucocephalus)*
Osprey (*Pandion haliaetus)*
American bittern (*Botaurus lentiginosus)*
Spruce grouse (*Falicipennis canadensis)*
Black-backed woodpecker (*Picoides arcticus)*
Dickcissel (*Spiza americana)*
Western meadowlark (*Sturnella neglecta)*
Grasshopper sparrow (*Ammodramus savannarum)*
Marsh wren (*Cistothorus palustris)*

Threatened
Common loon (*Graviainumer)*
Cerulean warbler (*Dendroica cerulea)*
Merlin (*Falco columbarius)*
Red-shouldered hawk (*Buteo lineatus)*

Endangered
Kirtland's warbler (*Dendroica kirtlandii)*
Peregrine falcon (*Falco mexicanus)*

Using both Point Count and Call Response Survey methods during 2008, 2010 and 2011, KME confirmed the presence of five special concern species within the area of investigation. Those species are: northern goshawk, northern harrier, bald eagle, American bittern, and spruce grouse. In addition, KME confirmed the presence of one threatened species, common loon, in the area of investigation.

With respect to the issue of potential habitat within the area of investigation for the above-listed seventeen birds, such potential habitat exists for eight species: black-backed woodpecker, marsh wren, osprey, Cerulean warbler, merlin, red-shouldered hawk, Kirtland's warbler and peregrine falcon; therefore these species have the potential of occurring within

this area of Marquette County. However none of these seven species were observed by KME within the area of investigation. The KME bird surveys were robust and were consistent with standard methodologies used to evaluate bird populations; therefore it is unlikely that these Special Concern, Threatened or Endangered birds are present within the area of investigation.

With respect to the other three above-listed species, potential habitat does not exist within the area of investigation for the dickcissel, western meadowlark and grasshopper sparrow which are grassland and prairie species.

5.22 Environmental Consequences: Birds

Some short-term negative effects to birds are possible during construction of the roadway, but these effects are not anticipated to have lasting impacts on bird populations. Birds are highly mobile for feeding and seeking protective cover and most of the species surveyed are not present during the entire year. Nesting habitat is the most critical factor in their life cycle. Some species are ground nesters, some species build nests in different zones of the tree/shrub canopy or in herbaceous vegetation, and some species nest in tree cavities. Depending on the time of year when clearing for construction of the road is taking place it is possible that some nests may be inadvertently impacted. However, adult bird mortality as a result of that clearing or construction is anticipated to be minimal.

Some species of birds rely on aquatic habitats as a food source; e.g. great blue herons feed almost exclusively in wetlands, streams, and lake/pond edges searching out small fish, snakes, frogs, toads, and small mammals. Other species such as flycatchers, kingbirds, or tree swallows may feed upon insects that are produced in wetlands and streams; but these species do not typically depend on wetlands for nesting or cover. Waterfowl species such as wood ducks, black ducks, or mallards depend on wetlands for most of their feeding, brood rearing, and protective cover, and may or may not nest in wetlands. Raptors may feed in some aquatic habitats on the project site but many of the wetlands have dense vegetation that is not conducive to raptors being able to catch prey. The proposed CR 595 will have minimal impact on wetlands utilized by waterfowl. Nevertheless, wetlands that are unavoidably impacted will be mitigated to ensure that the wetland habitat types are not diminished.

Mortality caused by bird-vehicle collisions on the proposed CR 595 may occur. While raptors are vulnerable to vehicle collisions, the most common incidences of road kill occur with passerine and small birds (Erickson et al. 2005). The individual species impacted will vary, depending on the density of habitat types available adjacent to or near the proposed road. Whereas small birds flying in the road corridor are typically coincidentally struck by vehicles, raptors may actually hunt in the open space afforded by the road corridor or scavenge dead animals on the roadway and therefore may be slightly more susceptible to mortality.

The fact that the proposed road corridor is not an entirely unbroken block of undisturbed habitat diminishes the potential impacts on some species of birds. Roads, once constructed, are not physical barriers to bird movement. However, increases in traffic volume and speed will result in increased noise levels along the proposed road corridor. Research shows that noise can result in decreased bird densities adjacent to road corridors. It is hypothesized, in part, that noise increases stress and interferes with bird communication during breeding and young rearing (Forman and Alexander 1998, Forman and Deblinger 2000).

It is important to note that collisions with automobiles results in approximately 9% of human-caused bird mortality; whereas buildings, power lines and feral cats account for roughly 83% (Erickson et al. 2005). Forman and Alexander found in their study (1998), "except for a small number of rare species, road kills have a minimal effect on (bird) population size."

Although studies appear to indicate that bird populations may redistribute upon construction of a new roadway, it does not appear that critical habitat or other factors exist on the proposed CR 595 corridor that would lead to an unacceptable loss rate that would impact bird populations in the area. As the results of the 2007, 2008, 2010, and 2011 bird surveys indicate, the only observations made of Threatened species were one merlin and two observations of common loon. Due to the habits and habitats of these two species, neither is expected to be impacted by the proposed CR 595. In addition, 2011 call-response surveys did not verify any nesting merlin in the project area.

5.23 Affected Environment: Mammals

5.23.A. Large Mammals

This group of wildlife species includes moose (*Alces alces*), black bear (*Ursus americanus*), white-tailed deer (*Odocoileus virginianus*), gray wolf (*Canis lupus*), coyote (*Canis latrans*), fox (*Vulpes vulpes*), bobcat (*Felix rufus*), fisher (*Martes pennant*), beaver (*Castor canadensis*), raccoon (*Procyon lotor*) and river otter (*Lutra canadensis*). Other relatively common large mammal species possibly present within the area of investigation, but not noted during the 2008 surveys, include common gray fox (*Urocyon cinereoargenteus*) and American badger (*Taxidea taxus*).

Due to the wildlife management implications for certain mammals, in particular the gray wolf, specific expertise was employed to document the species of large mammals present in the road study corridor. A study was initiated in April 2008 by James H. Hammill, president of Iron Range Consulting & Services, Inc. (IRC&S) for this purpose. Mr. Hammill is a retired MDNR wildlife specialist, with extensive experience with wolves and other large mammals in the Upper Peninsula, and is a recognized gray wolf expert.

The study by IRC&S, completed in October 2008, evaluated the presence of large mammal species along the proposed road study corridor. The study recorded and verified the presence of any large mammal that left spoor in the form of tracks or droppings, from images that were captured on infrared digital trail cameras, and also from visual sightings. IRC&S reviewed MDNR harvest records documenting the presence of bobcat, river otter, black bear, fisher, and pine marten in the area of investigation for the years 2005 through 2008.

The IRC&S study found that white-tailed deer are the most common species according to the tracking results, with 551 (79%) of the tracks identified. Moose were the next most common species identified by tracks with 85 (12%) of the tracks identified. The digital infrared camera results recorded 18 white-tailed deer (45%), 7 moose (17.5%), and 7 black bear (17.5%).

The gray wolf is currently listed on the State of Michigan list as a Threatened species and is known to exist in the area of investigation. Gray wolf is a species that is actively managed and monitored by the MDNR. The U.S. Fish & Wildlife Service (USF&WS) had de-listed the gray wolf in Minnesota, Wisconsin, and Michigan but recently placed the species back on the endangered species list due to a court settlement. The IRC&S report states, "According to MDNR records, no known wolf den or rendezvous (young-rearing) sites exist along the study

route and the nearest of these critical habitats is approximately 5 miles west-northwest of the northernmost point of the survey" (conversation with B. Roell, MDNR).

Canada lynx (*Lynx canadensis*) is listed as an endangered species in Michigan by the Federal Endangered Species Act administered by the USF&WS. However, no sightings or other evidence of the existence of Canada lynx were found in the area of investigation during field assessments by KME or IRC&S. According to the USF&WS, the state of Michigan is classified as a Peripheral Recovery Area. Peripheral areas generally have sparse records of lynx, and the habitat to support snowshoe hare (*Lepus americanus*) is not plentiful or not contiguous with preferable lynx habitat. These areas may support lynx during dispersal but stable, long-term population survival is not likely (U.S. Department of Interior, 2005).

The moose population is carefully monitored by the MDNR, but it is not at a level where a hunting season is currently available, although a limited hunting season is presently under consideration by MDNR. Climate and interactions with white-tailed deer that transmit brain worm, which is deadly to moose but not to white-tailed deer, are thought to be the primary limiting factors to expansion of the moose herd in Michigan's Upper Peninsula.

White-tailed deer populations in the area of investigation vary annually based primarily on the severity of winter weather conditions, but white-tailed deer are commonly seen in the area. Deer hunting seasons extend from October 1 through mid-December of each year.

Black bears are also common in the area. A hunting season is provided to help control their populations.

Beaver, river otter, bobcat, raccoon, red fox, and coyote are also common in Marquette County. Hunting and trapping seasons are provided for these species of furbearers. Fishers occur as well, but are less common in Marquette County; a trapping season is open for limited harvest of this furbearer. Badgers also occur, however there is no open season for taking them.

5.23.B. Small Mammals

The small mammals found in the area of investigation by KME during field assessments include muskrat (*Ondatra zibethicus*), mink (*Mustela vison*), pine marten (*Martes americana*), long-tailed weasel (*Mustela frenata*), striped skunk (*Mephitis mephitis*), opossum (*Didelphis marupialis*), porcupine (*Erithizon dorsatum*), snowshoe hares, Eastern cottontail (*Sylvilagus floridanus*, gray/black squirrels (*Scirurus carolinensis*), red squirrels (*Tamiasciurus hudsonicus*), and other small rodents. Occasional foraging for food will take place by some species in wetlands or along stream/pond margins; however most of the time, with the exception of muskrat, mink, and snowshoe hare, the small mammal species identified live primarily in upland habitats. No Threatened or Endangered small mammals are identified in MNFI records for Marquette County, and no State Threatened or Endangered small mammals were identified during field assessments.

Muskrat, mink, and pine marten trapping is allowed, although pine marten harvest is very limited. There is no trapping season for long-tailed weasel. Gray/black squirrel, Eastern cottontail, and snowshoe hare may be taken during hunting seasons for these species. Porcupine, opossum, red squirrels, and skunk may be taken during the entire year.

5.24 Environmental Consequences: Mammals

Burrowing mammals or those mammals found close to or in wetland may be directly impacted by the proposed construction of CR 595, depending on the timing of construction, if they do not vacate their dens prior to construction activities. These direct impacts are a one-time event and not likely to be significant. Mammals may suffer mortality from vehicle collisions using the proposed CR 595, probably most often at night or the dusk/dawn periods, particularly during breeding seasons. However, the fact that the proposed road will only allow an approximate average speed of 45 miles per hour will reduce mortality. Signage will also be deployed to notify motorists of wildlife crossing areas and to post advisory slower vehicle speeds in these areas. Current state law does not allow the posting of speed limits in wildlife crossing areas. The presence of the road may disturb some more sensitive species such as moose, gray wolf, or black bear.

Although some species of mammals are more dependent upon aquatic habitats such as river otter, muskrats, mink, and beaver, most mammal species in the area only utilize aquatic habitats for portions of their life cycle. Moose feed in wetlands, particularly during the summer, and browse on willows, aspen, and balsam fir in the winter. Black bears depend on wetland plants for early spring food and may forage for insects in rotting logs in wooded swamps. White-tailed deer rely on dense evergreen wetlands for thermal cover in winter to escape cold winds. Bobcats will forage and rear young in wooded swamps. Raccoons forage along streams and wetland edges for food, but may breed and rear young in uplands. Gray wolf, coyote, fox, bobcat, and fisher do not rely on aquatic habitats for any critical life cycle function, with the exception of feeding on animals that may inhabit wetlands, such as white-tailed deer or snowshoe hares.

The proposed road project should have little effect on muskrats or mink, as these species typically live in marshes or streams and there will be minimal effect on these types of habitats. Some mammal mortality may occur due to the stream and wetland crossings of the new road, the most likely locations where these species will be encountered, but should not have any significant deleterious effect on the local populations. Muskrat mortality may increase on the proposed road during periods when young are being kicked out of the nest and searching for new territory. However, numbers of muskrat should not be affected due to the prolific breeding of the muskrat species. Mink stay near water and tend to move along shorelines or streams. Adequate space to allow for movement under the road at stream crossings may aid in limiting impact to mink allowing them to avoid crossing over the road. Small mammals such as chipmunks and mice have been known to avoid crossing roads altogether (Forman and Deblinger 2000, Oxley 1974).

The proposed location of CR 595 will not be impacting old-growth forest. There are small areas of old-growth forest in some wetlands in the area, but those areas have been avoided with the proposed alignment. Most of the area along and immediately adjacent to the proposed road has been in active timber harvest for decades and the general landscape is in various stages of succession. Lands have been managed for timber growth on State and private lands along the road route, including planting of different species of trees than what existed previously. Examples are jack pine and red pine plantations that are managed for pulp production. These management practices result in changes in the assemblage of wildlife species that use the habitat.

Many portions of the proposed CR 595 are located along existing roads or trails with varying amounts of open tree canopy. The proposed road will create additional edge habitat that will alter the habitat adjacent to the road, which will benefit some wildlife species that prefer edge habitat and will be a detriment to interior forest species that do not use edge habitat.

In areas where the road is in proximity to wildlife feeding and bedding areas, there may be an increase in the probability of vehicle-wildlife collisions in the vicinity of those areas (Oxley 1974). Winter deer yards comprised of dense evergreen tree communities, which are critical for winter survival of white-tailed deer and some other wildlife species, are not affected by the proposed road. The proposed CR 595 will not be a physical barrier for large or small mammal species, but some species may avoid the proposed road due to noise, lights, and motion from vehicles (Forman and Alexander 1998, Forman and Deblinger 2000).

No federally-listed or Michigan-listed Threatened, Endangered, or Special Concern small mammal species were encountered during field investigations conducted by KME. Gray wolf (federally-listed as Endangered, Michigan-listed as Threatened) and moose (Michigan-listed as Special Concern) were the only listed large mammal species found to exist within or near the area of investigation. The overall impact of CR 595 to listed wildlife species is anticipated to be minimal due to their relatively low abundance as well as the fact that mitigation measures will be employed to minimize vehicle-wolf/moose interactions (e.g. signage, speed limit advisories, awareness training, etc.).

Overall, the proposed CR 595 is not expected to have substantial negative impacts to mammal populations.

5.25 Affected Environment: Reptiles and Amphibians

During the stream surveys conducted in 2008, 2010 and 2011, as well as during other ecological survey/field work, KME biologists also conducted turtle surveys. KME biologists also looked for turtles during other ecological survey field work. A survey specifically for wood turtles was conducted by KME in May 2011.

Of the species of reptiles known to occur in Marquette County, a species of particular interest is the wood turtle (*Glyptemys insculpta*), as it is a species of Special Concern in Michigan. According to the MNFI abstract, wood turtles prefer medium-sized rivers/streams with hard sand/gravel bottoms, but generally avoid clay-bottom or mucky-bottom streams. They also prefer floodplain/riparian zones with herbaceous vegetation for foraging, and need exposed sandy substrates for egg laying (Lee 2004).

<u>2011 Wood Turtle Survey</u>

During May 17-19, 2011, KME used methods described by MNFI (Lee 1999) to survey for the presence of wood turtles (*Glyptemys insculpta*) within potential riparian habitats near the proposed CR 595 route. Occurrences of wood turtle have been published by MNFI in southern Marquette County and Baraga County. According to MNFI, one of the best times to conduct a visual encounter survey for wood turtles is spring because turtles are active and concentrated near streams. Herbaceous ground cover is sparser than during summer or fall, allowing for better visibility, and wood turtles are frequently basking in or near water (Lee 1999).

KME biologists utilized meander survey methods to investigate the stream channels and associated riparian areas several hundred feet upstream and downstream of the proposed CR 595 route crossing sites at the Yellow Dog River, Mulligan Creek, Wildcat Canyon Creek, Voelkers Creek, and Second River. Meander surveys consisted of methodically examining herbaceous meadows, alder thickets, and forested areas and periodically using binoculars to observe potential basking sites from a distance. Additionally, a small kayak was utilized to survey the Yellow Dog River (8-mile survey reach); Dead River (0.75-mile survey reach); and Middle Branch Escanaba River (2.5-mile survey reach). Conditions during the three-day survey period were relatively mild (sunny to partly cloudy, 65-72 degrees Fahrenheit).

No wood turtles were found in the May 2011 surveys. Four Midland painted turtles (*Chrysemys picta*) were sighted basking on woody debris in a small pond associated with the upper reach of Wildcat Canyon Creek. One large Midland painted turtle was seen basking at the roadside beaver impoundment of Wildcat Canyon Creek. Another large Midland painted turtle was observed basking on the Yellow Dog River bank approximately 0.25 miles downstream of the proposed CR 595 crossing site. A large snapping turtle (*Chelydra serpentine*) was found on Trail 5 south of Voelkers Creek. The remains of an apparently unsuccessful snapping turtle nest (desiccated, dead hatchlings from the previous year) were found at the road edge near the Yellow Dog River Trail 5 Bridge.

Sufficient nesting substrate appears to be a major limiting factor on all of the stream reaches within the proposed CR 595 corridor, due to relatively stable headwater hydrological characteristics and consequently the natural encroachment of densely packed graminoid vegetation (grasses and sedges) and shrub thickets that typically crowd to the water's edge. Additional limiting factors may exist (e.g., harsh winters, predators) that prevent wood turtles from establishing viable metapopulations within these riparian systems.

Only two turtle species, Midland painted turtle (*Chrysemys picta marginata*) and snapping turtle (*Chelydra serpentine*), were sighted during all of the ecological surveys and other field work conducted by KME biologists and only a limited number of individuals were sighted. Based on all of the time spent in the field by KME biologists and the relative paucity of turtle sightings during those field efforts, it appears as though turtles are not common in the area of investigation.

Frog and Toad Surveys

KME conducted frog and toad surveys in accordance with MDNR survey guidelines (MDNR, 2002; Mossman et al, 1998) at nine sampling locations along the proposed road. A summary of the results of the frog and toad surveys is presented in Table 5-7. A delayed warm-up in the Western Upper Peninsula during spring 2008 made it necessary to postpone all three frog and toad surveys until the appropriate air temperatures were present; thereby slightly deviating from the survey periods outlined in MDNR guidelines (MDNR, 2002). Detailed sampling point data is provided in the 2008 Ecological Surveys report. No listed frog or toad species were found during the surveys, and the expected assemblage of several common frog and toad species is present in the area of investigation.

Table 5-7. Results of 2008 Frog & Toad Surveys on the Proposed CR 595 Corridor.

Date	NSP*	WF*	NLF*	PF*	GTF*	WCF*	GF*	MF*	AT*	BF*
5/13/08	•	•			•	•	•	•	•	
5/15/08	•	•	•		•	•	•	•	•	
6/9/08	•				•		•	•	•	
6/13/08 6/17/08	•				•		•		•	
7/14/08- 7/16/08							•	•		

***NSP=**Northern spring peeper (*Pseudacris crucifer*); **WF=**Wood frog (*Rana sylvatica*); **NLF=**Northern leopard frog (*Rana pipiens*); **PF=**Pickerel frog (*Rana palustris*); **GTF=**Eastern gray tree frog (*Hyla versicolor*); **WCF=**Western chorus frog (*Pseudacris triseriata triseriata*); **GF=**Green frog (*Rana clamitans melanota*); **MF=**Mink frog (*Rana septentrionalis*); **AT=**American Toad (*Bufo americanus*); and **BF=**Bullfrog (*Rana catesbeiana*).

Other Listed Reptile and Amphibian Species

Other than the wood turtle, the only Michigan-listed Threatened, Endangered, or Special Concern frog, toad, or turtle species are the spotted turtle (*Clemmys guttata*), and Blanchard's cricket frog (*Acris crepitans blanchardi*), neither of which have been previously recorded by MNFI in Marquette County. Similarly, neither the spotted turtle nor Blanchard's cricket frogs were encountered during field investigations conducted by KME. There are noknown occurances of federally listed frogs, toads or turtles for Marquette County, Michigan.

5.26 Environmental Consequences: Reptiles and Amphibians

Reptiles and amphibians may be directly impacted by the construction of CR 595. However, the potential construction impacts are anticipated to be limited and minimal. The potential for on-going reptile/amphibian road kill for the life of the road is a concern where wetlands or ponds are adjacent to the road.

The most frequent reptile and amphibian road kill typically occurs in times of peak species movement, during spring breeding and then again during hatchling migration (Jochimsen et al. 2004). Nesting sites along roads can lead to turtle mortality on the adjacent roadway (Aresco, 2005). During non-peak movement, road kill may, in part, be caused by the attraction of the reptiles and amphibians to the warm road surface.

The inherent mobility associated with some reptile or amphibian species may increase the likelihood and extent of road kill mortality for that species. For example leopard frogs are highly mobile, while green frogs are much less so. In addition, the inherent speed of the animal can affect its chances of avoiding vehicles (Jochimsen et al 2004). Turtles, due to their deliberate nature, have a reduced chance of survival when crossing a roadway.

If the proposed CR 595 causes reptile or amphibian populations to become isolated, then the road may impact local populations. However, this effect is not expected with the proposed CR 595 due to the relatively low traffic volumes, apparent low populations of turtles, and the common assemblage of amphibian species present. In addition, where stream crossings are proposed, the bridges and culverts have been designed to provide for passage of reptiles and amphibians under the road.

As a result of the various ecological surveys conducted in 2008, 2010, and 2011, KME determined that little preferred wood turtle habitat is present within the proposed project corridor. During those surveys, the streams with the best potential for wood turtle habitat were determined to be the Yellow Dog River and the Dead River. No wood turtles were sighted during the 2008 or 2010 KME field investigations. KME conducted additional wood turtle surveys on certain portions of the CR 595 route in May 2011. Based on KME surveys, impacts to potential wood turtle habitat are not expected and wood turtles have not been seen on the project. KME surveys did not identify any rare frogs or toads. Therefore, the overall impact of CR 595 to listed reptiles and amphibians is anticipated to be minimal.

5.27 Wildlife Mitigation Measures

Although a portion of the proposed CR 595 is located along existing road corridors, the increase in traffic will increase road kill frequency. MCRC is willing to coordinate with the USF&WS on permit conditions to protect gray wolf, a federally listed species. Discussions will be initiated with MDNR Wildlife Division staff regarding mitigation measures for CR 595 such as signage, barriers adjacent to important wildlife habitat, identification of wildlife travel corridors, speed limit advisories in critical areas, mortality surveys, and other actions to address wildlife-related issues. Additional discussion of possible wildlife mitigation measures is provided in the Habitat Fragmentation section of this document.

5.28 Summary of Environmental Consequences: Wildlife

The construction of the proposed CR 595 will cause some unavoidable impacts to wildlife species, both direct and indirect impacts. However, the level of the impacts is not a certainty due to the inherent adaptability of wildlife species and the unknown effect of the mitigating measures that will be employed during the road construction, operation, and maintenance for the purpose of avoiding and minimizing impacts to wildlife species. The proposed course of action (as an important component of the mitigating measures) will be to monitor wildlife mortality on the proposed road on an on-going basis and to implement measures to minimize impacts to wildlife, as necessary.

5.29 Secondary and Cumulative Impacts of Development Along the Proposed CR 595

When a new road is constructed where a road did not previously exist, or where an existing road is substantially upgraded, the potential for new development along the new road exists. The proposed CR 595 has some of both of these situations; some sections are existing gravel or unimproved county road that will be improved; some sections are trails or logging roads that will be reconstructed; and, some areas there is no road or trail at the present time.

The primary factors influencing the amount of development that may occur along any road in this instance are land ownership patterns and the availability of utilities. A secondary factor that may influence development would be the distance of the areas available for development from places of employment.

Land ownership patterns along the proposed CR 595 will substantially limit development of residences or camps. Nearly all of the land adjacent to the proposed road north of Brocky Lake is in corporate ownership with the long-term purpose of timber production. That does not mean that timber companies won't sell land, but the primary purpose for them owning the land is the significant value of the timber produced on these lands. Although some lands

could be made available for purchase after CR 595 is constructed, the amount of land that may be available in this manner is speculative and realistically is likely to be very limited.

The land adjacent to the proposed CR 595 generally near Brocky Lake and south has some existing development and privately-owned land adjacent to roads is more extensive. Due to the fact that some of these private lands already have homes or camps, construction of new development is not expected to have any substantial cumulative impacts on the landscape; however some of the private lands may be available for purchase and subsequent development. This southerly area of the project does not have the same character as the more northern segments of the project corridor, as there are more county roads and private roads in this southerly area that serve the many camps and residences along CR FY, Wolf Lake Road, and other county roads off Wolf Lake Road. If subsequent development is to happen as a result of the construction of CR 595, the area south of Brocky Lake would be the most likely area for that to occur.

The second factor that will influence development along CR 595, if built, is the lack of electric service along the road. Presently electric power is only provided for a distance of about 3,500 feet north of US-41 on Wolf Lake Road. According to We Energies, which is the power company that supplies the power in this area, there are no plans to extend power on CR 595 beyond what is presently available.

When a customer wants to have electric service provided, there is usually some distance provided free of charge (usually up to 600 feet), but installation of power beyond the distance provided must be paid for by the customer requesting service. The cost of installing electric power ranges from $50,000 to $100,000 per mile, depending on terrain, access, etc (Personal Communications; We Energies and Upper Peninsula Power Company).

It is reasonable to assume that the extension of Wolf Lake Road with the construction of CR 595 would not result in the extension of electric power for any substantial distance to serve future residential development. Customers would not likely pay for the extension of power at the cost imposed and neither is the density of residential development along the CR 595 route likely to be sufficient to make it financially viable to share the cost of extending power, or for We Energies to extend power at their expense. Therefore it is reasonable to assume that any development along the proposed CR 595 is likely to be limited to seasonal camps that receive only occasional use and do not need electric power service. In addition, due to land ownership patterns the availability of land on the CR 595 route for future development is very limited.

Power has recently been provided to the Eagle Development Project generally along CR 510 and Triple A Road by Alger Delta Electric Cooperative, but the extension of that power south from Triple A Road on CR 595 is not likely due to the presence of State of Michigan lands and land ownership by timber companies.

5.30 Secondary and Cumulative Impacts of Future Mining and Logging Along the Proposed CR 595

The proposed CR 595 is needed as an efficient and reliable transportation route for the mining and logging industry in northwest Marquette County. This is integral to the purpose and need for the proposed road. However, if the proposed CR 595 is not built, the mining and logging industries will go on, but will have to continue to utilize inefficient routes of

access to transport their products. These industries will not be able to operate with as much efficiency as would be realized with the new road, as has been explained earlier in this assessment. Employees will have longer and less reliable access to the Eagle Development Project without the new road. Local communities will not have the upgraded road infrastructure to provide enhanced public safety, emergency access, logging, mining, and recreational uses of the vast area of land that the new road would serve, which will greatly benefit local businesses.

The construction of CR 595 will not cause more mining or more logging to take place. If mineral resources are discovered and those resources are determined to be recoverable, then the mining will probably occur regardless of the quality of the road access. Mines have constructed haul roads in the U.P. for over 150 years. Timber resources need to reach a certain age or growth to be harvested according to the long-term management plans that the timber companies or landowners usually operate under. A new road won't cause more timber to be harvested; it will provide a more efficient means of transport which translates to more viable business for all concerned, including public and private timber owners. The viability of these industries is essential to many related businesses as well as state and local governmental revenues.

5.31 Road Construction Costs: Employment and Services Needed

It is estimated that it will require two construction seasons to construct the CR 595. An estimated 200 well-paying jobs would be created, with most of the road construction contracts anticipated to be awarded to local firms. The general contract for construction may be awarded to a large regional firm, however heavy construction firms in the U.P. would most likely be awarded subcontracts for construction of portions of the road and bridges. These firms would subsequently employ mostly local workers needed for the road construction project, as detailed below.

The following skilled trades and other labor would be employed for this project:

- Civil and structural engineers
- Project managers
- Geotechnical engineers
- Geotechnical equipment operators
- Surveyors
- Environmental consultants
- Heavy equipment operators
- Explosives experts
- Iron workers
- Welders
- Mechanics
- Truck drivers
- Safety coordinators
- Carpenters
- Fuel suppliers
- Heavy equipment suppliers
- Landscape contractors
- Laborers

The following services and supplies would be required:

- Steel and aluminum components for bridges
- Concrete for bridge/culvert footings, abutments, wingwalls, and bridge decks
- Concrete, steel, and polyethylene culverts
- Aggregate
- Rock riprap
- Geotextile fabric
- Erosion control fence
- Weed-free straw mulch, excelsior erosion control mat
- Traffic control signage
- Construction barrels
- Asphalt
- Fuel
- Surveying supplies
- Seed for erosion control
- Wetland seed and trees for mitigation sites

The CR 595 construction project would provide a significant number of jobs during a time of economic downturn and higher unemployment in Michigan. The local economy would also benefit substantially as a result of the employment and need for services and supplies to construct the road. Local lodging providers, restaurants, gas stations, convenience stores, and related businesses would benefit from the construction wages in the community and the services needed. This project would help many businesses and individuals get through these difficult economic times.

5.32 Affected Environment: Socioeconomics

This section discusses socioeconomics in Marquette County and within the proposed study area. The American Community Survey (ACS) data from 2005-2009 is a primary source of demographic data for this document. Unless otherwise noted, descriptions of demographic trends are from the American Community Surveys taken from 2005 through 2009.

5.32.A. Population Trends and Demographics

Results of the 2010 Census data show the number of Michigan residents fell by 0.6% since 2000. Michigan ranks eighth nationwide in population. Michigan's 2010 population was estimated to be 9,883,640; down from 9,938,444 in 2000 (2010 U.S. Census). The total estimated population for Marquette County was 65,000. The ratio of males to females was 50%. The median age was 39.2 years. The ethnic demographic of was 94% Caucasian or white; 2% black or African American; 1% American Indian and Alaska Native; 1% Hispanic; 1% Asian; and 2% reported an ethnicity of more than one race.

5.32.B. Households

The ACS reports there were 25,000 households in Marquette County. The average household size was 2.4 people. Families made up 64% of the households. Non-family households made up 36% of all households in Marquette County. Approximately 2% of the population was foreign born and 77% of the legal residents of the U.S. were born in Michigan. The median income of households in Marquette County was $43,692, as

compared to $47,800 for households in the State of Michigan. In Marquette County, approximately 31% of the households received Social Security and the average income from that Social Security was $15,389; and approximately 14% of people were in poverty and 14% of people under 18 were below the poverty level, compared with 10% of people 65 years old and over. In Marquette County 8% of all families had incomes below the poverty level as compared to 10% for the State of Michigan.

5.32.C. Education

In Marquette County approximately 91% of people 25 years and older had graduated from high school and 29% had attained a bachelor's degree or higher. The total school enrollment in Marquette County was 19,000. Nursery school and kindergarten enrollment was 1,500 and the combined elementary and high school enrollment was 8,900. College and graduate school enrollment was 8,300 combined.

5.32.D. Employment

Health care, educational services, and social assistance (21%) as well as retail trade (14%) are the leading industries in Marquette County for the employed population 16 years and older (MILMI, 2009). Mining, forestry, fishing, and agriculture employed approximately 5% of this population.

The most common occupations in Marquette County were management, professional, and related occupations (32%); sales and office occupations (27%); service occupations (22%); and construction, extraction, maintenance, and repair occupations (10%). Approximately 79% of the people employed were private wage and salary workers; 16% were federal, state, or local government workers; and 5% were self-employed. The unemployment rate in Marquette County is 9.6 percent and is slightly less than the U.S. average of 10.2% (ACS, 2009). Recent job growth is negative, as employment has decreased by 5.9% between 2005 and 2009 (Figure 5-7).

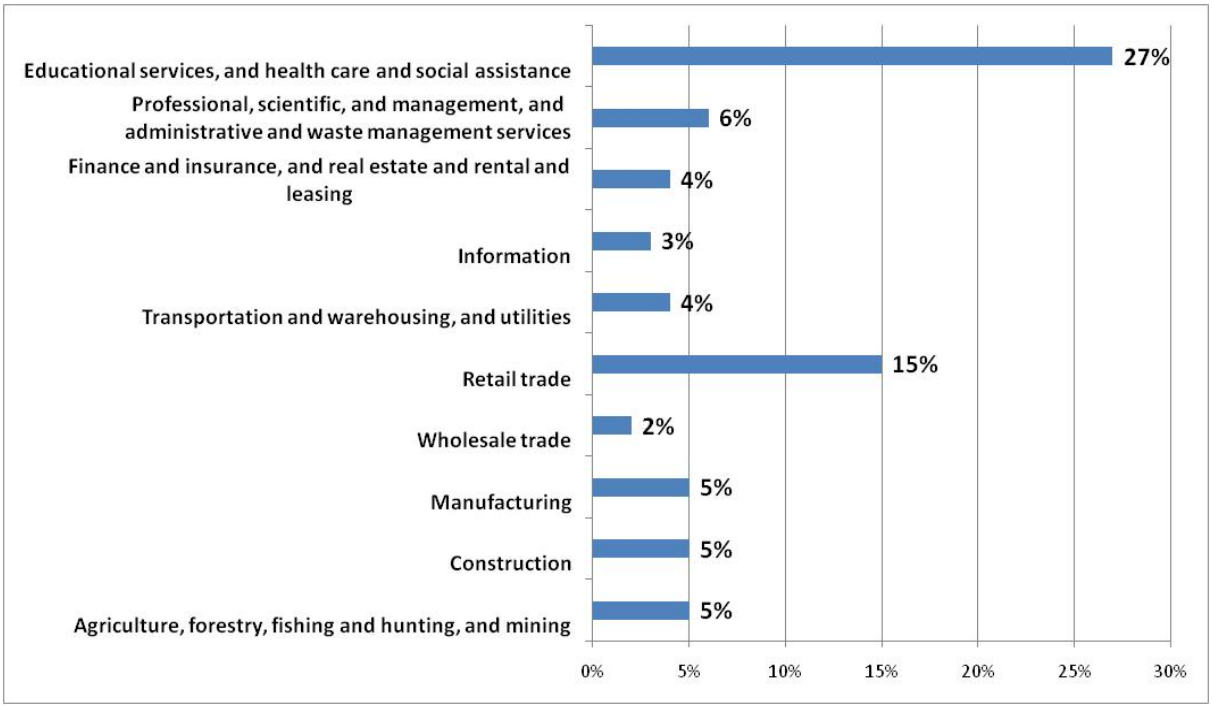


Figure 5-7. Employment by Industry in Marquette County, Michigan in 2005-2009
Source: American Community Survey, 2005-2009

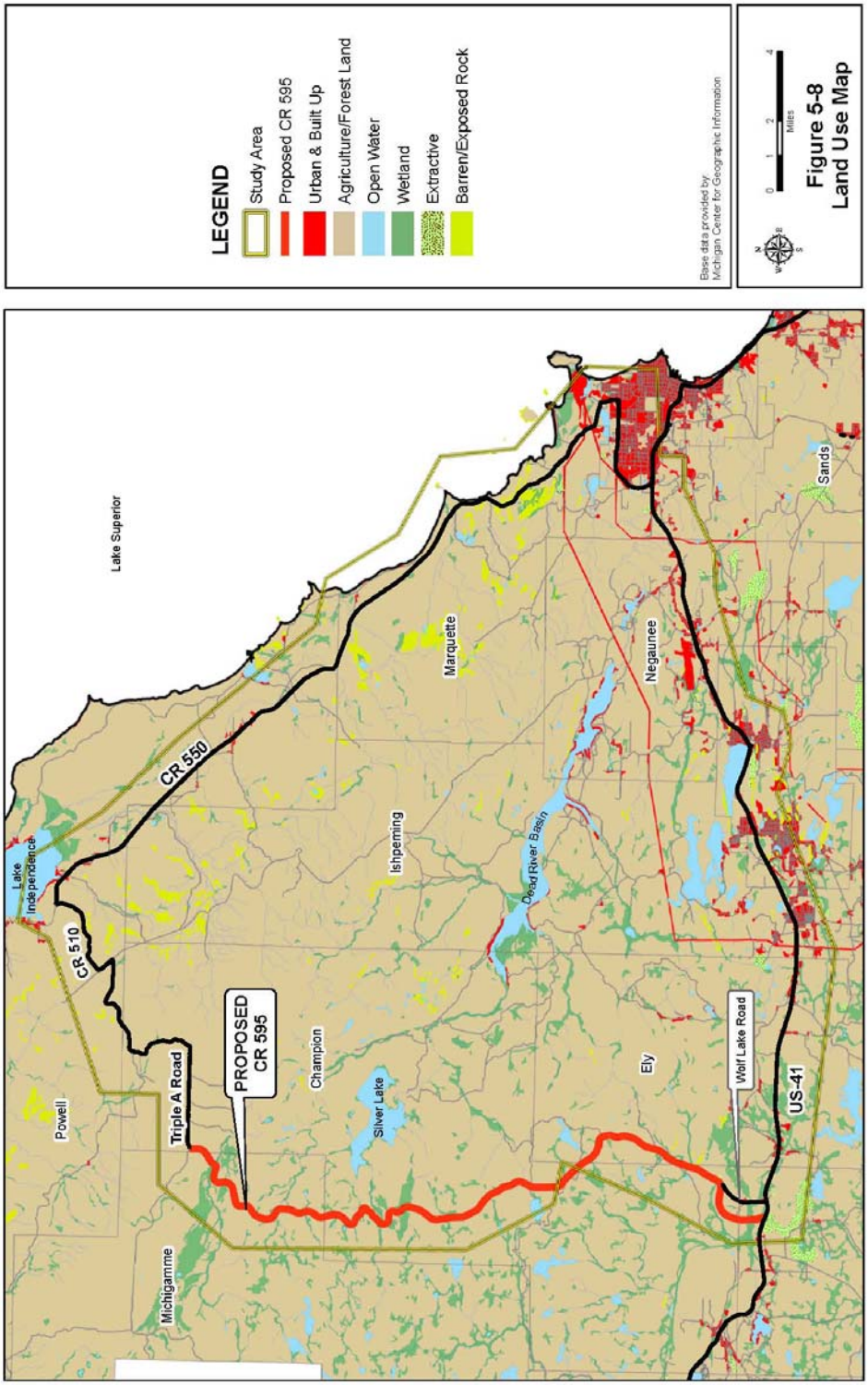
5.32.E. Transportation

Eighty percent of workers drove alone to places of employment, 10% carpooled, 1% took public transportation, 7% used other means, and the remaining 2% worked at home. The average commute was 17.5 minutes.

5.33 Affected Environment: Land Use

This section discusses existing land uses, key institutions and zoning within the study area.

Land use patterns and characteristics in Marquette County are typical of those found in the Upper Peninsula (Marquette County, 2009). Early settlers were attracted to the area by mining and forestry. Towns were developed near resource production centers and transportation facilities such as the harbor in Marquette. Population growth spurred other land uses such as farming, commercial, and industrial uses. Mining and timber harvesting continue to be important land uses in Marquette County. Development and conversion of land to "built" or "developed" has steadily occurred, mainly along the periphery of the County's urban corridor consisting of the cities of Ishpeming, Negaunee, and Marquette (Marquette County, 2009). Approximately 85% of the land in the Marquette County is classified as agriculture/forest, 4% of the land is classified as urban or built-up, and 7% is attributed to wetland (Figure 5-8).


LEGEND
Study Area
Proposed CR 595
Urban & Built Up
Agriculture/Forest Land
Open Water
Wetland
Extractive
Barren/Exposed Rock
Base data provided by:
Michigan Center for Geographic Information
Miles
Figure 5-8
Land Use Map
Lake Superior
Lake Independence
CR 550
CR 510
PROPOSED CR 595
Triple A Road
Powell
Michigamme
Champion
Silver Lake
Ishpeming
Marquette
Dead River Basin
Negaunee
Sands
Ely
Wolf Lake Road
US-41

Ownership of land in Marquette County consists primarily of corporate holdings used for forestry or mining. Over a million acres of timberland is under such corporate ownership. The CFA is a program devoted to the production of commercial forest products on private lands. A total of 327,181 acres of land is enrolled in this program in Marquette County (Marquette County, 2009). Although privately held, lands enrolled in the CFA are publically accessible and are often used for recreational purposes including hunting, biking, hiking, and berry and mushroom picking.

Lands under public ownership constitute 25% of land holdings and are available mostly for recreation purposes and may be used for forestry as well. Privately-held residences and businesses are the smallest land use segment (Marquette County, 2009).

5.34 Environmental Consequences: Socioeconomics and Land Use

5.34.A. Population

Forecasted population growth is not projected to be dependent on implementation of the proposed CR 595 or the use of Triple A Road, CR 510, Red Road, or CR 550 for hauling related to the timber or mining industries. Projected demographics could be indirectly affected by implementation of hauling on any of these routes if people do not want to be located on a busy road.

Implementation of the CR 550 route for traffic associated with the Eagle Development Project may result in voluntary relocation of a small percentage of the residential population away from CR 550, including Sugar Loaf Avenue and Wright Street due to the increase in heavy truck and other traffic. Implementation of the CR 595 and CR 510-Red Road-Sleepy Hollow routes may attract residential development to privately-owned parcels adjacent to the roadways. However, existing zoning ordinances, the potential for heavy truck traffic, and the lack of infrastructure to support residential development (primarily lack of electric service) are significant obstacles to residential establishment. The relative lack of privately-owned parcels adjacent to the proposed CR 595 will substantially reduce the likelihood of residential development on that road.

The proposed CR 595 would provide the transportation route that would benefit public safety and emergency services to serve the general public and recreationists, as well as the development of timber and mineral resources. Implementation of the CR 595 project may result in additional job growth and attract residents to the area.

5.34.B. Employment

Implementation of any one of these routes will result in additional employment during road construction. Improved access to commercial forest and recreational areas as a result of implementing the proposed CR 595 may result in increased opportunities for employment associated with production and haulage of mining and commercial forest products and tourism. The improved transportation safety provided by CR 595 for the logging industry as well as recreationists is important, as is the improved access for emergency services. Similarly, if upgraded or reconstructed, the CR 510-Red Road-Sleepy Hollow route would result in an improved roadway to support existing production and haulage of commercial forest products and tourism; however, its length and configuration would not provide an

optimum transportation route capable of attracting additional business and the potential for the consequential creation of jobs.

5.34.C. Impacts on Residents

During the construction phase of any of the routes, residents may be disrupted and inconvenienced by detours, local road closures, dust, noise, heavy equipment traffic on existing roads, changes in the level of service, safety hazards, and interference with emergency services.

The CR 550 route through the high density residential, institutional, and commercial areas will have the greatest impact on residents during road construction if this route were implemented. Implementation of the CR 550 route will result in substantial additional heavy truck traffic and other traffic through densely populated areas within the City of Marquette and Marquette Township. This is likely to result in negative impacts for some residents living near the roadway including increased noise, emissions and aesthetic impacts. The Mayor of the City of Marquette, the Marquette County Board of Commissioners, the Marquette City Commission, the Marquette Township Board and many residents of the City of Marquette are opposed to the CR 550 route being implemented as the access to the Eagle Development Project, citing quality of life impacts as the basis of their opposition.

Implementation of the CR 510-Red Road-Sleepy Hollow alternative will result in an increase in truck traffic near permanent residences and camps along Red Road north of the Dead River Storage Basin and adjacent to portions of Wolf Lake Road north of US-41. Permanent and seasonal residents at these locations will likely experience increased noise and aesthetic impacts as a result of roadway operation. Construction-related impacts including impaired access to driveways, road closures, detours, dust, noise, and vibrations are likely to occur.

The proposed CR 595 route will provide a more direct north-south roadway that will allow heavy truck traffic related to mining and commercial forestry to bypass densely populated areas within the City of Marquette and other areas of Marquette County and will thereby promote the safety of the public. The CR 595 alternative route will have the lowest construction-related impact on residents within the study area. The CR 595 route has the public support and endorsement of area communities and municipalities including the Mayor of the City of Marquette; the Marquette County Board of Commissioners; the Marquette City Commission and many residents of the City of Marquette; the Charter Township of Marquette Board; and the Township Boards of Richmond, Republic, Humboldt, Champion, Ely, Ishpeming, Negaunee, and Powell Township.

5.34.D. Residential Displacements

Displacement and re-settlement of residents is a significant impact and can lead to additional impacts on the broader community. Residential displacement for the construction of a road may result in economic impact resulting from acquiring new housing at a new location, social and psychological impacts due to the disruption of social relationships and establishing relationships in a new social environment, and changes in type and tenure of housing. No residential displacements will occur from the implementation of the proposed CR 595 or on the CR 510-Red Road or CR 550 routes.

Implementation of the CR 550 route may cause temporary impairment of access to driveways and connecting roadways of residents along CR 550 near Middle Island Point Road during construction-related road improvements. Implementation of the CR 510-Red Road Sleepy Hollow route may cause temporary impairment of access to driveways associated with camps and residences on the Red Road and Wolf Lake Road segments. Implementation of the proposed CR 595 route may cause impairment of access to driveways associated with camps and residences on the Wolf Lake Road segment.

5.34.E. Community Cohesion

Traditional urban neighborhoods are located on Wright Street. Those neighborhoods would be negatively affected by implementation of the CR 550 route. Community opposition in the Wright Street area includes petitions demanding implementation of an alternative route and calls for ordinances prohibiting heavy truck traffic along this segment of the alternative. The CR 595 and CR 510-Red Road-Sleepy Hollow routes will not impact traditional urban neighborhoods.

Implementation of the CR 550 route for mine-related transportation would not likely result in a major change in land use along the existing road. This existing road is the primary north-south arterial from Marquette to Big Bay, and therefore land use change within this corridor is unlikely to occur as the result of implementation of this route.

Implementation of the proposed CR 595 and CR 510-Red Road-Sleepy Hollow routes would likely result in local land use patterns of future development that are consistent with local zoning ordinances. In general, the type, intensity, quality and timing of new development are determined by the following five factors:

- The implementation schedule and sequence of the proposed route;
- The size and availability of vacant land;
- The suitability of the vacant land for urban development;
- The effectiveness of land use planning and development controls by local townships and municipalities having jurisdiction; and,
- The feasibility of providing electricity service to these areas not presently served by electric power.

New and improved roadways may potentially be an attraction for commercial and non-residential development, primarily at points of intersection with existing roadways. The greatest pressure for new development typically occurs within a quarter-mile of these areas and would be consistent with zoning. However, the proposed CR 595 will not have any major roadway intersections because the only existing road on this route is US-41 at the south terminus of the proposed CR 595. The land at this intersection is owned by KEMC on the south and by the Humboldt Wetland Mitigation Bank on the north side of US-41, which is in a conservation easement. The north terminus of the proposed CR 595 intersects with Triple A Road on land owned by the State of Michigan.

Implementation of the proposed CR 595 or the CR 510-Red Road-Sleepy Hollow routes may favor residential development along the routes by providing a better transportation link capable of supporting increased traffic capacity to employment, shopping, recreational and health care opportunities within Marquette County. These routes would also provide

increased efficiency in the distribution of goods and services from commercial forest lands and mining as well as buffer existing residential land uses served by other major arterials from future traffic increases due to the redistribution and diversion of existing commercial and residential vehicle traffic to the improved route.

5.34.F. Commercial Business and Community Services

Displacement of commercial or community facilities is not expected to occur from the implementation of the proposed CR 595, CR 510-Red Road-Sleepy Hollow, or CR 550 routes. Implementation of the CR 550 route may periodically inconvenience access to driveways and parking lots associated with several businesses, Marquette Missionary Church, Holy Cross Cemetery, Marquette Tourist Park, and Setter Field, which are located along CR 550 south of Compeau Creek Road, along Sugar Loaf Avenue, and Wright Street.

5.34.G. Public Revenue Expenditure

The cost for the MCRC to maintain a roadway is directly proportional to the length of the route to be maintained, as well as the amount and type of traffic on the route and season (i.e., summer or winter). The MCRC costs to maintain primary roads such as CR 550 and local roads such as Triple A Road are approximately $2,355 per mile in the summer and $2,763 per mile in the winter. The MCRC cost of maintaining a local road is approximately $1,270 per mile in the summer and $1,902 per mile in the winter (MCRC, 2011). Due to seasonal conditions which preclude maintenance of certain roads in the winter, MCRC maintains approximately 990 miles of road in summer and approximately 588 miles of road in the winter.

The CR 550 route would have the highest maintenance cost due to the length (i.e. 60 miles compared to 22.5 miles for CR 595). Implementation of any of the three routes will add additional paved road surface to the county road network, with the CR 510-Red Road-Sleepy Hollow route adding the most paved surface. CR 550 would only have new pavement from the CR 510 intersection to Eagle Development Project. The proposed CR 595 is the shortest route and would therefore likely require the least amount of overall maintenance over the life of the road for the routes considered in this analysis.

5.34.H. Utilities

Implementation of the proposed CR 595 or the other routes is not expected to impact existing water utility storage facilities, wastewater treatment plants, or electrical power stations. Overhead electric and telephone lines or underground gas, electric, telephone, sewer and water lines that are crossed by the routes that are located within existing rights-of-way should not be substantially affected with road reconstruction, if required. The CR 550 route exhibits the highest potential for impacts to utilities due to the proximity to urban infrastructure.

5.34.I. Road Closings

Temporary closure of local roads during construction of any of the routes may result in inconveniences to landowners and short-term reductions in patronage of businesses or commercial hauling due to reduced accessibility. However, the impact of road closings is expected to be minor due to their short-term nature.

5.35 Summary: Socioeconomics and Land Use

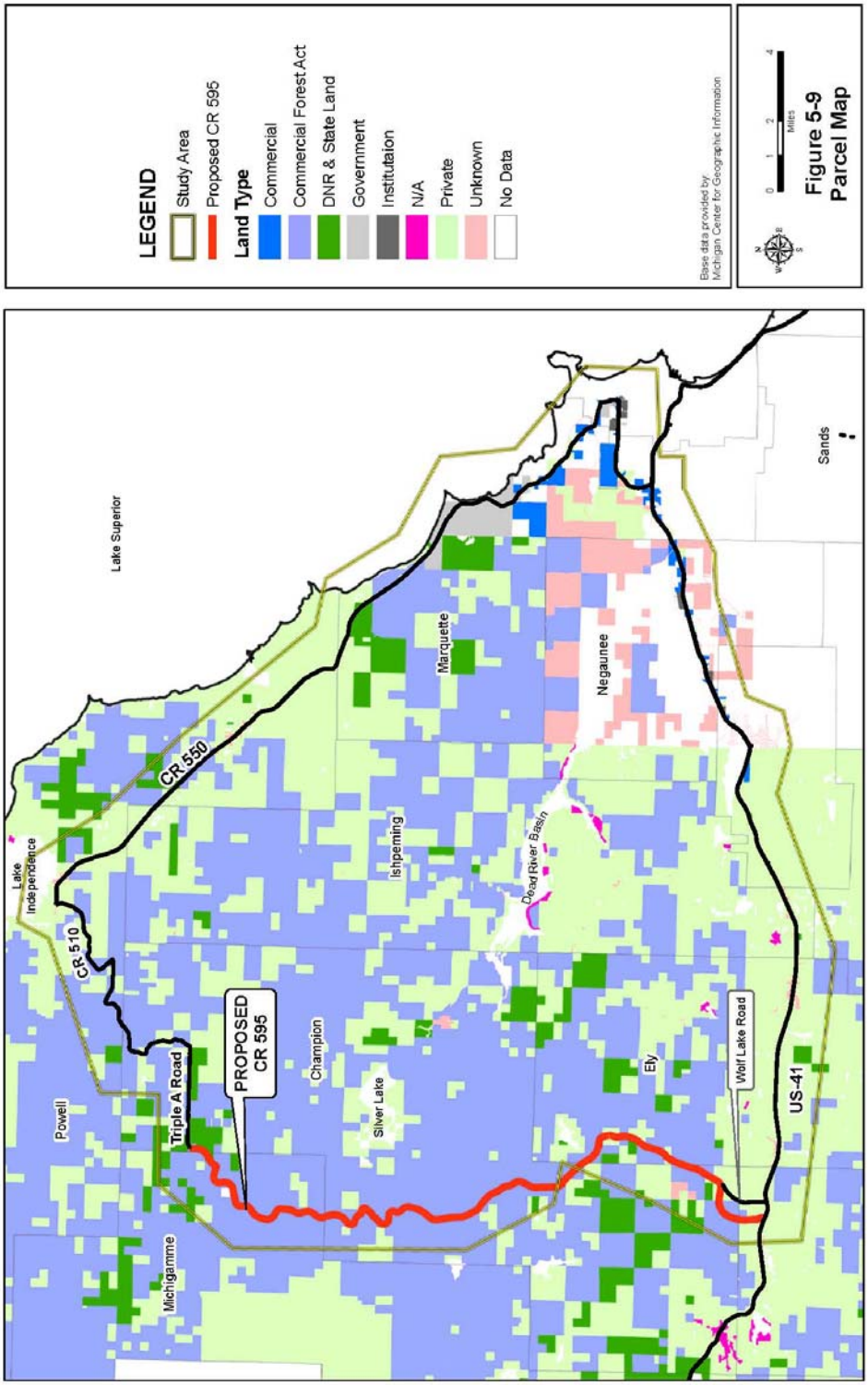
The implementation of the CR 550 route will have the greatest potential for negative social and economic impacts due to the use of segments that traverse portions of the City of Marquette containing high density residential, institutional, and commercial development. Direct impacts will be limited to impacts within the right-of-way and traffic mobility during construction. Secondary impacts will be associated with increases in heavy truck traffic that may result in voluntary relocation of a small percentage of the existing residential population away from segments that include part of CR 550, Sugar Loaf Avenue, and Wright Street. The CR 550 route is the longest route and will cost more to maintain. The CR 550 route exhibits the highest potential for impacts to utilities due to their proximity to urban infrastructure. Traditional urban neighborhoods are located on Wright Street and will be negatively affected by implementation of the CR 550 route. Community opposition has been vocal and residents are actively petitioning the implementation of a route that avoids the City of Marquette. In addition, there have been requests for enacting an ordinance prohibiting heavy truck traffic along routes within the City of Marquette.

The proposed CR 595 route provides the most benefit for the development of commercial forestry and mining operations and the public safety associated with those operations located in the service area of the proposed road. Implementation of the proposed CR 595 may result in additional job growth and attract residents to the area. The proposed CR 595 route will have the lowest construction-related impact on residents within the study area. The proposed CR 595 route is the shortest route and is therefore likely to require the least amount of maintenance, especially in the short term because the entire route will be new road surface. The proposed CR 595 route will provide a direct north-south roadway and will allow heavy truck traffic related to mining and commercial forestry operations to bypass densely populated areas within the City of Marquette and other urbanized areas of Marquette County. Implementation of the proposed CR 595 route will increase the ability of EMS, law enforcement, and fire departments to provide assistance along the proposed CR 595 route.

It is unlikely that there will be any substantial impacts to zoning classifications in the study area resulting from implementation of the proposed CR 595 route. The CR 595 project will not require changes in zoning classifications for implementation, and secondary land use changes will likely conform to existing master plans and zoning ordinances.

5.36 Affected Environment: Institutional/Government

Institutional and governmental facilities are shown on Figure 5-9. The City of Marquette supports a population of 21,004 and is the largest community in the Upper Peninsula (ACS, 2009). The City of Marquette has experienced a 6.8% increase in population growth between 2005 and 2009. Northern Michigan University and Marquette General Hospital are the largest and most economically significant institutions. Marquette General Hospital serves a regional medical center and offers comprehensive medical care. Northern Michigan University is a four-year public university that offers 180 programs for degree attainment to approximately 9,260 undergraduate and graduate students and employs 999 people (Lake Superior Community Partnership data, 2010). Numerous public, private and charter schools serve the local community. Facilities housing emergency services including dispatch, police, and fire are located along the US-41 corridor. Cemeteries, churches, and assisted living facilities are also primarily located along the US-41 corridor.


LEGEND
Study Area
Proposed CR 595
Land Type
Commercial
Commercial Forest Act
DNR & State Land
Government
Institutaion
N/A
Private
Unknown
No Data
Base data provided by:
Michigan Center for Geographic Information
Miles
Figure 5-9
Parcel Map
Lake Superior
Sands
Marquette
Negaunee
CR 550
Lake Independence
CR 510
Ishpeming
Dead River Basin
PROPOSED CR 595
Champion
Triple A Road
Powell
Silver Lake
Ely
Wolf Lake Road
US-41
Michigamme

5.37 Environmental Consequences: Institutional/Government

The implementation of any of the routes will not displace or directly impact the location of existing schools, hospitals, police or fire stations. Implementation of the CR 595 and CR 510-Red Road-Sleepy Hollow routes will increase the ability of emergency services, law enforcement, and fire departments to provide assistance along the proposed routes, but the CR 595 route will provide the greatest improvement of emergency services access and have more positive impact on public safety.

5.38 Summary: Institutional/Government

The City of Marquette is the largest city in the Upper Peninsula; is the home to Northern Michigan University and a regional medical center; and is the commercial hub of the Upper Peninsula. A significant amount of the support for CR 595 comes from the City of Marquette and surrounding cities and townships for the purpose of reducing the heavy truck traffic in the urbanized area. The proposed CR 595 will have no negative impacts on institutions or governmental units in the area, but will certainly serve to divert truck traffic away from developed areas on the more direct route provided by CR 595.

5.39 Affected Environment: Planning and Zoning

Planning and zoning are tools that communities may use to regulate land use. Each of the County's nineteen townships has established independent zoning districts and provisions according to the Township Rural Zoning Act 1943 Public Act 184 as amended (Marquette County, 2008). Generalized zoning districts are shown on Figure 5-9. The largest zoning classifications within Marquette County are natural resource production, residential, and rural residential (Marquette County, 2010).

5.40 Environmental Consequences: Planning and Zoning

Table 5-8 summarizes the estimated amount and percentage of land classified for a specific use crossed by the each of the routes.

It is unlikely that there will be significant impacts to zoning classification in the study area resulting from implementation of the any of the routes. The routes do not require changes in zoning classifications for implementation, and secondary land use changes will likely conform to existing master plans and zoning ordinances.

5.40.A. CR 550 Route

The CR 550 Route crosses multiple land use classifications including Urban Built Up which consists of residential, commercial, institutional and industrial land use sub categories, Agriculture/Forest Barren Rock, and Wetland. Approximately 20% of the route crosses land classified as Urban Built Up and approximately 77% is classified Agricultural/Forest Land.

5.40.B. CR 510-Red Road-Sleepy Hollow Route

The CR 510-Red Road-Sleepy Hollow route crosses land classified Agricultural/Forest Land (95.7%) and approximately 1% is classified Urban Built Up. Land classified as urban built up is primarily associated with small tracts and camps located immediately north of the Dead

River Storage Basin and areas of low to moderate density single family homes associated with an area of small tracts and camps along Wolf Lake Road.

5.40.C. CR 595 Route

The 595 Route crosses land classified as Agricultural/Forest Land (89.6%). The land is largely undeveloped.

Table 5-8. A Summary of Land Classifications Crossed by the Routes

Land Classification	*CR 550*		*CR 510-Red Road-Sleepy Hollow*		*CR 595*	
	Total Miles Crossed	**Percent**	**Total Miles Crossed**	**Percent**	**Total Miles Crossed**	**Percent**
Agriculture/Forest Land	48.6	76.5%	41.1	95.7%	19.1	89.6%
Barren/Exposed Rock	0.2	0.3%	0.0	0.0%	0.0	0.0%
Urban Built Up	12.4	19.5%	0.4	1.0%	0.2	0.8%
Wetland	2.4	3.8%	1.4	3.2%	2.1	9.6%
Summary	63.5	100.0%	43.0	100.0%	21.4	100.0%

Source: Marquette County Planning Department GIS Data, 2010

5.41 Summary: Planning and Zoning

Marquette County is progressive in regard to planning and zoning as compared to some other areas of the state. All 19 townships in Marquette County have adopted zoning ordinances to effectively manage growth and infrastructure to serve that growth.

The proposed CR 595 is an essential addition to the county's transportation infrastructure that is compatible with the county and township planning and zoning ordinances and, in fact, has been recognized for many years as a transportation need to serve northwest Marquette County. CR 595 has broad support from local governmental units and also has substantial support from the general public.

5.42 Affected Environment: Study Area Economics

5.42.A Key Employment Sectors

In Marquette County health care, educational services, and social assistance comprise 21% of the jobs, mining 5%, retail 14% and government 9%. Table 5-9 represents regional employers and approximate numbers of employees within the study area.

Two hospitals are present in Marquette County: Bell Hospital and Marquette General Health Systems. These and other health-care related facilities comprise the largest employment sector in the county. Marquette General Health System operates a 335-bed Regional Referral Center in the City of Marquette and employs 200 doctors practicing in 64 specialties from general medicine to advanced cancer, heart and brain specialties. The Marquette General Health System's Neuroscience Center collaborates with scientists at Northern Michigan University in brain tumor research (LSCP, 2010).

Table 5-9 Principal Regional Employers and Approximate Number of Employees in Marquette County, 2009.

Marquette County Employer	Number of Employees
Marquette General Health System	2,831
Cliffs Natural Resources, Michigan Operations	1,567
Northern Michigan University	999
Peninsula Medical Center	630
Westwood Mall Association	500
Wal-Mart	434
Marquette Area Public Schools	425
Michigan Department of Corrections	490
Bell Hospital	335
Alger-Marquette County Community Action Board	250
County of Marquette	240
AMR Regional Aircraft Maintenance Facility	233
We Energies	205
Pioneer Surgical	200
Target	200
Pathways	200
Negaunee Public Schools	190
City of Marquette	175
PCBM Management-Country Village	188
Gwinn Area Community Schools	180
Potlatch	152
Shopko	150
Americans Communication Network	148
Ojibwa Casino II	143

Source: Lake Superior Community Partnership, 2010 (http://www.marquette.org/community/industry)

The second largest employer in Marquette County is Cliffs Natural Resources, Inc. Cliffs operates two iron ore mines in Marquette County: the Tilden Mine and the Empire Mine (LSCP, 2010). Cliffs Natural Resources' subsidiary, Renewafuel, LLC, has developed a biomass fuel production facility at the Telkite Technology Park, located at Sawyer International Airport. It is anticipated that a capital investment of 19 million dollars will be made by Cliffs to generate the high-energy, low emission biofuel cubes which are composed of sustainably collected wood and agricultural feedstocks.

Northern Michigan University is a four-year public university that offers 180 programs for degree attainment to approximately 9,260 undergraduate and graduate students and employs 999 people (Lake Superior Community Partnership data, 2010).

Marquette County supports many retail establishments including WalMart, Target, Kohl's, Lowe's, Tractor Supply and Best Buy. These corporate establishments provide for regional employment in the retail sector.

5.42.B Mining

In 2002 exploration efforts led to the discovery of a valuable nickel and copper deposit at the Eagle Development Project located in Michigamme Township. It is expected that approximately 300 million pounds of nickel, 250 million pounds of copper and minor amounts of other minerals will be produced from this mine. As a result, the potential for mining activity for these minerals is likely to increase in Michigan's Upper Peninsula to meet industry demands. The viability of mining ventures will be improved through the implementation of transportation alternatives that provide more direct routes between ore deposits located in northern Marquette County and the KEMC ore processing mill located near US-41 at Humboldt.

5.42.C Forestry

Michigan leads the nation in the amount of new annual forest growth that is not harvested, according to US Forest Service statistics. In 2002 approximately 750,000 acres of Marquette County was considered timberland (USDA, 2002). Congressional District 109 encompasses the majority of Marquette County and supports 36 timber industries and 203 timber producers (U.S. Forest Service inventory data, 2005). There are over 1,400 forest products manufacturing facilities in Michigan, with more than an additional 1,700 business units related to forest products manufacturing (e.g. logging companies, consulting foresters, wholesalers, etc.). One out of every ten manufacturing jobs in Michigan is accounted for by the forest products industry (Korpi, 2010). In most rural communities, the forest products industry is the leading employer and largest economic contributor.

The value of Michigan's forests can be divided into two distinct sectors: 1) manufacturing and timber lands; and, 2) forest-associated recreation. Estimates of the direct and indirect economic benefit of the forest products industry on Michigan's economy exceed $12 billion and represent over 150,000 jobs (Korpi, 2010). Development of commercial forest operations would be improved through the implementation of the proposed CR 595, providing improved and more direct access to large areas of commercial forest within the western portion of the study area.

5.42.D Tourism

Tourism is the second-largest industry (after agriculture) in the State of Michigan and is a $17.5 billion industry which employs 200,000 people and contributes to the economies of all 83 Michigan counties (Michigan Tourism Industry Travel Council, 2007). A comprehensive study of the importance of tourism in Marquette County was conducted in 2001 (Stynes, 2001). Tourists spent an estimated $69 million in 1998 in Marquette County, resulting in about $50 million in direct sales to firms in Marquette County and supported about 1,600 direct jobs (Stynes, 2001). Tourist spending yielded $19 million in direct personal income to the County (wages and salaries) and $30 million in direct value added (Stynes, 2001). Between 1998 and 2000, hotel room taxes in Marquette County grew by 21% and visits to the county grew by 13%. Similarly, tourist spending increased to $85 million in 2000, direct tourism sales increased to $60.6 million, and direct tourism jobs increased to 1,761.

To further demonstrate the value of tourism to the local economy, Marquette County generated revenues of $70,415 and expenditures of $80,152 operating and maintaining recreation sites (Marquette County, 2008). Marquette County budget deficits generated from the County's recreation sites are subsidized from the Marquette County Forest Recreation fund with proceeds from the sale of timber harvested from the Marquette County Forest Area (Marquette County, 2008). The Marquette County Board of Commissioners has the fiscal and administrative authority over the five County-owned recreation sites including the Perkins Park Campground; Big Bay Harbor; Sugar Loaf; Honor Camp; and the Marquette County Forest Area.

In 2006 Marquette County conducted a survey to assess the needs and use of County-owned recreational facilities by County residents (Marquette County, 2008). The importance of the Marquette County Forest Area for recreational use was assessed. A total of 95 individuals (26% of total respondents) reported that they or their family members visited the Marquette County Forest Area 1,397 times within a 12-month period (Marquette County, 2008). The Marquette County Forest Area is serviced by M-553 and is very accessible. This rate (of approximately 116 visits per month to recreational forest land) indicates the significance of available and accessible forest for local tourism and recreation.

5.42.E County Government

Marquette County has been economically stable amid decline in other portions of the Upper Peninsula and Michigan. The County is still recovering from the loss of population after the closure of the K.I. Sawyer Air Force Base in 1995. Over the same period, the County's economy has both grown and diversified. Resources-based industry (i.e. mining and logging) and public institutions (e.g. university and prison) continue to be important components of the economic base; and, are now complemented by growth in the health care industry, education, and retail development.

The Marquette County budget for 2011 is balanced with respect to projected revenues, resources, accrued equities, and expenditures (Marquette County, 2011). The 2011 General Fund budget is $21,557,308, representing a less than one percent increase over the 2010 General Fund budget. The total amount for all funds, excluding internal services and trust and agency funds, is $47,538,478. Current County expenditures for almost all of their operations are funded with recurring revenues and minimal use of fund balances.

Beyond 2011 sources of revenue including County revenue sharing and other revenues for County services are unknown. Property values, after almost doubling in 14 years, are projected to be nearly flat through 2012. The projection for 2012 is for the General Fund to be out of balance by $1.4 million, assuming no significant changes to State revenue sharing or property values. The County looks to the opening of the Eagle Development Project in 2013 as a source of tax revenue and economic activity (Marquette County, 2011). Overall, the economic drivers (e.g. health care, mining, education, retail, and government) continue to progress and account for 78% of jobs in the County.

5.43 Environmental Consequences: Study Area Economics

5.43.A Key Employment Sectors: Mining and Forestry

Economic development of three key employment sectors (mining, commercial forestry, and tourism) depend on an improved north-south primary county road that provides improved accessibility to natural resources located within the western portion of the study area. Increasing the efficiency of transporting timber is necessary to maintain and/or increase the viability of the commercial forest industry, which in turn keeps these lands in timber production to the benefit of the general public that uses these lands. Ore processing facilities are located south of the Eagle Development Project where copper and nickel ore will be extracted. The improved and more efficient transportation route that would be provided by the proposed CR 595 route would allow the mining and forestry industries to prosper, thereby benefitting many other businesses and local governmental units.

Implementation of the CR 550 route will not provide efficient and direct access to natural resources within the western portion of the study area. Development of natural resources will be less advantageous due to increased cost of haulage and fleet maintenance engendered by the long length of the route as compared to other routes. In addition, there will be the societal costs that are presented in this evaluation

The CR 510-Red Road-Sleepy Hollow route likewise does not provide as efficient access to natural resources within the western portion of the study area as CR 595 would. The cost of haulage, fleet maintenance, and many other costs associated with this route would be substantially higher than the proposed CR 595.

The proposed CR 595 route provides the shortest and most direct route between industry production sites (i.e. mining and timber) and the associated ore processing facilities and timber market destinations. CR 595 would foster economic growth by providing the greatest transportation efficiencies for resource-based businesses.

5.43.B Key Employment Sectors: Tourism

The importance of forest land for recreation and tourism is exhibited by the use of the Marquette County Forest, comprised of 9,500 acres of land in Sands and Forsyth townships near Sawyer. Recreational use of the Marquette County Forest is likely related to its accessibility from M-553: a key north-south route linking the City of Marquette to the county forest. Correspondingly, a north-south route that provides similar access to CFA lands open to public use within the proposed study area will likely experience similar recreational use.

Owners of land enrolled in CFA must allow "reasonable access" to their property by hunters and anglers. Marquette County has the most CFA land of any county in Michigan. Large areas of commercial forest exist within the western portion of the study area and are largely inaccessible to tourists, especially during adverse weather that render unimproved county and local roads impassable. Recreational use of these areas by residents and tourists is difficult without access to an ORV or four-wheel drive vehicle, or snowmobiles in the winter. Improved access to commercial forest land is important for the generation of local economic benefits related to tourism.

Implementation of the CR 550 route provides the least amount of access to commercial forest land and will not result in a change to study area economics as they relate to tourism.
Implementation of the CR 510-Red Road-Sleepy Hollow route provides moderate access to commercial forest lands and may result in a moderate change to study area economics resulting from increases in use related to tourism.

Implementation of the CR 595 route provides the greatest access to commercial forest and represents the greatest potential for change to study area economics as they relate to increases in use related to tourism

5.43.C Key Employment Sectors: County Government

Marquette County is facing a budgetary shortfall due to lost tax revenues associated with the reduction in property values. The projection for 2012 is for the General Fund to be out of balance by $1.4 million, assuming no significant changes to State revenue sharing or property values. The County looks to the opening of the Eagle Development Project in 2013 as a source of tax revenue and substantial economic activity.

Transportation infrastructure that supports key economic sectors typically results in additional benefits to state and local government. In this case a direct north-south route linking areas of resource acquisition to resource processing facilities would increase operational efficiencies for mining and forestry industries by reducing costs of fleet maintenance, haulage, fuel, and potential costs associated with the regulation of greenhouse gas emissions. Efficient routes provide favorable conditions for business operations resulting in increased employment in the commercial forest and mining sectors of the local economy.

Increases in the quality and quantity of jobs usually lead to increases in property values and subsequent tax revenues that are critical for the continued operation of local and state government. For example, it is estimated that during the life of the project (dependent upon metal prices), the Eagle Development Project would provide 200 direct jobs, 600 indirect jobs and $200,000,000 in state and local taxes. A secondary economic benefit of this project will be the revitalization of the Humboldt Mill, which is presently a closed Brownfield Site. The renewed operation of the Humboldt Mill will generate additional tax revenue for local schools. The KEMC office currently houses more than 40 employees within the City of Ishpeming.

Implementation of the CR 550 route would provide the least efficient and least effective transportation infrastructure for forest and ore resource-based industries. This route is unlikely to attract additional forest and ore resource based industries whose operations would result in substantial increases in revenue to state and local government.
Implementation of the CR 510-Red Road-Sleepy Hollow route would provide additional efficiencies in transportation infrastructure for forest and ore resource-based industries as compared to the CR 550 route. However, the length and configuration of this route is less than optimal for transportation and is unlikely to attract additional forest and ore resource-based industries whose operations would result in substantial increases in revenue to state and local government.

Implementation of the CR 595 route will provide the most efficient and effective transportation infrastructure for forest and ore resource-based industries of the alternative routes. It is the shortest and most direct route between areas of resource acquisition to resource processing facilities and will likely attract additional operation of forest and ore

resource-based industries whose operations would result in substantial increases in revenue to state and local government.

5.44 Summary: Study Area Economics

Implementation of the CR 550 route will not provide efficient and direct access to natural resources within the western portion of the study area. Development of natural resources will be less advantageous due to increased cost of haulage and fleet maintenance engendered by the longer length of this route as compared to CR 595, as well as the societal costs presented in this evaluation.
The CR 510-Red Road-Sleepy Hollow route likewise does not provide efficient access to natural resources within the western portion of the study area. The cost of haulage, fleet maintenance, and many other costs associated with this route would be substantially higher than the proposed CR 595.

The proposed CR 595 route provides the shortest and most direct route between industry production sites (i.e. mining and timber) and the associated ore processing facilities and timber market destinations. CR 595 would foster economic growth by providing the greatest transportation efficiencies for resource-based businesses.

The proposed CR 595 route will support resource-based industry production of timber and metals and also will support increased tourism and recreation opportunities. These activities form the foundation of the economy of Marquette County, and directly contribute to its tax base. The efficiencies of the shorter transportation route that would be provided by CR 595 would substantially enhance the viability of these businesses and tourism/recreation. Implementation of the proposed CR 595 project is the most direct north-south route to meet the purpose and need for the transportation/vehicular infrastructure of Marquette County.

5.45 Affected Environment: Air Quality

The air quality in Marquette County is currently in attainment for all of the National Ambient Air Quality Standards (NAAQS) for which federal air quality criteria have been issued. These include Ozone, Particulate Matter, Lead, Sulfur Dioxide, Nitrogen Oxides and Carbon Monoxide.

The Air Quality Division (AQD) of the MDEQ operates a network of air monitors to measure the levels of various pollutants in the ambient air. Presently, there is one air quality monitor in the Upper Peninsula located in the town of Seney in Schoolcraft County. This monitor only measures ozone. In 2009, the monitor operated for 184 days which is the length of the ozone season. Air quality was assessed as good for 178 days, moderate for 5 days and 1 day was assessed as unhealthy for individuals with health conditions that would be negatively impacted by elevated ozone levels. Overall recorded levels of ozone were considered safe for the general population.

Three routes in the study area were evaluated for potential generation of criteria pollutants as well as potential contribution of greenhouse gases using available emission factors. Information on the criteria pollutants that were evaluated is presented below. These data were obtained from the 2009 State of Michigan Air Quality Report. A summary of characteristics for each criteria pollutant including potential sources and populations that may be at risk for exposure have been provided.

5.45.A. Carbon Monoxide (CO)

Carbon monoxide is a colorless, odorless and poisonous gas formed during incomplete burning of fuel. Levels peak during colder months primarily due to cold temperatures that affect combustion efficiencies of engines. Outdoor exposure sources are automobile exhaust, industrial processes (metal processing and chemical production), non-vehicle fuel combustion, and natural sources such as forest fires.

Individuals who suffer from cardiovascular (heart and respiratory) disease are most at risk for exposure to elevated levels of CO. People with angina and peripheral vascular disease are especially at risk as their circulatory systems are already compromised and less efficient at carrying oxygen. However, elevated CO levels can also affect healthy people.

5.45.B Sulfur Dioxide (SO_2)

Sulfur dioxide is a colorless gas formed by the burning of sulfur-containing material. Odorless at typical ambient concentrations, SO_2 can react with other atmospheric chemicals to form sulfuric acid. When sulfur-bearing fuel is burned, the sulfur is oxidized to form SO_2, which then reacts with other pollutants to form aerosols. In liquid form, it is found in clouds, fog, rain, aerosol particles, and in surface films on these particles. Coal-burning power plants are the largest source of SO_2 emissions. SO_2 is also emitted from smelters, petroleum refineries, pulp and paper mills, transportation sources, and steel mills. Other sources include residential, commercial and industrial space heating.

Asthmatics, children, and the elderly are especially sensitive to SO_2 exposure. Asthmatics receiving short-term exposures during moderate exertion may experience reduced lung function and symptoms, such as wheezing, chest tightness, or shortness of breath. Depending on the concentration, SO_2 may also cause symptoms in people who do not have asthma.

5.45.C Nitrogen Dioxide (NO_2) and Oxides of Nitrogen (NO_x)

Nitrogen dioxide is a reddish-brown, highly reactive gas formed through oxidation of nitric oxide (NO). Upon dilution it becomes yellow or invisible. High concentrations produce a pungent odor and lower levels have an odor similar to bleach. NO_X is the term used to describe the sum of NO, NO_2, and other nitrogen oxides. NO_X can lead to the formation of O_3 and NO_2, and can react with other substances in the atmosphere to form acidic products that are deposited in rain (acid rain), fog, snow, or as particulate matter.

NO_X compounds and their transformation products occur both naturally and as a result of human activities. Natural sources of NO_X are lightning, certain biological processes, including a biological process in soil, and stratospheric intrusion. Ammonia and other nitrogen compounds produced naturally are important in the cycling of nitrogen through the ecosystem. The major sources of man-made (anthropogenic) NO_X emissions, which account for a large majority of all nitrogen inputs to the environment, come from high temperature combustion processes such as those occurring in automobiles and power plants. Home heaters and gas stoves produce substantial amounts of NO_2 in indoor settings.

Individuals with pre-existing respiratory illnesses and asthmatics are more sensitive to the effects of NO_2 than the general population. NO_2 exposure can also increase respiratory illnesses in children.

5.45.D. Ozone (O_3)

Ground-level O_3 is created by photochemical reactions involving nitrogen oxides (NO_X) and volatile organic compounds (VOCs), or hydrocarbons, in the presence of sunlight. These reactions usually occur during the hot summer months as ultraviolet radiation from the sun initiates a sequence of photochemical reactions. O_3 is also a key ingredient of urban smog. In the Earth's lower atmosphere, also known as the troposphere, ozone is an air pollutant. Ground level ozone can also be transported hundreds of miles under favorable meteorological conditions. Ozone levels are often higher in rural areas than in cities due to transport to regions downwind from the actual emissions of ozone forming air pollutants. Shoreline monitors along Lake Michigan often measure high ozone concentrations due to transport from upwind states.

Major sources of NO_X and VOCs are engine exhaust, emissions from industrial facilities, combustion from power plants, gasoline vapors, chemical solvents, and biogenic emissions from natural sources. Ground-level O_3 can also be transported hundreds of miles under favorable meteorological conditions. As a result the long-range transport of air pollutants impacts the air quality of regions downwind from the actual area of formation.

Individuals most susceptible to the effects of O_3 exposure include those with a pre-existing or chronic respiratory disease, children who are active outdoors and adults who actively exercise or work outdoors.

5.45.E. Particulate Matter (PM_{10}, $PM_{2.5}$)

Particulate matter is a general term used for a mixture of solid particles and liquid droplets found in the air, which is further categorized according to size. Large particles with diameters of less than 50 micrometers (μm) are classified as total suspended particulates (TSP). PM_{10} are “coarse particles” less than 10 μm in diameter (about one-seventh the diameter of a human hair) and $PM_{2.5}$ are much smaller “fine particles” equal to or less than 2.5 μm in diameter.

Particulate matter can be emitted directly (primary) or may form in the atmosphere (secondary). Most man-made particulate emissions are classified as TSP. PM_{10} consists of primary particles that can originate from power plants, various manufacturing processes, wood stoves and fireplaces, agriculture and forestry practices, fugitive dust sources (road dust and windblown soil), and forest fires. $PM_{2.5}$ can come directly from primary particle emissions or through secondary reactions that include VOCs, SO_2, and NO_X emissions originating from power plants, motor vehicles (especially diesel trucks and buses), industrial facilities, and other types of combustion sources.

$PM_{2.5}$ has been linked to serious health effects. People with heart or lung disease, the elderly, and children are at highest risk from exposure to particulate matter.

5.45.F. Greenhouse Gas

U.S. Environmental Protection Agency's (EPA) "Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases" Under Section 202(a) of the Clean Air Act, published at 74 FR 18886 (April 24, 2009) listed two specific findings; 1) the current and projected concentrations of the six key well-mixed greenhouse gases — carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) — in the atmosphere threaten the public health and welfare of current and future generations and, 2) the combined emissions of these well-mixed greenhouse gases from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution which threatens public health and welfare. These findings were signed by the EPA Administrator on December 7, 2009. On December 15, 2009, the final findings were published in the Federal Register under Docket ID No. EPA-HQ-OAR-2009-0171.

The findings do not impose any requirements on industry or other entities. However, this action is a prerequisite to finalizing the EPA's proposed greenhouse gas emission standards for light-duty vehicles, which EPA proposed in a joint proposal including the Department of Transportation's proposed Corporate Average Fuel Economy (CAFÉ) standards on September 15, 2009.

5.46 Environmental Consequences: Air Quality

The potential for pollutant emissions from vehicle use for each of the three routes in the project study area was evaluated. Various emission factors were evaluated to assess on-road mobile source emissions for various criteria pollutants and greenhouse gases by assorted vehicle types. The emission factors for particulate matter (PM), carbon monoxide (CO), sulfur dioxide (SO_2) and the greenhouse gases take into account vehicle miles traveled per route over a specified time period. For ozone, which uses an emission factor for volatile organic compounds (VOCs) which are precursors to ozone and oxides of nitrogen, the emission factors also take speed of the vehicle into account.

One model generated the emission factors to address the operation of both light duty vehicles (< 8,500 pounds) and heavy vehicles (> 8,500 pounds) like delivery trucks and logging trucks and also "heavy heavy duty diesel vehicles" (> 33,000 pounds) used for construction or heavy transportation. A second model broke down vehicle classifications to two groups, light vehicles and all vehicles. Emission factors selected for the comparison of the routes evaluated were based on recommendations from the MDOT and MDEQ AQD staff. The VOC and NO_X emission factors are from MDOT and the other pollutant emission factors are from the EMFAC 2007 (v2.3) BURDEN model developed by California's South Coast Air Quality Management District. Both sets of emission factors are derived from the following equations:

VOC and NO_X Emissions (pounds per day) for Light Duty Vehicles = N x TL x EF1 based on speed of vehicle

VOC and NO_X Emissions (pounds per day) for All Vehicles = N x TL x EF1 based on speed of vehicle

CO, PM_{10}, $PM_{2.5}$, SO_2, CO_2 and CH_4 Emissions (pounds per day) for Light Duty Vehicles = N x TL x EF2

CO, PM_{10}, $PM_{2.5}$, SO_2, CO_2 and CH_4 Emissions (pounds per day) for Heavy Duty Vehicles = N x TL x EF2

CO, PM_{10}, $PM_{2.5}$, SO_2, CO_2 and CH_4 Emissions (pounds per day) for Heavy Heavy Duty Vehicles = N x TL x EF2

Where N = number of trips per vehicle type, TL = trip length (miles per day), EF1 = emission factor (pounds per mile) at rated mile per hour and EF2 = emission factor (pounds per mile).

Transportation parameters and assumptions used to model emissions for the three routes evaluated are shown in Table 5-10 and 5-11 below. The number of vehicle trips per route and vehicle type was kept constant for all routes.

Table 5-10. Air Quality Emission Modeling Transportation Parameters.

Route	Route ID	Length of Route[1] (Miles)
CR 550	550	60.0
CR 510-Red Road-Sleepy Hollow	Red/SH	42.0
CR 595	595	22.5

[1]Source: Coleman Engineering

Table 5-11. Air Quality Emission Modeling Transportation Assumptions.

Vehicle Classification and Cycle [1]
Ore Trucks (Heavy Heavy Duty Diesel (HHDT-DSL) 500 HP with double trailer) CR 595 - 7 trucks; 8 cycles\day; 159,040 miles per truck, 1,192,800 miles total annually CR 510/Red Rd - 9 trucks; 6 cycles\day; 191,520 miles per truck, 1,819,440 miles total annually CR 550/ US-41 - 13 trucks; 4 cycles\day; 181,440 miles per truck, 2,494,800 miles total annually
Logging Trucks and Delivery Trucks All Routes - 12 cycles per day @ 260 days per year = 3,120 cycles per route per year
Passenger and Light Duty Vehicles Vehicles - 175 cycles per day @ 260 days per year = 45,500 cycles per route per year

[1]Source: URS Transportation Study

The emission factor which accounted for all emissions including starting, running, and idling exhaust was selected to evaluate potential emissions from heavy heavy-duty diesel trucks (HHDT-DSL). Inclusion of the PM_{10} and $PM_{2.5}$ emission factors was performed to account for emissions related to tire wear and brake wear. Carbon dioxide and related greenhouse

gases have been deemed hazardous pollutants by the EPA and were included this evaluation, however the regulatory reporting of these emissions do not yet extend to operators of a fleet of vehicles. These values, however, can be used in comparisons between routes in the event that greenhouse gas emissions from fleets become regulated.

5.46. A. Analysis of Emissions and Length of Route

A summary of estimated criteria pollutant emissions and greenhouse gases for each of the routes is shown in Table 5-12. Evaluations of routes determined that the length of route is the primary factor determining the amount of emissions produced. This is an expected outcome and a function of the equations used in the model and should weigh heavily when selecting routes to minimize emissions.

Table 5-12. Estimated Tonnage of Emission of Criteria Pollutants and Greenhouse Gas for each Route.

Emissions [1]			
Pollutant	**CR 550**	**Red/SH**	**CR 595**
Criteria Pollutants	Tons	Tons	Tons
PM_{10}	2.45	1.77	0.18
$PM_{2.5}$	2.07	1.50	0.13
NO_x	12.15	8.40	4.92
SO_x	0.08	0.06	0.04
CO	41.06	28.55	16.31
VOC	11.03	7.71	4.37
Total of Criteria Pollutants	**68.83**	**47.99**	**25.95**
Greenhouse Gases			
CO_2	8,789.16	6,306.62	3,843.18
CH_4	0.39	0.28	0.16
Total of Greenhouse Gases	**8,789.5**	**6,306.9**	**3,843.3**
Ratio of the estimated amount of aggregate emissions produced by each route divided by CR 595	2.3	1.6	1.0

[1] Emission Factor References:
Michigan Department of Transportation
TABLE 1; 8 Hour Nonattainment Area Counties Excluding SEMCOG
FY2006 CMAQ Call for Projects--Emissions Factors (from 2005)
SCAQMD / CARB EMFAC2007 (version 2.3) BURDEN MODEL
Emission Factors for On-Road Passenger Vehicles, Delivery Trucks and Heavy-Heavy-Duty Diesel Trucks URL: http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html

CR 550 Route

The CR 550 route is approximately sixty miles in length. The significance of road length of this route as a factor of emission production is shown in Table 5-12. The CR 550 route is nearly three times longer than the CR 595 route and is estimated to generate twice the total amount of criteria pollutants and greenhouse gas. Segments of the route within the City of Marquette proceed through developed areas containing moderate to high density populations. These segments may expose a greater percentage of the public to vehicle-generated emissions. This route is estimated to produce more than twice the amount of emissions than what would be produced by the CR 595 route.

CR 510-Red Road-Sleepy Hollow Route

As compared to other routes, the CR 510-Red Road-Sleepy Hollow route is of intermediate length (42 miles) and therefore generates intermediate levels of emissions. Portions of the CR 510- Red Road-Sleepy Hollow route traverse undeveloped land containing woodland and wetland vegetation. Vehicle emissions may have a negative effect on growth and development of vegetation including negative impacts on gaseous exchange, chlorophyll degradation, starch production and synthesis, damage to leaves and other tissues, growth reduction and ultimately decline in crop yield (Grime, 1970; Bates and Farmer, 1992; Agarwal et al., 2003; and Yi et al., 2005).

CR 595 Route

The CR 595 route will produce the least amount of transportation-related emissions. This route is the shortest route (22.5 miles) and would traverse areas of Champion Township and Ely Township that contain some of the lowest population densities within the study area. Consequently, this route presents the lowest risk of potential impact from emissions on the populace of Marquette County. The majority of this route crosses undeveloped land containing woodland and wetland vegetation. Negative impact to vegetation as a result of vehicular emissions within the road right-of-way may occur as a result of the operation of this route, as explained in the preceding paragraph.

5.46.B. Analysis of Emissions Based on Vehicle Speed

The relationship of speed on estimated emissions of VOCs and NO_X is shown in Figure 5-10. Evaluation of these emission factors demonstrates that at very low speed there is greater potential for emission generation than at moderate speeds. MDOT conducted a study (Draft 9/2010) on the US-41corridor that includes the portions of the roadway between Marquette and Humboldt that reports varying speed limits between 35 and 55 mph. Traffic counts conducted by the MCRC were nonexistent for the majority of the routes evaluated in this document. Since actual data on individual speed limits was limited or nonexistent for sections of the proposed routes average rate of speed for each route was derived from existing data and assigned to portions of segments exhibiting similar characteristics. Using this method, an average speed of 45 miles per hour was used for passenger and light duty vehicles with the exception of the CR 550 route. The CR 550 alternative included 25 mph for the portion that proceeds along Sugarloaf Avenue and Wright Street and 55 mph for the section on CR 550 from Sugar Loaf Avenue to CR 510. A 45 mph speed was applied to the section of and the route containing US-41 through Negaunee and Ishpeming. An average

rate of speed of 50 mph was applied to vehicles classified as Heavy Duty Diesel trucks for all routes (URS, 2010).

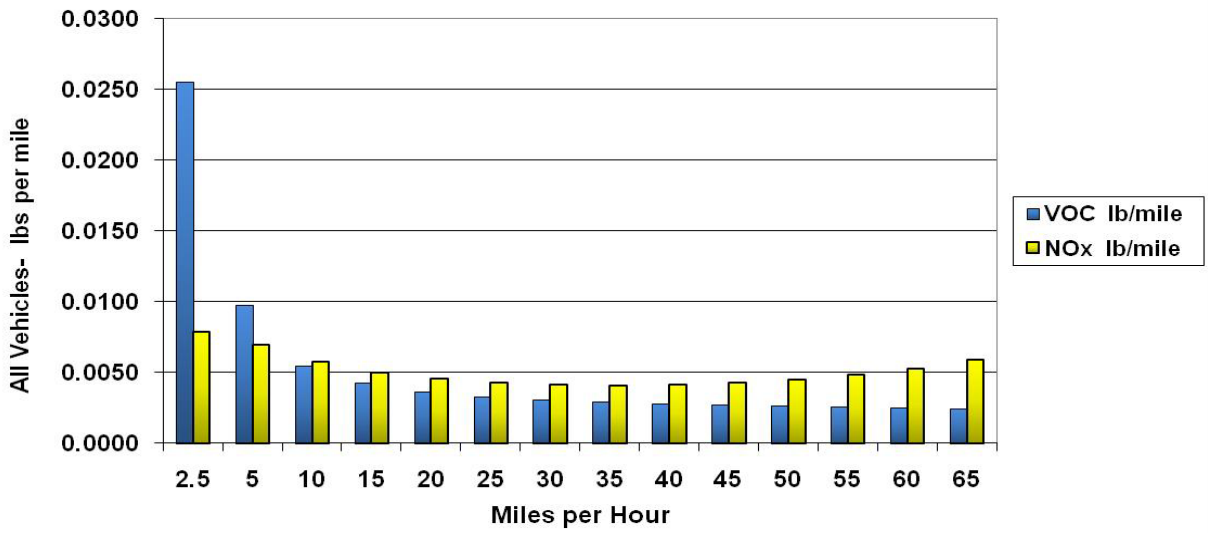


Figure 5-10. The Relationship Between Projected Emission of NO_x and VOCs and Vehicle Speed.

To address pollutant quantities impacted by vehicle speed, three vehicle classifications were used. Model inputs included data from MCRC traffic counters. Routes that traverse through urban areas such as CR 550 through Marquette will have slower speeds and more stopping and starting sequences. Variables such as slope, traffic volume, and composition may result in minor variation between actual and estimated emissions. In addition, changes in driving behavior in adjustment to road conditions and configurations including adverse weather conditions, accelerating to maintain speed when climbing hills, or increased braking when descending steep grades or navigating sharp curves may also result in minor variation between actual and estimated emissions. Routes that traverse long stretches of road and consistently maintain moderate speeds will potentially exhibit lower emissions, as observed in Figure 5-10.

The relationship between speed and emissions should weigh heavily when selecting routes that allow for minimization of the contribution of criteria pollutants emissions to air quality. This is most important where routes may travel through areas of high population densities.

CR 550 Route

Overall, emissions for this route are expected to be low but are likely to exhibit the greatest variability of the routes considered in this analysis. Emissions are expected to be low from the intersection of CR 550 and CR 510 to the intersection of CR 550 and Sugar Loaf Avenue. This segment exhibits a fairly straight alignment and allows for travel at a rate of speed between 45 mph and 55 mph for light duty vehicles that reduces emissions. Loaded Heavy Duty Diesel vehicles are expected to average 50 mph, but will not produce appreciably greater amounts of emissions.

Segments of the route within the City of Marquette and Marquette Township proceed through developed areas containing moderate to high density populations. These segments have

potential to expose a greater percentage of the public to increased vehicle-generated emissions as rate of speed decreases below 5 mph often during braking and acceleration associated with stops and traffic congestion. Increases in emissions resulting from decreased speed, idling, stopping and starting are likely to occur at the Sugar Loaf Avenue and Wright Street intersection (traffic signal) and the Wright Street and US-41 intersection (traffic signal). Increases in emissions resulting from decreased speed, idling, stopping and starting may also occur along US-41, as vehicles encounter reduced speed due to long grades, traffic signals, and increased traffic in the vicinity of the cities of Ishpeming and Negaunee.

CR 510-Red Road-Sleepy Hollow Route

The CR 510-Red Road-Sleepy Hollow route contains segments exhibiting grade changes and curves that will require speed reduction and braking during periods of sub-optimal road conditions due to weather-related events. This may result in minor and temporary increases in emission of criteria pollutants. However the majority of the route exhibits lengthy segments of road that allow for maintained speed and reduced emissions. Overall, emissions for this route are expected to be low.

CR 595 Route

Based on the analysis of the routes, the CR 595 route would contribute the lowest amount of vehicle emissions. This is the shortest and most direct route of all the routes and is located in primarily undeveloped areas. Final design and alignment may result in minor changes in slope and speed resulting in corresponding and minor changes in emissions. Minor and temporary increases in emissions resulting from decreased speed, long grades, idling, stopping and starting may occur at the intersection of this route with US-41.

5.47 Summary: Air Quality

In general, emissions related to the proposed increase in vehicular traffic should not impact levels of ozone recorded at the MDEQ Air Quality Monitor at Seney regardless of the route selected. The CR 595 route exhibits the shortest and most direct route of the routes considered and is estimated to produce the smallest amount of vehicular emissions. The CR 595 route traverses land supporting some of the lowest population densities in Marquette County and is least likely to expose populations to increased emissions. Temporary increases in emissions will likely be located at intersections from decreased speed, grade changes, idling, stopping and starting. CR 595 and the CR 510-Red Road-Sleepy Hollow routes are expected to generate fewer emissions from decreased speed, idling, stopping and starting due to fewer encounters with traffic signals. In general, increases in vehicular emissions can result in direct impacts to vegetation and indirect impacts to surface water quality through the increased deposition of criteria pollutants along paved road surfaces.

5.48 Affected Environment: Noise

5.48.A. Acoustical Terminology, Concepts and Sound Perception

Sound is assessed in terms of a unit of measure called Hertz (Hz). Audible sound occurs over a wide frequency range, from approximately 20 Hz to 20,000 Hz. Human hearing responds differently to sounds at different frequencies (or pitch). Sound level perception is

expressed in terms of loudness and is measured in units called decibels (dB). Decibels are power ratios and logarithmic quantities. Lower frequency sounds that are equally as "loud" have a much higher decibel level than high frequency sounds. To accommodate for variation in frequency sensitivity of human hearing, a frequency weighting is often applied to sound level measurements. When the weighting is applied, the resulting sound level measurements are said to be "A-weighted" and the decibel level is expressed as "dBA".
When sound energy doubles, the decibel value increases by 3 dB. Human hearing is logarithmic and therefore when perceived loudness of a sound is "doubled", the corresponding sound level increases by approximately 10 dBA. The average listener begins to detect a change in level at 3 dBA, and a clearly noticeable change occurs at 5 dBA.

A common index, the equivalent sound level, or "Leq", is commonly used to indicate the average sound level over a period of time. Although Leq is an average, it is strongly influenced by the loudest events occurring during the time period because these loudest events contain most of the sound energy.

Table 5-13 lists the association between commonly encountered noise sources, their A-weighted level, and auditory response.

Table 5-13. Commonly Encountered Noise Sources, A-Weighted Level and Auditory Response.

Auditory Response	A- Weighted Level	Common Noise Source
Pain Threshold	140 dBA	Jet Engine (at 60ft)
	130 dBA	"Hard Rock" Band (near stage)
	120 dBA	Thunder (nearby)
Long-term Hearing Loss	100 dBA	Auto Horn (at 9 ft)
	90 dBA	OSHA 8 Hour Noise Exposure Limit
	80 dBA	Street Corner in Busy City
Typical Daily Exposure	70 dBA	Noisy Restaurant
	60 dBA	Typical Office Environment
	50 dBA	
	40 dBA	Average Residence
	30 dBA	
Very Quiet	20 dBA	Whisper
	10 dBA	Human Breathing
Threshold of Hearing	0 dBA	

5.48.B. Traffic Noise Study

A noise study was conducted at noise sensitive areas along the routes shown in Figure 5-9. The data collected for this study include baseline ambient noise level measurements using a sound pressure level and future noise prediction using Federal Highway Administration's (FHWA) Traffic Noise Model (TNM). This study assesses the subjective impact to the residential populations based on projected increases in traffic.

A twenty-four hour sound level measurement was conducted using a sound pressure level along the alternative routes at eight representative locations containing noise-sensitive areas

also known as "noise sensitive receptors" (Table 5-14 and Figure 5-11). Noise sensitive receptors are areas where the existing land use requires low noise levels and typically

includes land occupied by churches, public and private schools, libraries, cemeteries, park and recreation facilities, institutions, residential units, and hospitals. Low noise levels are necessary for these types of uses in order to preserve their intended beneficial goals such as education, health promotion, and general state of public well-being.

Of the eight locations selected, seven were considered to be noise sensitive receptors and one (US-41 between Brebner Road and M-35) was selected to assess noise levels associated with a long road grade. The noise measurements at these locations were used to establish baseline ambient noise levels and to verify calibration of the TNM software. In addition, traffic count data completed by MCRC from route segments near noise sensitive receptors were incorporated into the model variables (Table 5-15). Where available, the highest traffic count for twenty-four hour weekday traffic count was incorporated into the TNM model to assess peak traffic noise levels.

Table 5-14. Locations of 24-hour Sound Level Measurements within the Proposed Study Area.

Location Number	Noise Sensitive Receptor Location	Latitude	Longitude
Location 1	Noquemanon Trail Head	46°34'22.25"N	87°24'53.69"W
Location 2	Army Corps of Engineers Office	46°33'50.97"N	87°24'31.25"W
Location 3	Huron Woods Subdivision	46°33'44.34"N	87°27'35.64"W
Location 4	North Star Academy	46°33'18.74"N	87°27'29.86"W
Location 5[1,2]	US-41 between Brebner Road and M-35	46°32'10.00"N	87°31'11.37"W
Location 6	CR 573, West Ishpeming	46°30'56.83"N	87°40'31.96"W
Location 7	Wolf Lake Road North of US-41	46°30'2.39"N	87°53'12.59"W
Location 8[1]	Dead River Camps on Red Road	46°36'45.58"N	87°43'56.17"W

[1]Traffic counts from MCRC were not available for the route segment at the route survey location and were therefore estimated.
[2]Not a noise sensitive receptor but assessed for noise associated with long road grades.

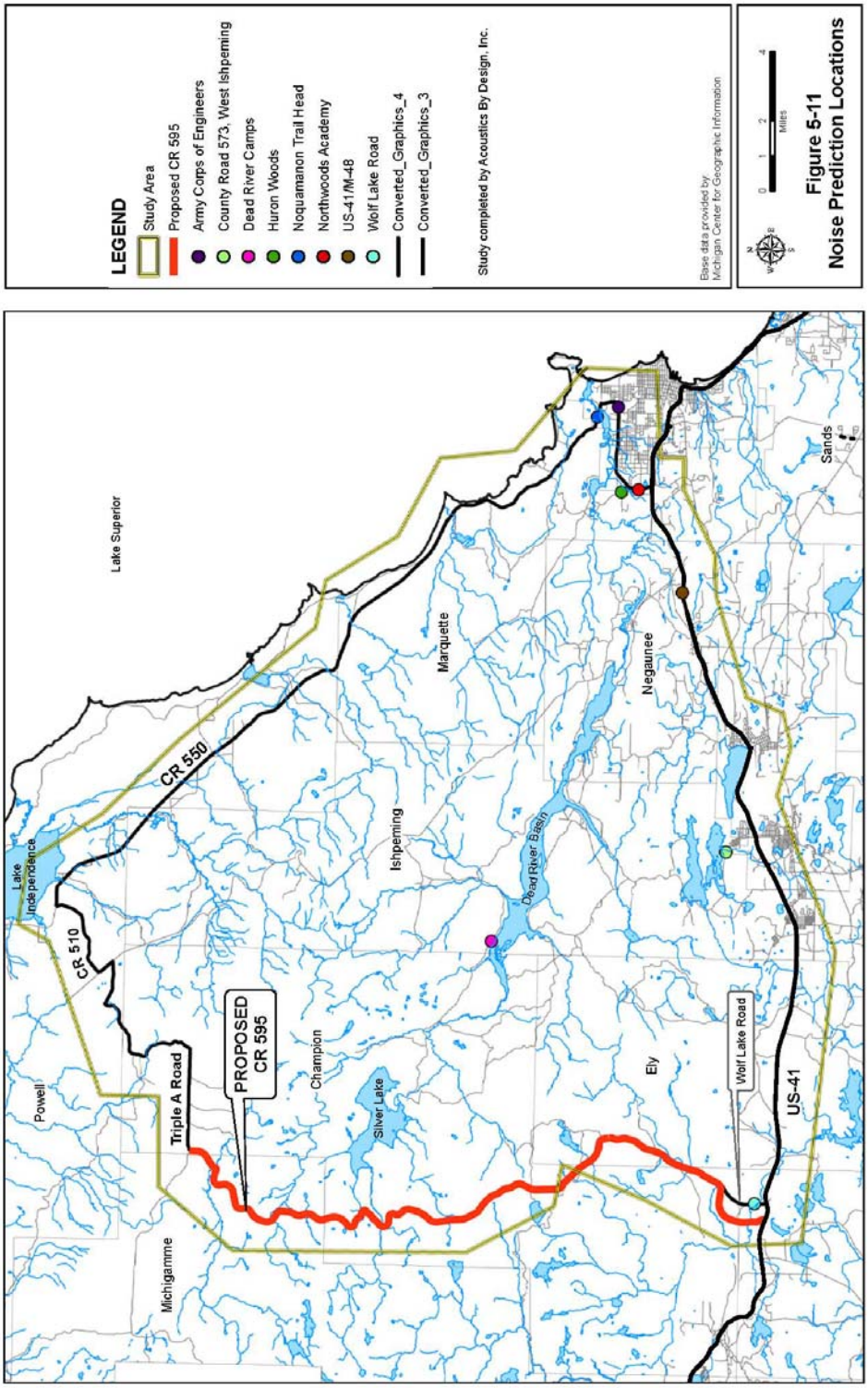

LEGEND
Study Area
Proposed CR 595
Army Corps of Engineers
County Road 573, West Ishpeming
Dead River Camps
Huron Woods
Noquamanon Trail Head
Northwoods Academy
US-41/M-48
Wolf Lake Road
Converted_Graphics_4
Converted_Graphics_3
Study completed by Acoustics By Design, Inc.
Base data provided by Michigan Center for Geographic Information
Miles
Figure 5-11
Noise Prediction Locations
Lake Superior
Lake Independence
CR 550
CR 510
PROPOSED CR 595
Triple A Road
Powell
Champion
Michigamme
Silver Lake
Ishpeming
Marquette
Dead River Basin
Negaunee
Ely
Wolf Lake Road
US-41
Sands

Table 5-15. Marquette County Road Commission Traffic Count Survey Locations and Dates.

Measurement Location	Counter	Road Name	Location Description	Study Dates
Location 1	33-a	CR 550	Marquette City Limit	6/25/07 to 7/2/07
Location 2	8-8-b	CR 492	S. of County Road HD	5/11/10 to 5/18/10
Location 3	8-8-a	CR HD-Forestville Rd	N 492	5/11/10 to 5/18/10
Location 4	178	CR 492 – New	N of US-41	5/11/10 to 5/18/10
Location 5[1,2]	Traffic Count Estimated			
Location 6	11-1-a	CR 573	At Carp River	7/14/09 to 7/21/09
Location 7	903	Wolf Lake Road North of US-41	At RR Tracks	7/20/10 to 7/27/10
Location 8	Traffic Count Estimated			

[1]Traffic counts from MCRC were not available at for the route segment at the route survey location and were therefore estimated.
[2]Not a noise sensitive receptor but assessed for noise associated with long road grades.

Noise Study Criteria

FHWA document 23 CFR 772 "Procedures for Abatement of Highway Traffic Noise and Construction Noise" provides guidance for determining both the community response to increases in ambient noise levels and mitigation recommendations. The primary indicator in this analysis is the “Noise Abatement Criteria” or NAC as defined by FHWA - 23 CFR 772 (Table 5-16) that defines traffic noise impacts as those that occur when:

1.) the predicted traffic noise levels approach or exceed the noise abatement criteria, or

2.) the predicted traffic noise levels substantially exceed the existing noise levels.

This definition reflects the FHWA position that traffic noise impacts can occur under either of two separate conditions: 1) when noise levels are unacceptably high (absolute level); or, 2) when a proposed project will “substantially exceed” the existing noise environment. In order to adequately assess the noise impact of a proposed project, both criteria must be analyzed. In addition, FHWA - 23 CFR 772 purposefully provides State Highway Authorities with the flexibility to establish their own definition of "substantially exceed”.

While the FHWA noise regulations do not define "approach or exceed”, all State Highway Authorities must establish a definition of "approach" that is at least 1 dBA less than the NAC for use in identifying traffic noise impacts shown in Table 5-9. The Michigan State Transportation Commission Policy on Noise Abatement Guidance Document 10136 accepts the FHWA document 23 CFR 772 criteria. Factors such as available resources, the public's attitudes toward highway traffic noise, and the absolute noise levels may influence a state's definition of substantial increase. The FHWA will accept a well-reasoned definition that is uniformly and consistently applied.

The State of Michigan Guidance Document 10136 defines a Noise Impact as noise levels that are one dBA below or greater than the federal noise abatement criteria, as shown in Table 5-9, or are expected to increase 10 dBA above baseline ambient noise levels as measured with a sound level meter. In accordance with the provided guidelines, the NAC for the State of Michigan and for the purpose of this study will be levels that exceed the FHWA-23 CFR 772 NAC criteria minus 1 dBA, or if predicted levels exceed the baseline ambient noise levels by more than 10 dBA. Noise ordinances within Marquette County are established through the cities and townships. Local ordinances do not have specific NAC and do not explicitly address impacts related to noise generated from vehicular traffic. In general, local noise ordinances would pertain to noise levels generated by construction of the routes. In most cases construction-related noise would be subject to restrictions limiting the time of day when construction activity would be allowed to occur.

The purpose of the study is not to determine locations to propose noise abatement, but rather to evaluate the potential noise impact of the increased vehicle traffic along the routes evaluated. The NAC are useful for framing the context of the noise impact of each route.

Table 5-16. FHWA document 23 CFR 772 Noise Abatement Criteria for L_{Eq}(h).

Activity Category	L_{eq}(h)	Description of Activity Category
A	57 Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 Exterior	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 Exterior	Developed lands, properties, or activities not included in Categories A or B above.
D	N.A.[1]	Undeveloped lands.
E	52 Interior	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

N.A[1]. - Noise abatement criteria not developed for undeveloped lands

5.48.C. Baseline Noise Conditions

Recordings of the level of baseline ambient noise at noise sensitive receptors were assessed during the week of November 15, 2010 and are shown in Table 5-17.

Table 5-17. Baseline Ambient Noise Survey Results at Noise Sensitive Areas (All Results in Dba).

Location	Noise Sensitive Receptor Location	Activity Category (FHWA-23CFR 772)	NAC-L_{eq}(h) (FHWA-23CFR 772)	Recorded L_{eq}(24h)
Location 1	Noquemanon Trail Head	B	67	63
Location 2	Army Corps of Engineers Office	B	67	64
Location 3	Huron Woods Subdivision	B	67	55
Location 4	North Star Academy	B	67	58
Location 5[1,2]	US-41 between Brebner Road and M-35	C	72	69
Location 6	CR 573, West Ishpeming	B	67	57
Location 7	Wolf Lake Road North of US41	B	67	50
Location 8	Dead River Camps on Red Road	A	57	38

[1]Traffic counts from MCRC were not available at for the route segment at the route survey location and were therefore estimated.
[2]Not a noise sensitive receptor but assessed for noise associated with long road grades.

5.48.D CR 550 Route

Baseline levels of ambient noise recorded at the noise sensitive receptors at Locations 1, 2, 4 and 5 do not exceed the NAC.

5.48.E. CR 510-Red Road-Sleepy Hollow Route

Baseline levels of ambient noise at Location 8 do not exceed the NAC. The sound level measurement of 38 dBA was the lowest level of ambient noise recorded during the survey.

5.48.F. Wolf Lake Road East of Proposed CR 595 Route

Baseline levels of ambient noise recorded at the noise sensitive receptor at Location 7 do not exceed the NAC.

5.49 Environmental Consequences: Noise

5.49.A. Predicted Traffic Noise Impacts

The noise study included baseline ambient noise level measurements, future noise predictions using FHWA's TNM, and predicted the subjective impact to the community resulting from the increase in traffic should a permit be granted for CR 595 and should the project be implemented. The analysis was performed at eight locations containing noise sensitive receptors. MCRC traffic counts were used for the models (Table 5-15). In addition, the predicted noise levels were compared to the 24-hour sound level measurements to

validate TNM model accuracy. Under all conditions both the predicted existing noise levels and the measured existing noise levels varied by no more than +/- 2 dBA. The TNM models were analyzed with the projected traffic increase of five heavy trucks per hour. The results of the predicted noise levels were compared against the FHWA and State of Michigan NAC previously discussed. Model predictions, validation, and evaluation of the predicted increased noise levels compared to NAC for this study and FHWA - 23 CFR 772 are shown in Table 5-18.

Table 5-18. TNM Model Predictions and Subjective Change in Noise Levels Compared To NAC for This Study and FHWA - 23 CFR 772 (All Measurements in Dba).

Location	Activity Category (FHWA-23CFR 772)	Sensitive Noise Receptor Location	NAC-L_{eq}(h) (FHWA-23CFR 772)	Measured L_{eq}(24h)	Predicted Existing L_{eq}(h)[1]	Predicted Future L_{eq}(h) [1]	Predicted Increase in Noise Level (dBA)	Subjective Change in Noise Level
Location 1	B	Noquemanon Trail Head	67	63	62	63	1	Little Increase
Location 2	B	Army Corps of Engineers Office	67	64	64	65	1	Little Increase
Location 3	B	Huron Woods Subdivision	67	55	55	58	3	Little Increase
Location 4	B	North Star Academy	67	58	60	61	1	Little Increase
Location 5	C	US-41 between Brebner Road and M-35	72	69	67	67	0	Little Increase
Location 6	B	CR 573, West Ishpeming	67	57	56	59	3	Little Increase
Location 7	B	Wolf Lake Road North of US-41	67	50	51	56	5	Little Increase
Location 8	A	Dead River Camps on Red Road	57	38	37	56	19	Substantial Increase

[1]Predicted Existing Leq(h) - TNM Model prediction of existing or future ambient noise levels at survey locations.

CR 550 Route

Predicted levels of ambient noise recorded at noise sensitive receptors at Locations 1, 2 and 4 and 5 do not exceed NAC. Therefore, the projected increase in traffic noise will not result in a significant noise impact.

CR 510-Red Road-Sleepy Hollow Route

Predicted levels of ambient noise recorded at noise sensitive receptors at along the Red Road segment of this alternatives do not exceed FHWA - 23 CFR 772 NAC. However, the TNM model predicts a 19 dBA increase in noise level over baseline conditions. The State of Michigan Guidance Document 10136 defines a noise impact as noise levels that are one dBA below or greater than the federal noise abatement criteria, or those levels that are

expected to increase 10 dBA above baseline ambient noise levels as measured with a sound level meter. Consequently, the projected increase in traffic noise will result in a significant noise impact at Location 8 on Red Road (Dead River camps).

Wolf Lake Road east of Proposed CR 595 Route

Predicted levels of ambient noise recorded at the noise sensitive receptor at Location 7 do not exceed NAC. Therefore, the projected increase in traffic volume if this route were used for the anticipated traffic will not result in a significant noise impact at Location 7. It should be noted that the proposed route for CR 595 is approximately 0.5 mile west of Location 7, which should result in further minimization of traffic-related noise to the residential area on Wolf Lake Road near Location 7.

5.49.B. Impacts of Traffic Related Noise on Wildlife

Studies of noise impacts on wildlife are extensive and indicate both negative and positive impacts on wildlife populations (Parris and Schneider 2008). Change in territorial range, nesting behavior, migratory movement, pitch and frequency of vocalizations, and reductions in fitness and reproductive capacity due to stress are listed impacts in birds, mammals, reptiles and amphibians from noise associated stress (Benson, R. 1995, Eigenbrod et al., 2009, Grubb et al., 1998, Hoskin and Goosem, 2010). It is important to note that not all species have shown these effects. In some instances, species may benefit from the establishment of transitional ecological zones that typically occur along roadways that would increase populations of those species near roads (Kaseloo P.A., 2006).

5.50 Summary: Noise

Based on the field measurements and traffic noise models, there is no predicted impact to the noise levels at sensitive receptor Locations 1-7 if these routes are implemented. However, a substantial increase in noise levels is predicted at Location 8 (Dead River camps) along the Red Road segment of the CR 510-Red Road-Sleepy Hollow route. This increase is primarily due to the existing baseline condition that exhibits a low level of ambient noise and is related to the low level of development and traffic observed in the surrounding area.

Several noise sensitive receptors are located along segments of routes that traverse moderate-to-high density populations where baseline ambient noise levels are a few dBAs less than the FHWA-23CFR 772 NAC threshold levels. However, changes in existing ambient noise levels would need to increase significantly to result in an increase in excess of 10dBA that would represent a noise impact. Impacts of noise on wildlife from vehicular traffic are likely to be mixed as some species may avoid the roadway, while others may not be impacted and/or seek out the roadway corridor as a preferred habitat.

5.51 Affected Environment: Geological Resources

The road routes investigated traverse various geologic resources including bedrock formations, surficial geology (mostly unconsolidated glacial and alluvial deposits) and soils. Soils are derived from glacial and alluvial deposits and contain living organisms, such as plant roots, fungi, micro-organisms and animals. Unconsolidated glacial and alluvial deposits below the biologically active surface soils lack the biological activity of soils.

Soils function as reservoirs of water and plant nutrients, provide habitat for animals, and host vital biogeochemical processes required for cycling energy and nutrients through wetland and terrestrial ecosystems. Soils contribute beneficial nutrients to aquatic ecosystems, including lakes and streams, but can also become a source of pollution as a result of erosion and sedimentation processes.

5.51.A Bedrock Geology

The bedrock geology of Michigan's Upper Peninsula is split into two distinct terrains: 1) the Precambrian and Lower Paleozoic igneous, metamorphic, and sedimentary rocks found on the western half; and, 2) the much younger Paleozoic formations found on the eastern half. The Precambrian metamorphosed igneous and sedimentary rocks of an ancient mountain range are upwards of 3.5 billion years old, while the eastern Paleozoic rocks, mainly sandstones and limestones, are approximately 310 million to 600 million years old (Dorr and Eschman, 1970).

Figure 5-12 below, which includes the alternative routes west of Marquette, illustrates the consolidated bedrock formations found below the unconsolidated glacial drift. On Figure 5-12, the Paleozoic Jacobsville Sandstone and the Siamo Slate-Ajibak Quartzite are relatively younger rocks, believed to be approximately 500 million to 600 million years old, while the major formations south of the Jacobsville, the Archaean and Michigamme formations are much older Precambrian-aged rocks. Archean bedrock often exhibits low permeability, which restricts water infiltration and creates the many lakes, wetlands and streams in Marquette County. The Jacobsville formation is comprised of red, brown, and white quartz-rich sandstone and is an important aquifer along the Lake Superior shoreline. This formation has been quarried for building stone and contains minor components of shale and conglomerate.

From a transportation management perspective, the bedrock geology, when near the ground surface, largely determines surface topography, elevations and grades, and may require significant modification in order to construct roads.

5.51.B. Surficial Geology

Surficial geologic resources within the study area consist of approximately 12,000-year-old unconsolidated Pleistocene Late-Wisconsinan glacial drift, younger alluvial sediments, organic peats and mucks. Glacial drift varies in thickness, texture, and degree of sorting throughout Marquette County. These sediments are closely tied to hydrologic conditions, soil composition, and land use. Basic categories of surficial deposits include the following:

Thin to discontinuous glacial till and coarse-textured till.
These deposits are relatively unsorted and range in thickness from a few inches to about 60 feet. The central area of Marquette County has broad areas of this thin deposit covering bedrock highlands. Bedrock is often exposed where the glacial till has washed away.

Outwash sand and gravel and recent alluvium.
These deposits consist of stratified, well-sorted sands and gravel. They range in thickness from several feet to as much as 300 feet and are often valuable, high-yield aquifers.

LEGEND
Study Area
Proposed CR 595
ARCHEAN GRANITE & GNEISSIC
ARCHEAN ULTRAMAFIC
ARCHEAN VOLCANIC & SEDIMENTARY
CHOCOLAY GROUP
GOODRICH QUARTZITE
JACOBSVILLE SANDSTONE
MICHIGAMME FORMATION
NEGAUNEE IRON FORMATION
SIAMO SLATE & AJIBIK QUARTZITE
Base data provided by:
Michigan Center for Geographic Information
Miles
Figure 5-12
Potential Impacts to Bedrock
Lake Superior
CR 550
CR-510
PROPOSED
CR 595
Triple A Road
Powell
Michigamme
Champion
Ishpeming
Marquette
Negaunee
Ely
Wolf Lake Road
US-41
Sands

Glacial moraines.
Glacial moraines consist of unsorted, unstratified and unconsolidated glacial drift exhibiting a wide range of particle size from as small as clay to as large as boulders. Moraines formed where glacier fronts remained stationery. The topography of glacial moraines consists of thick deposits that form rolling, low ridges.

Peat and muck.
Peat and muck are organic deposits formed in former glacial lakes, depressions, and broad river valleys. The mucks range from a few feet to tens of feet in thickness and are typically found in wetlands.

Lacustrine sand, gravel, silt and clay.
Lacustrine deposits are sorted and stratified according to energy of deposition. Sand and gravel were deposited along former lake shorelines where the sediments were subjected to the energy of wave action. Finer sand, silt, and clay were deposited in progressively deeper lake waters, with clay particles being the last to settle out of the water column.

5.51.C. Soils

Soils in Marquette County found along the study routes include a variety of textures: sands and gravels on well-drained moraines and outwash plains and finer-textured and mucky, organic-rich soils found in depressions and adjacent to lakes, streams and ponds. The coarser-textured soils have moderate to rapid infiltration rates and permeability and the silts and clays have low permeability. The upland soils are generally less fertile than those in wetlands and areas with poor permeability and are dominated by forest vegetative cover.

The proposed CR 595 traverses the following soil associations shown on Figure 5-13. The Marquette County Soil Survey provides classifications and characteristics of soil associations within the study area, which are described as follows:

Keewaydin Michigamme Rock Outcrop Association

Rock outcrop and very deep and moderately deep, nearly level to very hilly, well drained soils on bedrock controlled moraines. Erosion and seedling mortality are potential limitations.

Kalkaska Ishpeming Rock Outcrop Association

Rock outcrop and very deep and moderately deep, gently rolling to very hilly, somewhat excessively drained, sandy soils on bedrock-controlled moraines are found in this Association. Wind and water erosion, slope stability, drought, and seedling mortality are potential limitations.

Rubicon Sayner Association

Very deep, nearly level to very hilly, excessively drained, sandy soils exist on outwash plains and outwash terraces. Wind and water erosion, slope stability, drought, and seedling mortality are potential hazards.

LEGEND
Study Area
Proposed CR 595
Coarse-textured glacial till
End moraines of coarse-textured till
Glacial outwash sand and gravel and postglacial alluvium
Lacustrine sand and gravel
Peat and muck
Postglacial alluvium
Thin to discontinuous glacial till over bedrock
Water
Base data provided by Michigan Center for Geographic Information
Miles
Figure 5-13
Surficial Geology
Lake Superior
CR 550
CR 510
PROPOSED CR 595
Triple A Road
Powell
Michigamme
Champion
Ishpeming
Marquette
Negaunee
Ely
Wolf Lake Road
US-41
Sands

Kalkaska Carbondale Deford Association

Very deep, nearly level to very hilly, somewhat excessively drained, very poorly drained, and poorly drained, sandy and mucky soils occur on outwash plains and outwash terraces. Potential limitations include wetland impacts and equipment accessibility due to wetness. Access may be best during winter. Slope stability is a potential limitation for upland soils.

Pence Association

Very deep, nearly level to very hilly, somewhat excessively drained, sandy soils occur on outwash plains and outwash terraces. Wind and water erosion, poor moisture retention, and seedling mortality are potential limitations.

Sundog Minocqua Channing Association

Very deep, nearly level to very hilly, well drained, poorly drained, and somewhat poorly drained, loamy soils exist on outwash plains and outwash terraces. Potential limitations include wetland impacts and equipment accessibility due to wetness. Access is best during winter.

Rubicon Keweenaw Association

Very deep, nearly level to very hilly, somewhat excessively drained, and sandy soils occur on disintegration moraines. Slope stability, wind and water erosion, poor moisture retention, and seedling mortality are potential limitations.

Munising Yalmer Association

Very deep, nearly level to gently sloping, moderately well drained, loamy and sandy soils occur on till-floored lake plains.

Skanee Munising Gay Association

Very deep, nearly level to rolling, somewhat poorly drained, moderately well drained, and poorly drained, loamy soils exist on till-floored lake plains and ground moraines. Potential limitations include wetland impacts and equipment accessibility due to wetness. Access is best during winter.

Keweenaw Kalkaska Waiska Association

Very deep, moderately sloping to very steep, well drained, somewhat excessively drained, and excessively drained, sandy soils occur on dissected moraines and till floored lake plains.

Garlic Alcona Voelker Association

Very deep, moderately sloping to very steep, well drained, sandy and loamy soils occur on dissected moraines and till-floored lake plains.

5.52 Environmental Consequences: Geology

5.52.A. Potential Impacts to Bedrock

CR 595 and the CR 510-Red Road-Sleepy Hollow route would require some bedrock excavation to create an all-season road with design grades and road alignments appropriate for heavy truck and general commercial and non-commercial traffic. Excavation of rock may create unstable side slopes requiring additional stabilization to reduce erosion and falling rock hazards. If the project produces excess waste rock that cannot be land-balanced within the project, then disposal may be required.

Routes crossing bedrock units are shown in Figure 5-12. A GIS analysis of distances of bedrock units crossed for each of the routes is shown in Table 5-19. The distances do not indicate where there is bedrock exposed at the ground surface, however. For the most part, bedrock lies buried beneath soils and unconsolidated glacial sediments.

The CR 550 route mainly crosses areas underlain by Jacobsville Sandstone and Archean Granite and Gneissic formations. The CR 510-Red Road-Sleepy Hollow route and CR 595 route mainly cross areas underlain by the Michigamme and Archean Granite and Gneissic formations.

Table 5-19. Bedrock Geology with Approximate Crossing Distances (Miles) per Route.

Bedrock Unit	CR 550	CR 510-Red Road-Sleepy Hollow Road	CR 595
Michigamme formation	4.6	17.5	5.6
Archean granite and gneissic	10.4	14.5	14.9
Archean volcanic and sedimentary	0.0	5.3	0.0
Archean ultramafic	0.0	0.0	0.0
Siamo slate and Ajibik quartzite	1.4	1.4	1.6
Jacobsville sandstone	18.4	0.0	0.0
Negaunee iron formation	0.0	0.0	0.0
Goodrich quartzite	0.0	0.0	0.0
Distance from US-41 to Eagle Development Project	34.7	38.7	22.1
Total Distance of Route	63.4	43.0	22.5

5.52.B. Potential Impacts to Surficial Geology (Unconsolidated Sediments)

Three dominant surficial deposits in roughly comparable proportions are found along the routes: 1) thin to discontinuous glacial till over bedrock; 2) coarse-textured till and, 3) glacial outwash sand and gravel with post-glacial alluvium. Lacustrine sand and gravel and post-

glacial alluvium are also found to lesser extents (Figure 5-13). The areas of thin till over bedrock are areas where bedrock is near the ground surface, presenting an increased potential for digging and moving rock. The glacial outwash and alluvial deposits are often found in stream valleys; impacts to those areas may also involve impacts to wetlands and watercourses. A summary of approximate crossing distances for each sediment type is given in Table 5-20.

The coarse-textured sediments that dominate in the region have moderate-to-high infiltration rates and permeability. These soil properties help reduce surface runoff and contribute to groundwater storage. Impervious road surfaces cause water to run off the road, as opposed to infiltrating the ground under existing conditions. With more surface runoff comes the likelihood of more surface erosion and sediment deposition. These adverse impacts can be substantially mitigated through best management practices being implemented during construction.

Table 5-20. Surficial Geology with Approximate Crossing Distances (Miles) per Route.

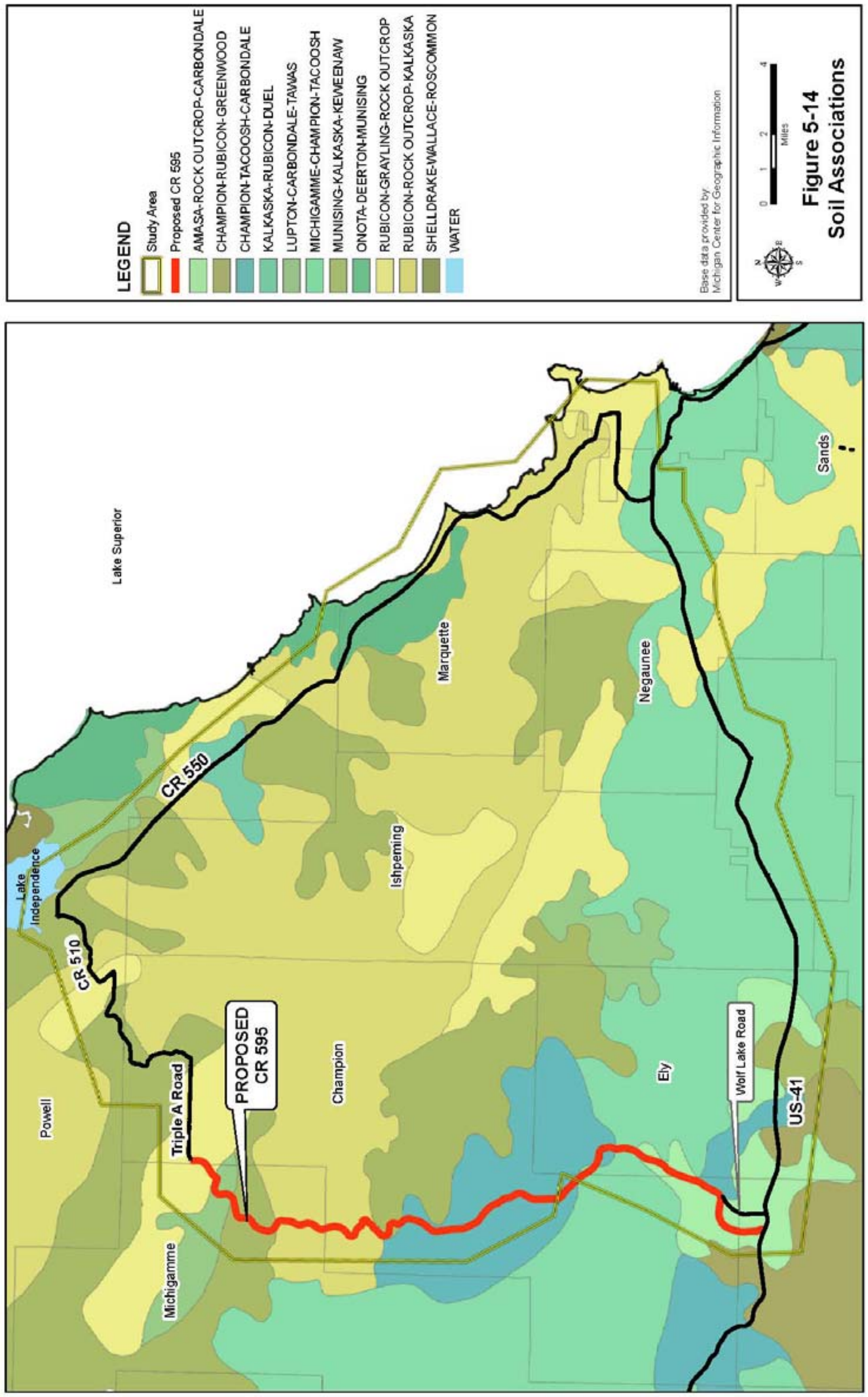
Sediment Type	CR 550	CR 510-Red Road-Sleepy Hollow	CR 595
Thin to discontinuous glacial till over bedrock	9.9	8.3	5.2
Glacial outwash sand and gravel and postglacial alluvium	6.7	16.1	6.5
Coarse-textured glacial till	13.6	13.7	9.7
Post-glacial alluvium	0.6	0.6	0.0
Lacustrine sand and gravel	3.9	0.0	0.0
Distance from US-41 to Eagle Development Project	34.7	38.7	21.4
Total Distance of Route	63.4	43.0	21.4

Table 5-20 indicates that the main sediment type crossed by the routes is “Glacial outwash sand and gravel” and “Course-textured glacial till.” The table provides an indication of excavation impacts associated with the different routes. For example, the proposed CR 595, which is the shortest route, is more primitive than CR 550 (the longest route) and would require more earth movement and disturbance of surficial sediments than the CR 550 alternative.

5.52.C. Potential Impacts to Soils

Soils in the study area are derived from the surficial sediments previously described (Figure 5-14). Soils retain many of the physical properties of the sand and gravel “parent materials” including moderate-to-high infiltration rates, moderate-to-high permeability, low fertility, droughtiness, and susceptibility to wind and water erosion. In general, the soils in the study area are not considered prime agricultural soils and remain mostly forested. Once the forest cover is removed and soils are exposed, they are at substantial risk of eroding.

The coarse-textured soils help to delay and reduce the amount of stormwater runoff reaching streams and other surface waters. These sandy, gravelly soils filter stormwater and help to maintain quality of surface water and groundwater resources. When these soils are covered by impervious road pavement there is a reduction in the amount of permeable surface, which


LEGEND
Study Area
Proposed CR 595
AMASA-ROCK OUTCROP-CARBONDALE
CHAMPION-RUBICON-GREENWOOD
CHAMPION-TACOOSH-CARBONDALE
KALKASKA-RUBICON-DUEL
LUPTON-CARBONDALE-TAWAS
MICHIGAMME-CHAMPION-TACOOSH
MUNISING-KALKASKA-KEWEENAW
ONOTA-DEERTON-MUNISING
RUBICON-GRAYLING-ROCK OUTCROP
RUBICON-ROCK OUTCROP-KALKASKA
SHELLDRAKE-WALLACE-ROSCOMMON
WATER
Base data provided by:
Michigan Center for Geographic Information
0 1 2 4
Miles
Figure 5-14
Soil Associations
Lake Superior
Lake Independence
CR 510
CR 550
Marquette
Negaunee
Ishpeming
Sands
Powell
Triple A Road
PROPOSED CR 595
Champion
Ely
Wolf Lake Road
US-41
Michigamme

can increase stormwater runoff during periods of rainfall and snowmelt. These higher runoff volumes may result in higher rates of erosion and sedimentation during and after road construction. A summary of the soil associations' composition and key management concerns is given in Table 5-21. Approximate crossing distance for each road route is given in Table 5-22.

Table 5-21. Soil Association Composite Series and Management Concerns (Corresponds To Figure 5-15).

Association (Map Unit)	Slopes (%)	Composite Series	Percent Composition	Management Concerns
Buckroe-Yalmer (01)	0 to 70	Buckroe very stoney loamy sand	60	Wind and water erosion, slope stability, seedling mortality, wind throw.
		Yalmer fine sand	30	
		Minor Soils	10	
Keewaydin Michigamme Rock Outcrop (04)	1 to 70	Keewaydin cobbly fine sandy loam	45	Wind and water erosion, slope stability, seedling mortality, wind throw.
		Keewaydin cobbly fine sandy loam	20	
		Rock Outcrop	10	
		Other Soils	25	
Schweitzer-Michigamme Rock Outcrop (05)	6 to 70	Schweitzer cobbly very fine sandy loam	40	Wind and water erosion, slope stability, seedling mortality, poor filter
		Michigamme cobbly fine sandy loam	20	
		Rock Outcrop	10	
		Other Soils	30	
Kalkaska Ishpeming Rock Outcrop (07)	6 to 70	Kalkaska sand	55	Wind and water erosion, slope stability, seedling mortality, poor filter
		Ishpeming sand	20	
		Rock Outcrop	10	
		Other Soils	15	
Rubicon Saynor (09)	0 to 70	Rubicon sand	65	Wind and water erosion, slope stability, seedling mortality, poor filter
		Saynor loamy sand	20	
		Minor Soils	15	
Kalkaska Carbondale Deford (11)	0 to 35	Kalkaska sand	30	Wind and water erosion, slope stability, seedling mortality, poor filter, compaction and ponding in mucks
		Carbondale muck	25	
		Deford muck	25	
		Minor Soils	20	
Prence (12)	0 to 35	Pence fine sandy loam	85	Wind and water erosion, slope stability, seedling mortality
		Minor Soils	15	
Sundog Minocqua Channing (13)	0 to 35	Sundog silt loam	30	Wind and water erosion, slope stability, seedling mortality, compaction and ponding in mucks
		Minoqua muck	25	
		Channing fine sandy loam	25	
		Other Soils	20	
Munising Yalmer (22)		Munising loamy fine sand	40	Wind and water erosion, slope stability, seasonal wetness
		Yalmer fine sand	30	
		Other Soils	30	
Skanee Munising Gay (23)		Skanee		Slope Stability, seedling mortality, poor filter, seasonal wetness
		Munising fine sandy loam		
		Gay muck		
		Other Soils		
Keweenaw Kalkaska Waiska (24)		Keweenaw loamy sand		Wind and water erosion, slope stability, seedling mortality, poor filter
		Kalkaska sand		
		Waiska cobbly loamy sand		
		Other Soils		
Garlic Alcona Voelker (25)		Garlic fine sand		Slope stability, seedling mortality, poor filter
		Alcona loamy very fine sand		
		Voelker fine sand		
		Minor Soils		

Table 5-22. Approximate Soil Association Crossing Distances (Miles) per Route

Soil Association	CR 550	Red Road- Sleepy Hollow	CR 595
Buckroe-Yalmer (01)	4.8	0.0	0.0
Keewaydin Michigamme Rock Outcrop (04)	0.0	8.4	17.5
Schweitzer-Michigamme-Rock Outcrop (05)	0.0	0.0	0.0
Kalkaska Ishpeming Rock Outcrop (07)	8.1	6.4	0.0
Rubicon Saynor (09)	2.9	10.8	0.4
Kalkaska Carbondale Deford (11)	2.2	0.0	1.4
Prence(12)	0.0	1.2	1.3
Sundog Minocqua Channing (13)	0.0	0.0	0.4
Rubicon Keweenaw (14)	0.0	0.0	0.0
Munising Yalmer (22)	1.1	0.0	0.0
Skanee Munising Gay (23)	3.3	0.0	0.0
Keweenaw Kalkaska Waiska (24)	6.9	12.2	.8
Garlic Alcona Voelker (25)	5.4	0.0	0.0
Distance to Highway 41 from Eagle Mine	34.7	38.7	21.4
Total Distance of Route	63.4	43.0	21.4

According to Table 5-22, the proposed CR 595 would mainly cross the Keewaydin Michigamme Rock Outcrop Soil Association. This suggests that the CR 595 project would frequently encounter areas where rock would need to be excavated, and fine sandy soils would dictate the need for substantial soil erosion (both water and wind) control measures during and immediately following construction.

5.53 Summary: Geological Resources

The proposed CR 595 alignment will impact geologic resources to varying degrees, but the impacts are considered minor. The study area does not contain prime farmland and the soil types are not suited for agricultural production; consequently there will be no impacts to prime or unique farmlands. Impacts associated with soil erosion and sedimentation will be limited to the constructed road corridor and will be mitigated using BMPs to protect remaining geologic resources.

5.54 Affected Environment: Hydrology

To characterize the existing condition of groundwater, floodplains and surface water resources, collectively known as the hydrology within the study area, the following documents were reviewed and pertinent information was incorporated into this section.

The Natural Features and Resources Chapter of the Marquette County Comprehensive Plan, Part 7 Subsurface Water. Prepared by: Resource Management & Development Department, Planning, Community Development, Forestry & Recreation Division, pp. 27. Adopted April 7, 2010 by the Marquette County Planning Commission.

Hazard Mitigation Plan for the County of Marquette, Chapter 3 Flooding, December 21, 2007, prepared by the Marquette County Resource Management/Development

Department for the Marquette County Sheriff's Department – Emergency Management Division, pp. 3-13.

5.54.A. Groundwater

Sources of groundwater for municipal or industrial use are found within Precambrian bedrock formations. Glacial drift is the main source of subsurface water. Glacial outwash deposits in these areas, which can be 250 feet thick, are the best source of potential groundwater. Groundwater resources are evenly divided between aquifers in bedrock and aquifers in glacial deposits. Most wells in the northern part of the study area are completed in bedrock at depths less than 100 feet with yields between 3 gallons and 40 gallons per minute. Deeper wells found in the central part of the study area are completed in glacial deposits and yield up to 200 gallons per minute. The static water table is near ground surface (i.e. less than 50 feet from the ground surface) in most of Marquette County; however, in some areas such as areas of outwash or hilly terrain underlain by bedrock, this depth may exceed 100 feet (Doonan and VanAlstine, 1982).

5.54.B. Floodplain Management Act

The area of inundation outside the normal boundary of a water body is the floodplain. Flood frequencies can be estimated by studying the yearly maximum discharge of a stream from a gaging station over a long period of time. The State of Michigan's Floodplain Regulatory Authority found in Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act (NREPA), 1994 PA 451, as amended, requires that a permit be obtained prior to any alteration or occupation of the 100-year floodplain of a river, stream or drain with a contributing watershed greater than two square miles.

In 1968 Congress created the National Flood Insurance Program (NFIP). Privately issued flood insurance subsidized by the federal government became available within communities that agreed to manage flood prone areas within their boundaries. In addition to flood insurance coverage of structure(s), coverage of contents is also available. To become eligible for Federal flood insurance, the community enters an "emergency phase" by adopting preliminary actions to reduce flood threat. The following city and townships located in Marquette County are participating in the NFIP (names in **bold** contain portions of the proposed study area):

1. Chocolay Township
2. **Ely Township**
3. Ewing Township
4. **City of Marquette**
5. **Marquette Township**
6. **Powell Township**
7. Republic Township
8. Skandia Township
9. West Branch Township

The Carp River and the Middle Branch Escanaba River systems provide the greatest risk of property damage due to flooding. Flooding occurs in Negaunee Township where North Road and M-35 cross the Carp River, and where CR 510 crosses a tributary of Midway Creek,

north of the intersection of CR 510 and CR 502 (Midway Drive). Water on the road at those locations interferes with traffic (*Hazard Mitigation Plan for the County of Marquette, 2007*).

5.54.C. Surface Water

According to the MDEQ map of Michigan's Major Watersheds, there are five major watersheds in the project study area, with four of those watersheds crossed by the proposed CR 595 route. The five watersheds are the Escanaba, Michigamme, Dead, Carp and Falls watersheds. (While described in this document, the Carp River watershed is not affected by the proposed CR 595.) Each of the five major watersheds contains smaller subwatersheds as shown in Figure 5-15 and Table 5-23. Table 5-23 summarizes the major watersheds crossed, and some subwatersheds within those major watersheds, the number of watershed crossings, and the total length of road crossings for each of the routes. Subwatersheds within each major watershed were determined using data provided by the Michigan Center for Geographic Information. Overall, surface water within the study area generally flows into rivers, streams or creeks within one of these five watersheds, eventually discharging into Lake Superior or Lake Michigan. The following information describes the five major watersheds located within the study area.

Table 5-23. Summary of Watershed Crossings for Each Route.

Route	Names of Major Watersheds[1] and Subwatersheds[2] Crossed	No. of Major-Watershed Crossings	No. of Subwatershed Crossings	Length of Crossing (Miles)
CR 550	**Falls Watershed** (Salmon Trout River, Yellow Dog River, Big Garlic River, Little Garlic River, Harlow Creek) Lake Drainage, **Dead River, Carp River**, (Carp Creek), **Escanaba River**	4	7	60.4
Red Road–Sleepy Hollow	**Falls Watershed** (Salmon Trout River, Yellow Dog River, Iron River, Big Garlic River) **Dead River**, **Escanaba River**	3	4	43.0
CR 595	**Falls Watershed** (Yellow Dog River) **Dead River, Michigamme River (**Dishno Creek**), Escanaba River**	4	2	21.4

1 - Major watersheds in bold as shown in the Michigan MDNR Maps of Michigan's Major Watersheds at http://www.MDNR.state.mi.us/spatialdatalibrary/PDF_Maps/Watersheds/Major_Watersheds_24k.pdf

2 - Sub watersheds in parentheses as determined from Michigan Center for Geographic Information

LEGEND
Study Area
Proposed CR 595
Big Garlic River
Carp Creek
Carp River
Dead River
Dishno Creek
Escanaba River
Harlow Creek
Iron River
Lake Drainage
Little Garlic River
Salmon Trout River
Yellow Dog River
Base data provided by: Michigan Center for Geographic Information
Miles
Figure 5-15
Watersheds
Lake Superior
Lake Drainage
CR 550
Iron River
CR 510
Yellow Dog River
Salmon Trout River
Triple A Road
PROPOSED CR 595
Big Garlic River
Little Garlic River
Harlow Creek
Dead River
Carp River
Carp Creek
Wolf Lake Road
US-41
Escanaba River
Dishno Creek

Escanaba River Watershed

The Escanaba River watershed is one of the largest watersheds in Michigan's Upper Peninsula and the largest in Marquette County. It encompasses approximately 628,320 acres. Surface water flow within the watershed is towards the southeast, where the Escanaba River ultimately discharges into northern Lake Michigan at Escanaba. The Escanaba River watershed contains a considerable amount of forest land and wetlands. Between 1996 and 2001 there were slight increases in developed land and grassland in the watershed and a slight decrease in forest cover and agricultural use.

The Escanaba River and its watershed provide a wide variety of recreational opportunities that include canoeing, swimming, camping, fishing, hunting and hiking. The river itself and its tributary streams support brook, brown and rainbow trout as well as some warmwater fish species. Most of the Escanaba River watershed is open to public use including a large tract of land on the lower East Branch Escanaba River that is owned by Marquette County. The proposed CR 595 would have one crossing of the Escanaba River watershed near the south end of CR 595.

Carp River Watershed

The Carp River watershed encompasses approximately 47,040 acres and contains many swift cold water streams with many waterfalls and rapids. As stated above, while included in this study, CR 595 does not occur within this watershed. There are two dams on the Carp River, one forming Deer Lake in Ishpeming Township and one forming Carp River Lake in Sands Township.

The Carp River supports a healthy population of wild brook trout in its upper reaches. In the lower Carp River, small rainbow trout are the dominant residents, with brook trout and brown trout present in lesser numbers. The Carp River supports substantial runs of chinook salmon and coho salmon in the fall, with rainbow trout (steelhead) running in the late fall through springtime. In addition, mercury contamination of fish caught in Deer Lake has resulted in a ban on fish consumption since 1981. Deer Lake is not accessible to anadromous fish; they are blocked by the dam forming Deer Lake.

Falls Watershed

The Falls watershed, as mapped on the MDEQ map of Michigan's Major Watersheds, contains streams that flow at various points into Lake Superior and includes the Yellow Dog River watershed and the Salmon Trout River watershed.

The Yellow Dog River watershed lies in eastern Baraga County and western Marquette County and encompasses approximately 62,786 acres. The Yellow Dog River itself begins in the McCormick Wilderness Area as an outflow of Bulldog Lake and proceeds 52 miles to Lake Independence. Upon exiting Lake Independence, it proceeds to its confluence with Lake Superior. There are many waterfalls along the Yellow Dog River and its tributaries. The watershed contains numerous wetlands, and the forest composition of the watershed includes old growth pine groves, young aspen stands and large areas of commercial forest consisting of mixed hardwoods and conifers. The proposed CR 595 would have one crossing of the Yellow Dog River watershed near the north end of the road.

The Yellow Dog River within the Ottawa National Forest is designated as a Wild and Scenic River under the Federal Wild and Scenic Rivers Act (16 U.S.C. §§ 1271-1287, October 2, 1968, as amended). It is designated a top quality coldwater stream and a blue ribbon trout stream by the MDNR. MDEQ reports show elevated levels of mercury within the river (MDEQ, 2007). Erosion of stream banks is a problem and is associated with increased sediment loading within the river (Central Lake Superior Watershed Partnership, 2004).

The Salmon Trout River watershed is located in Powell, Champion, and Michigamme townships and encompasses approximately 31,641 acres. The Salmon Trout River flows northerly out of the Yellow Dog Plains towards its confluence with Lake Superior. The Salmon Trout River is an MDNR-designated trout stream. The Salmon Trout River supports the only population of coaster brook trout known to spawn in the U.S. waters of Lake Superior. The coaster brook trout population is stable; however, their spawning habitat is limited to the segment of the river between Lake Superior and an upstream natural waterfall approximately one mile from Lake Superior. Impacts to coaster brook trout habitat include low gradient downstream of the natural waterfall, sediment from upstream sources and competition with Chinook salmon and coho salmon for spawning habitat. There are two U.S. Geological Survey water stage recorders and crest stage gages located on the Main Branch Salmon Trout River and the East Branch Salmon Trout River.

The Huron Mountain Club and several corporations hold the majority of the land in the Salmon Trout River watershed, and smaller private holdings are concentrated near Conway Lake, at the lower end of the Salmon Trout River watershed. These smaller private holdings range from small tracts to 40-acre parcels. The Superior Watershed Partnership completed a watershed management plan for the Salmon Trout River watershed as part of the Clean Michigan Initiative (CMI) Nonpoint Source Pollution Control Grant program. That Plan includes recommendations to protect and improve water quality and was approved by the MDEQ in 2008. The proposed CR 595 does not cross any of the Salmon Trout River watershed.

Dead River Watershed

The Dead River watershed is located within the City of Marquette as well as within six townships (Michigamme, Champion, Ely, Ishpeming, Negaunee and Marquette) and encompasses approximately 104,988 acres. In an analysis of coastal tributaries conducted in July of 2001 by the MDNR, five of the main tributaries in the watershed were given a habitat rating of fair or good (Godby 2002). Recent surveys conducted by the MDEQ suggest that quality of aquatic habitat is non-uniform along the Dead River, with substantially different river habitat conditions at locations in close proximity to each other. However, differences in aquatic habitat did not appear to impact benthic macroinvertebrate scores, which were rated by the MDEQ as being good to excellent (MDEQ, 2007).

The Dead River flows through a series of impoundments and eventually outlets into Lake Superior in Marquette. The impoundments are formed by the Hoist Dam, which forms the Dead River Storage Basin; the McClure Dam, which forms the McClure Storage Basin; the Forestville Dam, which forms the Forestville Storage Basin; and the Silver Lake Dam which forms the Silver Lake Storage Basin. The Hoist, McClure, Forestville, Tourist Park, and Silver Lake dams are licensed by the Federal Regulatory Commission (FERC).

An earthen fuse plug at the Silver Lake Basin and the Tourist Park dam failed during a flood event during May of 2003. The Silver Lake dam failure caused a significant flood event that had devastating effects on the river and adjacent lands for miles downstream. Following the flood event, about five miles of the Dead River was reconstructed at substantial cost, the AAO Bridge, which was destroyed in the flood, was replaced, and numerous other restoration projects were completed in the river corridor. The earthen fuse plug at the Silver Lake Basin was rebuilt and a permit was issued by MDEQ in 2010 to rebuild the Tourist Park Dam. The Collinsville Dam, the oldest dam on the system, was removed in 2004 by the Marquette Board of Light and Power, Superior Watershed Partnership, and Marquette County Conservation District with a grant from FEMA (#A-1346.38). In addition to these large impoundments, there are several smaller ponds and lakes scattered throughout the Dead River watershed including Bishop Pond, Long Lake, and Three Lakes.

The Marquette County Conservation District and the Superior Watershed Partnership created the Lower Dead River Watershed Improvement District which consists of a 22-square mile sub-basin within the Dead River Watershed. Subsequently, a Lower Dead River Watershed Plan was developed by the Conservation District through grant funding under Section 319 of the federal Clean Water Act. This Watershed Plan was approved by the MDEQ in 2002 and issued final in 2003. The Plan includes management recommendations to improve and protect water quality. In general, the tributaries located within this sub-basin of the Dead River watershed are good quality. The western portion of the Dead River watershed exhibits large natural areas containing wetlands, impoundments and commercial forest. Residential development in the form of camps and permanent homes occurs along the Dead River Storage Basin.

Michigamme River Watershed

The Michigamme River watershed covers approximately 727 square miles and contains approximately 465 miles of rivers and streams in the watershed. Approximately 82 percent of the watershed is forested. Macroinvertebrate community status was assessed at 10 different sites within the Michigamme River Watershed. Half of the macroinvertebrate community ratings were deemed “excellent,” while the other half were rated acceptable (Lake Michigan LaMP 2006).

Between the years of 1996 and 2001, there has been a slight increase in developed land and a slight decrease in farmland and forest. Most of the forested land in the Michigamme watershed is owned by timber companies. The proposed CR 595 would cross the Michigamme River watershed for less than 0.5 mile.

5.54.D. Lakes

Several lakes are located within/near the study area. Some of these lakes include: Bear Lake, Big Mud Lake, Bob’s Lake, Brocky Lake, Dead River Storage Basin, Deer Lake, Dishno Lake, Echo Lake, Gander Lake, Glass Lake, Harlow Lake, Hills Lake, Lake Independence, Log Lake, McClure Storage Basin, Pine Lake, Rocking Chair Lakes, Round Lake, Saux Head Lake, Silver Lake Basin, Stag Lake, Teal Lake, Three Lakes, and Wolf Lake. In addition there are numerous other smaller lakes in the study area.

5.54.E. Stream Crossings

Watershed management plans for the Lower Dead River watershed and the Salmon Trout River watershed have identified existing problematic road crossings that currently are negatively impacting aquatic resources. Conveyance of stormwater at road crossings through improperly installed culverts has impacted quality of aquatic habitat in streams within the study area and may directly contribute to a reduction in fish and aquatic macroinvertebrate populations (Lower Dead River Watershed Management Plan, 2003). Habitat degradation including increased sedimentation and plunge pools, which create waterfalls at the culvert outlet, can block fish migrating upstream. Plunge pools caused by the previous installation of culverts too small in diameter for the amount of stream flow create hydraulic "head" causing water to pass through the culvert at high velocity. This causes erosion of the stream bottom and can potentially block fish from migrating upstream. Some crossings are made of old or improvised materials (hollow logs or timbers) or have no crossing structure at all, with vehicle traffic driving directly through the steam (Salmon Trout River Watershed Plan, 2006).

5.54.F. Impervious Surfaces

The percentage of impervious surface is strongly correlated to land use classified as "urban and built up". Land classified as "urban and built up" represents 4% of the total land use within Marquette County. Land classified as "urban and built up" increased 1% from 1978 to 2005 (Marquette County, 2009). A watershed that has 11%-25% impervious surface is considered to be "impacted" and areas that contain more than 25% impervious surfaces are considered "degraded". The Lower Dead River watershed is considered "impacted" with approximately 15% of the land within the watershed being impervious. The proposed CR 595 project would have insignificant effect on the impervious surface in each of the watersheds it would traverse.

5.55 Environmental Consequences: Hydrology

Road design elements have been added to maintain normal groundwater levels and surface water flows within the same watershed where the proposed roadway bisects an existing wetland or runoff pattern. These mitigating measures are described in the following groundwater and surface water sections.

5.55.A. Environmental Consequences: Groundwater

None of the routes evaluated in this report would result in any substantial impact to groundwater resources. Impacts to groundwater resulting from the disruption of shallow aquifers are expected to be temporary; however even in such a scenario no impact to groundwater resources would be anticipated. For example, small amounts of groundwater seepage could accumulate in excavations associated with road construction in areas where intersection of the shallow water table occurs. Engineering design that employs the use of underdrains to intersect horizontal seepage and rerouting of flow into conveyance channels can be implemented during construction in order to maintain the existing hydrology, thereby minimizing impacts to groundwater resources.

In order to minimize secondary impacts on groundwater flow in wetlands, Groundwater Drainage Layers will be installed in key road crossing locations. Groundwater Drainage

Layers will be constructed by placing a layer of rock from the existing ground surface down to a depth of three feet. The rock will be placed as wide as the granular road embankment fill and would be at least 50% of the length of the wetland crossing. The rock fill will be centered on the length of the wetland crossing or on each side of the stream if one is present. In addition, a layer of geotextile fabric will wrap the rock fill to protect the interstitial spaces in the rock from being filled with sand from the road fill above. This mitigating measure is intended to provide for free passage of groundwater through the road fill sections in wetlands in order to ensure the road fill will not hinder natural groundwater flow. This measure will serve to minimize secondary effects on existing wetland vegetation as well as wetland functions and values.

5.55.B. Environmental Consequences: Floodplains

The State of Michigan's Floodplain Regulatory Authority is designed to reduce both the risk of property damage and loss of life due to flooding and to preserve natural floodplain benefits. These benefits include preserving aesthetics, reducing the number and severity of floods, maintaining conveyance of stormwater runoff and minimizing non-point source water pollution.

Impacts to floodplains from implementation of a proposed route will occur where a crossing or widening of a road segment within the floodplain is unavoidable. Floodplain modifications from construction would typically include cut and fill. Alteration of floodplains may disturb natural detention areas, alter stream channels, restrict rates of flow, increase sediment-laden runoff, decrease vegetation and/or soil absorption rates, increase stream flashiness and increase frequency of floodplain inundation.

Impacts to floodplains will be reduced and mitigated by appropriate engineering design and proper implementation of sediment and erosion control measures during construction. Replacement existing culverts at existing road crossings and restoration of additional culvert crossings on road segments that will be abandoned along the CR 595 route will result in improved conveyance of stream flows within the floodplain. Engineering studies conducted for this permit application indicate that there will be no significant impacts to floodplain function or capacity as a result of the implementation of any of the routes, because all new structures are properly designed. In addition, avoiding construction activities within the watercourses during periods of above-normal flow will be avoided. Stabilization of road fill slopes, swales, and areas directly draining into a stream channel with sod, riprap or temporary seeding are practices that will further minimize local and temporary impacts resulting from implementation of a proposed route during construction. Compensatory cuts will be constructed near the Middle Branch Escanaba River stream crossing (to offset floodplain impacts for the Middle Branch Escanaba River and Second River stream crossings), the Dead River stream crossing, and the Yellow Dog River stream crossing.

5.55.C. Environmental Consequences: Surface Water

Measures to maintain surface water flows as close to the pre-construction drainage patterns as possible have been incorporated into the project plans. These measures include:

- properly-sized culverts and bridges;
- compensating cuts to mitigate 100-year flood storage;
- equalization culverts to allow free interchange of water in wetlands;

- upland drainage culverts to maintain the pre-construction drainage patterns in uplands to the extent possible;
- ditching to ensure flow is directed properly with outlets on uplands at non-erosive velocities, and;
- energy dissipation structures to reduce flow velocities at the outlets of upland drainage culverts or stormwater outfalls.

5.55.D. Mitigating Measures for Maintaining Surface Water and Groundwater Flow

The mitigating measures for maintaining surface water and groundwater are described for each plan sheet in the following text. Note that equalization culverts in wetlands and upland drainage culverts are identified by an alpha-numeric label with the first letter indicating the watershed; i.e. E6 indicates the culvert is in the Escanaba watershed and is the 6th culvert. Equalization culverts and upland drainage culverts are not in streams regulated under Part 301. Also note that the plans depict runoff structures (e.g. energy dissipation outfalls) and other measures with numbers in circles that are referenced to the Runoff Plan Legend on each plan sheet.

Plan Sheet 1 (County Road FY)

A Groundwater Drainage Layer (Plan Detail Sheet K) will be added from Sta. 124+00 to Sta. 126+00 to provide for free flow of groundwater in wetland R1.

A Compensating Cut will be constructed (Detail Sheet CC-1 & CC-2) to mitigate the 100-year flood plain disturbed for installation of the Middle Branch Escanaba River bridge approaches. A portion of this compensating cut was also created to mitigate the 100-year floodplain disturbance at the Second River (Plan Sheet 6 and Detail Sheet CC-3).

A 60-foot span concrete box beam bridge will be constructed over the Middle Branch Escanaba River at Sta. 122+51. This structure will provide adequate waterway area to not affect surface water flows and will provide wildlife passage under the structure.

CR FY exists from Sta. 100+00 at US-41 to Sta. 120+00; therefore no adverse hydrologic effects are expected in this portion of the proposed CR 595 route.

Plan Sheet 2 (County Road FY)

The land on Sheet 2 is sandy soil and relatively flat with pine plantation and only three minor wetland impacts. Surface or groundwater flow in this area is not a concern.

Plan Sheets 3 and 4 (Wasie Route) and Sheet 5 (South Wolf Lake Road)

These sheets are for lands that are flat with sandy soils and pine plantation with no wetland impacts. Surface or groundwater flow in this area is not a concern.

Plan Sheet 6 (Second River)

The Second River crossing at Sta. 261+00 will be reconstructed with the installation of a 58-foot span concrete box beam bridge. A temporary stream crossing over Second River will be constructed to maintain traffic on Wolf Lake Road (Plan Detail Sheet N). This temporary crossing will be restored to pre-construction conditions after the permanent structure is

completed. The existing Wolf Lake Road currently crosses the Second River at this location; therefore no adverse hydrologic effects are expected in this portion of the proposed CR 595 route. Due to the new structure, stream flow and flood flows will be improved by the reconstruction of the Second River crossing.

Plan Sheet 7 (County Road AAD)

Wetland equalization culverts (E4, E5, and E5A) will be constructed in Wetland A61 to allow surface water to freely flow under the proposed roadway.

Plan Sheet 8 (Trembath Lake Outlet)

A 12-foot span by 5-foot rise concrete box culvert (E6) will be constructed in Wetland A61 at Sta. 311+91 to allow surface water from the Trembath Lake Outlet to freely flow under the proposed roadway. 2,631 square feet of existing Wolf Lake Road will be removed upstream of the proposed new road crossing, which will restore hydrologic connection of Wetland A61.

A wetland equalization culvert (E7) will be constructed in Wetland A60 to allow surface water to freely flow under the proposed roadway. In addition, an existing 15-inch diameter culvert will be removed during the abandonment of the existing Wolf Lake Road. Removal of the two portions of the existing Wolf Lake Road will restore 21,233 square feet (0.5 acre) hydrologic interchange within wetland A60.

A Groundwater Drainage Layer (Plan Detail Sheet K) will be added from Sta. 332+00 to Sta. 333+00, to normalize groundwater levels within Wetland A60.

Plan Sheet 9 (North Wolf Lake Road)

Wetland equalization culverts (E8 and E9) will be constructed in Wetland A58, to allow surface water to freely flow under the proposed roadway. In addition, an existing 12-inch diameter culvert will be removed during the abandonment of the existing Wolf Lake Road. A total of 30,270 square feet of existing Wolf Lake Road will be removed from Wetland A58, which will improve hydrologic flow in this wetland.

A Groundwater Drainage Layer (Plan Detail Sheet K) will be added from Sta. 357+50 to Sta. 358+50 to normalize groundwater levels within wetland A58.

Plan Sheet 10 (North Wolf Lake Road)

A wetland equalization culvert (E10) will be constructed in Wetland A56 to allow surface water to freely flow under the proposed roadway. In addition, an existing 20-inch diameter culvert will be removed during the abandonment of the existing Wolf Lake Road and 3,622 square feet of wetland will be restored to improve hydrologic flow in Wetland A56.

An upland drainage culvert (D1A) will be installed at Sta. 380+70 to facilitate surface water flow from the east side of the proposed roadway to wetland A54 on the west side of the roadway. A total of 14,841 square feet of the existing Wolf Lake Road will also be removed to improve hydrologic flow in Wetland A54.

Wetland equalization culverts (D1 and D2) will be constructed in Wetland A54 to allow surface water to freely flow under the proposed roadway and maintain the hydrologic connections in this groundwater slope wetland.

Plan Sheet 11 (Kipple Creek)

Wetland equalization culverts (D100, D101, and D102) will be constructed in Wetland A53 to allow surface water to freely flow under the proposed roadway.

A wetland equalization culvert (D103) will be constructed in Wetland F8 to allow surface water to freely flow under the proposed roadway.

Plan Sheet 12 (Kipple Creek)

A 6-foot span by 4-foot rise concrete culvert (E99) will be constructed in Wetland F10 at Station 426+50 to allow surface water to freely flow under the proposed roadway in an unnamed tributary to Kipple Creek.

A wetland equalization culvert (E100) will be constructed in Wetland CC to allow surface water to freely flow under the proposed roadway.

A wetland equalization culvert (E101) will be constructed in Wetland F13 to allow surface water to freely flow under the proposed roadway.

A 12-foot span by 6-foot rise concrete culvert (E102) will be constructed in Wetland F13 at Sta. 453+00 to allow surface water in Kipple Creek to freely flow under the proposed roadway.

Plan Sheet 13 (Kipple Creek)

A wetland equalization culvert (E103) will be constructed in Wetland FF to allow surface water to freely flow under the proposed roadway.

A wetland equalization culvert (E104) will be constructed in Wetland E39 to allow surface water to freely flow under the proposed roadway.

Plan Sheet 14 (Kipple Creek)

A 6-foot span by 4-foot rise concrete culvert (E105) will be constructed in Wetland E39 at Sta. 491+00 to allow surface water in an unnamed tributary to Kipple Creek to freely flow under the proposed roadway.

A wetland equalization culvert (E106) will be constructed in Wetland M to allow surface water to freely flow under the proposed roadway.

Plan Sheet 15 (Kipple Creek)

A Groundwater Drainage Layer (Plan Detail Sheet K) will be added from Sta. 514+75 to Sta. 515+25 to provide for free flow of groundwater in wetland L.

Wetland equalization culvert E108 will be constructed in Wetland L to allow surface water to freely flow under the proposed roadway.

A 6-foot span by 4-foot rise concrete culvert (E109) will be constructed in Wetland L at Sta. 517+25 to allow surface water in an unnamed tributary to Kipple Creek to freely flow under the proposed roadway.

A wetland equalization culvert (E110) will be constructed in Wetland ETREX to allow surface water to freely flow under the proposed roadway.

A wetland equalization culvert (E111) will be constructed in Wetland KM7 to allow surface water to freely flow under the proposed roadway.

A wetland equalization culvert (E112) will be constructed in Wetland KM6 to allow surface water to freely flow under the proposed roadway.

Plan Sheet 16 (Kipple Creek)

A wetland equalization culvert (E113) will be constructed in Wetland KM7 to allow surface water to freely flow under the proposed roadway.

Plan Sheet 17 (Kipple Creek)

A wetland equalization culvert (D107) will be constructed in Wetland E26 to allow surface water to freely flow under the proposed roadway.

Plan Sheet 18 (Trail 5 South)

A wetland equalization culvert (M1A) will be constructed in Wetland E23 at Sta. 1126+40 to allow surface water to freely flow under the proposed roadway.

A Groundwater Drainage Layer (Plan Detail Sheet K) will be added from Sta. 1126+00 to Sta. 1127+00 to provide for free flow of groundwater within wetland E23.

An existing 8-inch diameter culvert will be replaced by a 6-foot span by 4-foot rise box culvert (M1) in Wetland E23 at Sta. 1131+96 to allow surface water from an unnamed tributary to Dishno Creek to freely flow under the proposed roadway and to provide for wildlife passage under the road.

Plan Sheet 19 (Trail 5 South)

A wetland equalization culvert (M2) will be constructed in Wetland E23 at Sta. 1149+00 to allow surface water to freely flow under the proposed roadway. An existing road fill (4,536 sq. ft.) will be removed to restore hydrologic connection in Wetland E23.

Plan Sheet 20 (Trail 5 South)

An existing 8-inch diameter culvert will be replaced with a 24-inch diameter wetland equalization culvert (D26) in Wetland E20 at Sta. 1197+65 to allow surface water to freely flow under the proposed roadway.

Plan Sheet 21 (Voelkers Creek)

An upland drainage culvert (D27) will be constructed at St. 1206+50, to allow surface water to freely flow under the proposed roadway into Wetland E18.

A 6-foot span by 4-foot rise concrete box culvert (D28) will be constructed in Wetland E17 at Sta. 1219+67 to allow surface water (unnamed tributary to Voelkers Creek) to freely flow under the proposed roadway.

An existing 48-inch diameter culvert will be replaced by a 10-foot span by 5-foot rise box culvert (D29) at Sta. 1225+61 to allow surface water from Voelkers Creek to freely flow under the proposed roadway and to provide wildlife passage under the road. A portion of the existing road (1,370 square feet) will be removed to restore free flow of water in that portion of Wetland E17.

A Groundwater Drainage Layer (See Plan Detail Sheet K) will be added from Sta. 1224+50 to Sta. 1225+25 to provide free flow of groundwater within wetland E17 adjacent to Voelkers Creek.

Plan Sheet 22 (Voelkers Creek)

A wetland equalization culvert (D30) will be constructed in Wetland E14 to allow surface water to freely flow under the proposed roadway. A section of existing road will be removed (1,488 sq. ft.) to restore hydrologic connection to Wetland E13.

Plan Sheet 23 (Trail 5 South)

A wetland equalization culvert (D31) will be constructed in Wetland E9 to allow surface water to freely flow under the proposed roadway. A section of the existing road (2,266 square feet) will be removed to restore hydrologic connection in Wetland E9.

An upland drainage culvert (D32) will be constructed at Sta. 1274+00 to allow surface water to freely flow under the proposed roadway to Wetland E8.

Plan Sheet 24 (Trail 5 South)

A Groundwater Drainage Layer (Plan Detail Sheet K) will be added from Sta. 1299+50 to Sta. 1300+50 to normalize groundwater levels within Wetland E2. A portion of Trail 5 will be removed (3,330 sq. ft.) to restore hydrologic connections in Wetland E2.

Wetland equalization culverts (D33 and D34) will be constructed in Wetland E2 to allow surface water to freely flow under the proposed roadway.

A Groundwater Drainage Layer (Plan Detail Sheet K) will be added from Sta. 1304+50 to Sta. 1305+50 to normalize groundwater levels within wetland E2. Another segment of Trail 5 will be removed (1,985 sq. ft.) to restore hydrologic connections in Wetland E2.

An upland drainage culvert (D35) will be constructed at Sta. 1308+50 to allow surface water to freely flow under the proposed roadway to Wetland E1.

An existing 18-inch diameter culvert will be replaced with a 30-inch wetland equalization culvert (D36) in Wetland E1 at Sta. 1314+00 to allow surface water to freely flow under the proposed roadway.

A Groundwater Drainage Layer (Plan Detail Sheet K) will be added from Sta. 1313+00 to Sta. 1313+75 to provide for free flow of groundwater in wetland E1.

Plan Sheet 25 (Trail 5 South)

A wetland equalization culvert (D39) will be constructed in Wetland AA7 to allow surface water to freely flow under the proposed roadway.

Plan Sheet 26 (Dead River)

A 24-foot span by 10-foot rise Conspan® bridge will be installed in the Dead River at Sta. 1353+00 to replace an existing timber bridge.

An upland drainage culvert (D41) will be constructed at Sta. 1359+61 to allow surface water to freely flow under the proposed roadway to Wetland A10.

An existing 15-inch diameter culvert with be replaced with a 42-inch diameter wetland equalization culvert (D42) in Wetland A12 to allow surface water to freely flow under the proposed roadway.

A Compensating Cut (shown on sheets 25 and 26) will be constructed (Detail Sheet CC-4 in the Floodplain Activity plans) to mitigate the 100-year floodplain disturbed for installation of the Dead River bridge approaches.

Plan Sheet 27 (Wildcat Canyon Creek)

A wetland equalization culvert (D43) will be constructed in Wetland A13 to allow surface water to freely flow under the proposed roadway.

A 7-foot span by 5-foot rise box culvert (D44) is being constructed at Wildcat Canyon Creek at Sta. 1404+15 directly downstream of twin 36-inch diameter culverts. The existing beaver dam that is immediately upstream of the existing road at this location is being left in place.

A wetland equalization culvert (D45) will be constructed in Wetland A15 to allow surface water to freely flow under the proposed roadway.

Plan Sheet 28 (Wildcat Canyon Creek)

An existing 30-inch diameter culvert will be replaced with a 6-foot span by 6-foot rise concrete box culvert in Wildcat Canyon Creek (D46) in Wetland A16 at Sta. 1418+55 to allow

surface water to freely flow under the proposed roadway. Wildlife passage will also be facilitated by this crossing.

An existing 24-inch diameter culvert will be replaced with a 6-foot span by 4-foot rise concrete box culvert (D47) in Wetland A17 at Sta. 1423+19 to allow surface water to freely flow under the proposed roadway and to provide wildlife passage.

An existing 24-inch diameter culvert will be replaced with an 8-foot span by 6-foot rise box culvert (D48) at Sta. 1430+13 in Wildcat Canyon Creek, which will also facilitate wildlife movement.

An existing 12-inch diameter culvert will be replaced with a wetland equalization culvert (D49) in Wetland B41 to allow surface water to freely flow under the proposed roadway.

An existing 18-inch diameter culvert and 1,073 square feet of existing road will be removed from Wetland A15 to restore hydrologic connection in this wetland.

An existing 12-inch diameter culvert and 1,538 square feet of existing road will be removed from Wetland A16 to restore hydrologic connection in this wetland.

Plan Sheet 29 (Trail 5)

A wetland equalization culvert (D50) will be constructed in Wetland B40, to allow surface water to freely flow under the proposed roadway. Also a section of Trail 5 will be removed (5,857 sq. ft.) to restore hydrologic connection in Wetland B40.

A Groundwater Drainage Layer (Plan Detail Sheet K) will be added from Sta. 1460+00 to Sta. 1461+00 to allow free flow of groundwater in wetland B38.

Wetland equalization culverts (D51, D52, and D53) will be constructed in Wetland B38 to allow surface water to freely flow under the proposed roadway.

Plan Sheet 30 (Trail 5)

A wetland equalization culvert (D54) will be constructed in Wetland B37 to allow surface water to freely flow under the proposed roadway. A section of Trail 5 will be removed (3,379 sq. ft.) to restore hydrologic connection in Wetland B37.

A Groundwater Drainage Layer (See Plan Detail Sheet K) will be added from Sta. 1474+50 to Sta. 1475+50 to provide free flow of groundwater in wetland B37.

A wetland equalization culvert (D55) will be constructed in Wetland B34 to allow surface water to freely flow under the proposed roadway.

A wetland equalization culvert (D56) will be constructed in Wetland B33 to allow surface water to freely flow under the proposed roadway.

Plan Sheet 31 (Trail 5)

Existing 24-inch diameter and 36-inch diameter culverts will be replaced with a 10-foot span by 6-foot rise concrete box culvert (D57) at Sta. 1506+70 to allow an unnamed tributary to Mulligan Creek to freely flow under the proposed roadway and to provide wildlife passage.

An upland drainage culvert (D58) will be constructed at Sta. 1510+80 to allow surface water to freely flow under the proposed roadway to Wetland B31.

An existing 36-inch diameter culvert will be replaced with a 6-foot span by 4-foot rise box culvert (D59) at Sta. 1513+27 to allow an unnamed tributary to Mulligan Creek to freely flow under the proposed roadway and allow wildlife passage.

An existing 6-inch diameter culvert will be replaced with a 5-foot span by 3-foot rise box culvert (D60) at Sta. 1522+93 to allow an unnamed tributary to Mulligan Creek to freely flow under the proposed roadway and provide for wildlife movements.

An existing buried culvert will be replaced with a 4-foot span by 3-foot rise box culvert (D61) at Sta. 1527+21 to allow an unnamed tributary to Mulligan Creek to freely flow under the proposed roadway and allow wildlife movements.

Plan Sheet 32 (Mulligan Creek)

A wetland equalization culvert (D62) will be constructed in Wetland B9 to allow surface water to freely flow under the proposed roadway.

A wetland equalization culvert (D63) will be constructed in Wetland B7 to allow surface water to freely flow under the proposed roadway.

A wetland equalization culvert (D63A) will be constructed in Wetland B6 to allow surface water to freely flow under the proposed roadway.

A 4-foot span by 3-foot rise concrete box culvert (D64) at Sta. 1557+00 will be constructed in Wetland B3 to allow surface water from an unnamed tributary to Mulligan Creek to freely flow under the proposed roadway. A portion of Trail 5 (1,359 sq. ft.) in Wetland B3 will also be removed to restore hydrologic connection in this wetland.

Plan Sheet 33 (Mulligan Creek)

A wetland equalization culvert (D65) will be constructed in Wetland B1 to allow surface water to freely flow under the proposed roadway. A portion of Trail 5 in Wetland B1 will also be removed (1,824 sq. ft.) to restore hydrologic connection in this wetland.

A new 36-foot span by 11-foot rise Conspan® bridge crossing the Mulligan Creek will be constructed at Sta. 1565+25 to meet the requirements based on the HEC-RAS analysis. This new bridge will provide for free flow of Mulligan Creek at this location as well as wildlife passage.

A wetland equalization culvert (D66) will be constructed in Wetland M1 to allow surface water to freely flow under the proposed roadway.

A wetland equalization culvert (D66A) will be constructed in Wetland M2 to allow surface water to freely flow under the proposed roadway.

Plan Sheet 34 (Trail 5 North)

A wetland equalization culvert (Y1) will be constructed in Wetland M9 to allow surface water to freely flow under the proposed roadway.

A wetland equalization culvert (Y2) will be constructed in Wetland M10 to allow surface water to freely flow under the proposed roadway.

A wetland equalization culvert (Y3) will be constructed in Wetland M11 to allow surface water to freely flow under the proposed roadway.

Plan Sheet 35 (Trail 5 North)

Upland drainage culverts Y4, Y5, Y6, Y7, Y8, and Y9 will be constructed to allow the surface water from the hillside to freely flow under the roadway at intervals to facilitate better disbursement of runoff to maintain existing runoff patterns to the extent feasible.

Plan Sheet 36 (Trail 5 North)

Wetland equalization culverts (Y10, Y11, Y12, and Y13) will be constructed in Wetland L2 to allow surface water to freely flow under the proposed roadway.

A Groundwater Drainage Layer (Plan Detail Sheet K) will be added from Sta. 1663+00 to Sta. 1664+00 and Sta. 1667+00 to Sta. 1668+00 to ensure free flow of groundwater in wetland L2.

Two portions of Trail 5 in Wetland L2 will be removed (6,211 sq. ft. and 12,519 sq. ft.) to restore hydrologic connection in this wetland.

Plan Sheet 37 (Yellow Dog River)

This plan sheet is for a portion of the proposed road in sandy soil and relatively flat terrain with few wetlands. Road runoff is not an issue for the proposed road on this plan sheet.

Plan Sheet 38 (Yellow Dog River)

A Groundwater Drainage Layer (Plan Detail Sheet K) will be added from Sta. 1710+00 to Sta. 1712+00 to ensure free flow of groundwater in wetland D3.

The existing Yellow Dog River Bridge and its abutments will be removed. As part of construction of the new 55-foot span bridge at this location, the bankfull width will be increased to improve stream flow and provide for passage of wildlife by removing fill placed during the construction of the existing bridge.

A Compensating Cut will be constructed (Detail Sheet CC-5) to mitigate the 100-year floodplain disturbed for installation of the Yellow Dog River bridge approaches.

Plan Sheet 39 (Trail 5 North)

This plan sheet is also for a portion of the proposed road in sandy soil and relatively flat terrain with few wetlands. Road runoff is not an issue for the proposed road on this plan sheet.

5.55.E. Soil Erosion Control Plans

Soil Erosion and Sedimentation Control and Stormwater Pollution Prevention plans will be prepared to comply with the National Pollution Discharge Elimination System (NPDES) of the Federal Clean Water Act. The Soil Erosion and Sedimentation Control Plan will include temporary and permanent soil stabilization measures to prevent erosion of disturbed soil into waterways or wetlands both during and after construction. Measures to be implemented will include silt fencing, gravel check dams, temporary siltation basins, and fabric protection of any existing drainage structures. Excess soil material generated during construction will be disposed in an appropriate manner away from surface water resources, floodplains and wetlands.

Construction of a new road surface may create increased stormwater runoff in some areas of the new road. Impacts to local surface water quality could result from additional inputs of sediment and pollutants from the roadway unless mitigation measures are implemented. The concentration of pollutants deposited from vehicle exhaust emissions and from direct discharge of oil, grease, etc. would be proportional to traffic volumes. The amount of sediment and de-icing materials deposited into surface waters adjacent to the roadway would be correlated to the number of miles of road and application rate of maintenance materials. The amount of sediment, de-icing materials, oil, and heavy metals generated from the roadway also depend on the type of road surface. Paved roadways tend to generate less sediment than gravel roadways and runoff from gravel roadways contains lesser quantities of oil and heavy metals.

It is unlikely that implementation of the proposed route would result in long-term impacts to designated uses for surface water resources under Part 31. However, minor and temporary changes in concentrations of de-icing chemicals and sediment load would be anticipated and would increase with increases in traffic volume.

The environmental impacts to surface waters will be mitigated by implementing BMPs during construction of the roadway to minimize adverse impacts to surface water resources due to erosion and sedimentation. BMPs will also be employed during use and maintenance of the roadway to address such issues as de-icing chemicals. During construction, erosion control and sedimentation measures will be implemented in accordance with the Soil Erosion and Sedimentation Control Plan and the applicable permits. After construction, surface water quality impacts will be mitigated by the use of BMPs such as vegetated swales that reduce concentrations of pollutants associated with stormwater runoff.

In summary, the measures taken in the design of the proposed CR 595 will provide for the natural runoff patterns to continue on the landscape and the impacts to the associated streams and wetlands will be minimal. Stormwater outlets, curbing, and other measures will be implemented to ensure that stormwater does not directly enter streams. There are no reasons to expect any negative impacts to water quality or water quantity on a watershed scale.

5.55.F. Stream Crossings

The CR 550 route would require the replacement of seven existing stream crossings, including three existing culverts on Triple A Road over the East Branch Salmon Trout River. The CR 510-Red Road-Sleepy Hollow route would result in 35 stream crossings. The CR 595 route will result in 22 stream crossings and the Dishno route would require 29 stream crossings.

Existing stream crossings along segments of a route may consist of culverts that are misaligned, improperly sized, and/or negatively impact fish and aquatic macroinvertebrate populations, and stream channel hydrology. Reconstruction of stream crossings to meet the most current and environmentally-sensitive design standards will provide beneficial improvements including reduced erosion, increased hydrologic connectivity, improved conveyance of stream flows, and improved habitat for fish and other aquatic organisms.

5.55.G. Impervious Surfaces

None of the routes will result in significant increases in the percent of impervious surfaces within the respective watersheds where the routes are located.

5.55.H. Watershed Impacts

CR 550 Route

The CR 550 route crosses a total of four major watersheds and seven subwatersheds. This route exhibits the longest overall road distance, but utilizes existing roads for its entire length; therefore, impacts to surface water quality and hydrology as a result of construction are expected to be lessened. Potential contribution of pollutants from road maintenance and use are expected to be higher than the other routes due to the greater length of the CR 550 route.

CR 510-Red Road-Sleepy Hollow Route

The CR 510-Red Road-Sleepy Hollow route crosses three major watersheds and four subwatersheds over its 43 miles. This route would result in construction of new road surface along a significant portion of its length and would increase the potential for impact to surface water quality from pollutants associated with maintenance and road use. Existing impacts to surface water from erosion of gravel road surface would be expected to decrease from the conversion to a paved road surface over its entire length.

CR 595 Route

The CR 595 route crosses four major watersheds and the fewest number of subwatersheds (two). The proposed CR 595 also has the shortest distance (21.4 miles). Implementation of this route will require construction of paved road surface along its entire length. Therefore, this route would be expected to have potential for temporary, short-term, construction-related impacts to surface water quality. The CR 595 route is also the shortest route and as such, exhibits the lowest potential for long-term surface water quality impacts from pollutants associated with maintenance and road use.

5.56 Summary: Hydrology

In general, the three routes that were evaluated cross multiple watersheds and numerous streams. Significant impacts to groundwater resources as a result of the implementation of any of the routes are unlikely. There will be no long-term impacts to floodplain resources as a result of the implementation of any of the routes. Replacement of existing road crossings with new road crossings designed to current standards will result in improved conveyance of stream flows at many locations. The amount of impervious surfaces added to the watersheds as a result of implementation and improvements to any of the routes would not be significant. Impacts to surface water resources resulting from implementation of any one of the routes are related to increased runoff rates and volumes, as well as water quality impacts associated with sedimentation, and pollutants associated with maintenance and road use. All of these impacts discussed above are considered minor and will be mitigated during construction and road use by employing BMPs that control sedimentation and minimize surface water quality impacts.

The proposed CR 595 route has the shortest distance and crosses the fewest number of watersheds; therefore, local and temporary impacts resulting from construction within floodplains will be minimal. Impacts of stream crossings as a result of this route will be improved at 15 sites as undersized bridges or culverts are replaced with properly sized culverts. An additional seven stream crossings will be new locations and the impacts will be minimized by installation of structures that are of appropriate size and alignment to maintain stream channel connectivity and conveyance.

The CR 595 route will not result in a significant increase of impervious surface within the watersheds crossed. Of all the routes, the CR 595 route exhibits the greatest potential for temporary impacts to surface water quality during construction due to building a new road in some areas of that route where no roads or only two-tracks or trails currently exist. However, CR 595 has the lowest potential for impacts to surface water quality from pollutants associated with road use and maintenance in the long-term due to its relatively short distance.

5.57 Affected Environment: Archaeological Resources

A Phase 1 archaeological field survey was conducted along the majority of the CR 595 route (Supporting Documentation Woodland Road Permit Application). The Phase 1 archaeological field survey resulted in the identification of six archaeological resources including two isolated finds: two scatters of 20th century artifacts (20Mq299, 20Mq300) and two scatters of 20th century artifacts associated with features (20Mq297, 20Mq298). All of these resources are likely associated with homesteads or the logging industry, which since the late 19th century or early 20th century has been the primary commercial enterprise in Marquette County. An additional archaeological survey is currently being contracted to ensure that the entire CR 595 route can receive a letter of clearance from the State Historic Preservation Officer.

5.58 Environmental Consequences: Archaeological Resources

None of the archaeological sites identified are considered to be eligible or potentially eligible for the National Register for Historic Places and no further work is recommended as part of compliance with the National Historic Preservation Act of 1966, as amended for this project.

5.59 Summary: Archaeological Resources

Archaeological resources have been investigated using accepted protocols by experienced consultants and there have been no findings to require any further investigations. Additional archaeological investigations will be conducted to review the current CR 595 route; the results of that investigation will be provided as soon as they become available for distribution.

5.60 Affected Environment: Historical Properties

A search of Historic Sites Online, the Michigan State Historic Preservation Office's inventory of historic properties, was conducted along corridors adjacent to the route alternatives. The list of properties is current through December 2003. The database query included National Historic Landmark listed, State Register listed, National Register listed and Marker-erected sites. Archaeological sites are not included in the database. Inquiry into the Office of the State Archaeologist (OSA) is necessary to obtain information on below-ground sites.

5.61 Environmental Consequences: Historical Properties

There were no known sites listed on the National Historic Landmark list, State Register list, National Register list and Marker-erected sites listed within the corridor adjacent to any of the alternatives. There will be no known impacts to historic properties resulting from implementation of any of the route alternatives.

5.62 Summary: Historical Properties

Historical properties have been fully investigated using accepted protocols by experienced consultants and there have been no findings to require any further investigations.

5.63 Affected Environment: Recreational Resources and Land

The study area contains a variety of recreation lands including community parks, school recreation areas, informal recreation areas, and non-motorized trails. Outdoor recreation opportunities in the study area are enjoyed by local residents and tourists. Local visitors' bureaus advertise outdoor recreational opportunities afforded by large expanses of undeveloped lands and extensive trail systems existing within the study area as a means to increase tourism.

A detailed description of these recreational resources is provided below.

5.63.A. Parks and School Recreation Areas

There are a number of public parks in the study area and many other parks in the local communities outside of the study area. The City of Marquette operates three parks on the north side of the city, all in the immediate vicinity of the intersection of CR 550 and Sugar

Loaf Avenue. The Marquette Tourist Park Campground is a 40-acre park containing 110 full-service campsites located southwest of that intersection. Setter Field, a two-acre site within Marquette Tourist Park, contains a softball field and picnic tables. The River Park Sports Complex, located northeast of the intersection of CR 550 and Sugar Loaf Avenue, is a sports complex containing four softball fields and three soccer fields with associated parking, spectator seating, and restrooms. In addition, a designated bike lane runs along Wright Street between Ontario Avenue and Presque Isle Avenue within the City of Marquette. A bike lane is also located on the shoulder of CR 550 from the Dead River Bridge to Sugar Loaf Mountain. Bike lanes are also frequented by walkers, joggers, and pedestrians walking pets.

The City of Negaunee operates Miners Park which is located northeast of the intersection of US-41 and Maas Street. Amenities at this park include a volleyball court, two basketball courts, playground equipment, picnic tables, and a new restroom facility.

Ishpeming Township operates the Ishpeming Township Recreation Area located at the intersection of US-41 and CR 494. This park includes two softball fields, two tennis courts, and picnic facilities.

School recreation areas include: 1) the Northern Michigan University intramural field and tennis complex with eight tennis courts located on the south side of Wright Street, west of Lincoln Avenue; and 2) the North Star Academy which includes a gymnasium and playground located at the intersection of CR 492 and Commerce Drive.

5.63.B. Other Recreation Areas

The study area contains a mix of public and private lands including Commercial Forest Act (CFA) lands that are open to the public. These lands are used for variety of outdoor recreation opportunities such as camping, hiking, berry picking, wildlife viewing, hunting and fishing. Many of the lakes and rivers provide opportunities for boating, canoeing and kayaking. Much of the existing network of county roads, two-track roads and logging trails is designated for use by off-road vehicles (ORVs) and snowmobiles. Bicycling, with both road bikes and mountain bikes, is a popular activity in Marquette County. The Little Presque Isle Beach is located off of CR 550 approximately five miles north of Marquette. Public access to Lake Superior, impoundments and inland lakes is provided by numerous launches for both trailered and hand carried vessels. CR 550 also borders a portion of the Escanaba State Forest and Little Presque Isle State Forest. The Ottawa National Forest is located approximately two miles west of the proposed CR 595 route at its closest point.

5.63.C. Non-motorized Trails

The study area is crossed by a number of trails that can be used for hiking, cross-country skiing, snowshoeing and mountain biking. The trails often follow rivers and streams and provide access to the many waterfalls that exist in the study area. Notable trails in the study area include the Little Garlic River Trail, Sugarloaf Mountain Trail, Presque Isle/Harlow Lake Trail, Elliot Donnelly Wilderness Trail and Mead Trail, all of which are accessed from CR 550. The Lower Noquemanon Trail Network has a trailhead near Forestville Road that marks the beginning of the Forestville Basin Trail. In addition, a volunteer organization is in the process of developing a section of what is called the North Country Trail within the study area. The North Country Trail is an interstate trail system, that when completed, will stretch from New

York to North Dakota. Existing portions of the North Country Trail follow or cross a number of roads within the study area including CR 550, CR 510, and Red Road and crosses CR 595 between Dead River and Wildcat Canyon Creek.

5.64 Environmental Consequences: Recreational Resources and Land

Construction of the proposed CR 595 route will require upgrades to portions of the existing road system and creation of new road segments. Implementation of the project will result in increased traffic from heavy trucks, light-duty trucks and passenger vehicles that may have some effect on the existing recreational lands within the study area and the uses of these recreational lands.

There will be no direct impacts to parks and schools as a result of implementation of any of the routes evaluated in this document. Indirect impacts, including increased noise and emissions during construction and operation of these routes, may occur at several locations. Those locations include Marquette Tourist Park Campground and school recreation areas including the Northern Michigan University intramural field and tennis complex as well as the North Star Academy, which includes a gymnasium and playground.

A detailed description of the potential environmental consequences for recreational resources of each of the routes is provided below

5.64.A. CR 550 Route

Implementation of the CR 550 route will not directly impact existing parks or school recreation areas. Indirect impacts to Marquette Tourist Park Campground, recreation areas associated with Northern Michigan University, North Star Academy, and non-motorized trails would include increased heavy truck traffic, noise and emissions. These effects may degrade the existing recreational experience at these areas. Large truck interactions with bicycles, ORVs, and snowmobiles that utilize the road rights-of-way may increase if the CR 550 route is implemented. In addition, bicyclists and hikers that cross CR 550 when following the section of the North Country Trail northwest of Marquette may be affected.

5.64.B. CR 510-Red Road-Sleepy Hollow Route

Implementation of the CR 510-Red Road-Sleepy Hollow route will not directly impact existing parks or school recreation areas. The section of the North Country Trail that currently follows Red Road will be directly affected by road reconstruction and heavy truck traffic; however it should be noted that the current location of the North Country Trail on Red Road is considered temporary and planning efforts are underway to construct a permanent segment of the trail away from CR 510 in the future, as described at the following website: (http://www.northcountrytrail.org/nct/County510.htm).

Large truck interactions with ORVs and snowmobiles that currently use the network of two-tracks and trails that cross the CR 510-Red Road-Sleepy Hollow route may increase if this route is implemented. A beneficial direct impact of this proposed route includes increased and improved public access to land enrolled in the CFA program. These lands are currently used by the public for hunting, berry picking, fishing, hiking, cycling and other recreational activities. Another beneficial direct impact of this route is enhanced public safety at remote

locations used for recreation as a result of increased access by law enforcement and emergency services personnel.

5.64.C. CR 595 Route

Implementation of this proposed route consists of a combination of construction of new road segments and upgrades to existing improved and unimproved county roads and two-track trails. Truck traffic on the existing roads will increase and heavy trucks, light-duty trucks and passenger vehicles will be able to access areas that have poor access or are currently inaccessible. CR 595 will provide increased opportunities for utilization of recreational areas within the western-most portion of the study area and those lands enrolled in the CFA program. Vehicular utilization of portions of this area is presently restricted due to inferior road conditions that are unsuitable to passenger vehicles without four-wheel drive capability in certain areas. In addition, the CR 595 route will provide greater access to a segment of the North County Trail that is located through the Ottawa National Forest and the McCormick Wilderness Area.

A beneficial direct impact of this route is enhanced public safety at remote locations used for recreation as a result of increased access by law enforcement and emergency services personnel. CR 595 will cross the North Country Trail and may result in increased interactions between heavy trucks, light-duty trucks, and passenger vehicles as well as ORVs, snowmobiles, hikers and hunters that utilize the trail system. An additional North Country Trail trailhead parking area will be provided at the location of the CR 595 crossing at about Sta. 1383+50.

5.65 Summary: Recreational Resources and Land

All of the routes will result in indirect impacts to existing recreational resources through the increase in truck and other vehicular traffic, noise and emissions.

The CR 550 route will result in indirect impacts associated with increased truck and other vehicle traffic, noise and emissions. Implementation of the CR 550 route will result in indirect impacts to recreational resources within the City of Marquette including Marquette Tourist Park Campground and outdoor recreation areas associated with Northern Michigan University.

The CR 510-Red Road-Sleepy Hollow route will directly impact the current location of the North Country Trail; however, plans are in place to relocate that trail away from its existing location on the Red Road. Indirect impacts associated with this route include increased truck traffic, noise, and emissions that may affect the existing recreational experience. Beneficial direct impacts of this route include increased public access to CFA land and enhanced public safety at remote locations used for recreation due to increased access by law enforcement and emergency services personnel.

Implementation of the CR 595 route would have the least impact on existing recreational resources, in part because of the lack of existing vehicular access in this area. If constructed, this route will increase access to the existing recreational resources in the area; however, indirect impacts associated with increased truck and other vehicular traffic, noise and emissions may occur. Beneficial direct impacts of this route include increased public access to CFA land and enhanced public safety at remote locations used for recreation due

to increased access by EMS, fire fighters, and law enforcement agencies. Access to the North Country Trail will be enhanced with a needed trailhead and parking area on CR 595.

5.66 Affected Environment: Snowmobile Trails

The year-round use of Triple A Road for access to the Eagle Development Project required the relocation of Trail 14 snowmobile trail, which was completed in 2010. The Trail 14 project is not related to the CR 595 project. Trail 14 formerly used a portion of Triple A Road in the winter for snowmobiles because Triple A Road was not plowed in the winter. KEMC paid for the relocation of Trail 14.

The Trail 5 snowmobile trail comes from the south and formerly ended at Trail 14 on Triple A Road. Due to the location of the proposed CR 595, a portion of Trail 5 must be relocated for safety reasons. Trail 5 is presently located primarily on logging roads on timber company property and is maintained by Moose Country Snowmobile Club. Due to the fact that Moose Country receives funds from the State of Michigan for trail maintenance, the relocation of Trail 5 will have to be approved by MDNR. Discussions have been made with MDNR staff and once the CR 595 project is permitted, an application for the Trail 5 relocation will be processed by MDNR. Moose Country will then apply for the permit from MDEQ to authorize the construction of the relocated portion of the trail. Unavoidable wetland impacts will be mitigated as part of the CR 595 project, as explained in the following section.

5.67 Environmental Consequences: Snowmobile Trails

The proposed Trail 5 snowmobile trail relocation is on existing logging roads/trails except for a 1,600-foot section where the trail crosses the Yellow Dog River and a 1,465-foot section adjacent to Mulligan Creek for a total of 0.6 mile of relocation off existing trails. The total length of the Trail 5 relocation is 15.9 miles. The plans for the trail relocation are provided in the project plan set. There are no other feasible or prudent alternatives to crossing the Yellow Dog River and Mulligan Creek other than crossing on the same proposed bridges as CR 595, which is not acceptable for safety reasons.

The use of existing trails and roads minimizes the impact for clearing and grading for the trail relocation. Where the proposed trail relocation crosses wetlands, the only activity will be clearing of woody vegetation, which is not a regulated activity under Part 303. Fill will be placed in wetlands in only one minor location, as mentioned below. Once winter conditions set in and the ground freezes and snow accumulates, the snowmobile trail is groomed and used without any alteration of the ground needed.

The Trail 5 snowmobile trail relocation will require the construction of three bridges, one over the Yellow Dog River, one over Mulligan Creek, and one over an unnamed tributary to Mulligan Creek. The Trail 5 bridge over the Yellow Dog River will be a 50-foot clear span bridge located immediately downstream of the proposed CR 595 bridge. The proposed snowmobile trail bridge over Mulligan Creek will be a 40-foot clear span bridge and will be located approximately ½ mile upstream of the proposed CR 595 Bridge over Mulligan Creek. The proposed bridge over the unnamed tributary to Mulligan Creek will be a 40-foot clear span bridge and is about 1,000 feet west of the proposed snowmobile bridge over Mulligan Creek. The bridge decks will be 14 feet in width to safely accommodate the trail groomer and two-way snowmobile traffic and will include approach ramps. Plans for the proposed

bridge over Mulligan Creek are included in the enclosed HEC-RAS report for that stream crossing. Plans for the other two bridges will be provided at a later date.

The wetland impacts associated with the Trail 5 relocation are located at each of the stream crossings for new trail sections through wetlands. Wetland fill will be required at the Mulligan Creek and Yellow Dog River crossings (i.e. 0.01 and 0.05 acre, respectively) to provide for a safe ramp up to the bridge deck, as shown on the project drawings. The remaining 0.29 acre of wetland impact is for clearing only on the two new trail location segments and, although not regulated by Part 303, will be mitigated as part of the CR 595 project.

The indirect and cumulative impacts of the Trail 5 relocation are: 1) the establishment of a new trail on a small amount of previously undisturbed lands; 2) the operation of snowmobiles and ORVs in areas where they have not previously traveled; and, 3) the positive economic impact on the region derived from snowmobiling.

The potential indirect effects of the establishment of a new trail on a small amount of previously undisturbed lands would primarily be the effects to wildlife species and vegetative communities on the new trail. These impacts would be manifested to the greatest degree if the new trail was entirely on undisturbed lands. However, in order to minimize the impacts of clearing and operating a new trail segment, relocating the new trail segment on existing trails and roads to the extent possible was a primary design criterion. As mentioned above, only 0.6 mile of the total 15.9 miles of the trail relocation is on new corridor (4%). These two reroutes off existing trail roads could not be avoided because of existing trail roads not being located across the Yellow Dog River and Mulligan Creek at the proposed Trail 5 relocation crossings.

The second category of potential indirect and cumulative impacts relate to the operation of snowmobiles and ORVs on the proposed relocated portion of Trail 5. Due to the fact that 96 percent of the proposed trail relocation is located on existing trails or roads, it is very likely that snowmobiles and ORVs already ply these roads to some extent. However, connecting the existing trail and road segments into the trail network will result in more travel on the trail, especially for snowmobiles. Snowmobile use is much greater than ORVs due to the tourists coming to the area to snowmobile. ORV use is more local in nature and not the same level of use.

According to MDNR Forest Management Division, which is responsible for the snowmobile trail system including Trail 5, the relocation of Trail 5 will be a much improved location for this heavily used trail. Presently the bridge abutments at the existing Trail 5 crossing Mulligan Creek have been washed out and ORVs travel through the stream. There are also wetland crossings on this route segment that have to be frozen down before snowmobile travel is possible. The new route will avoid the problematic wetland crossings and will provide a new bridge over Mulligan Creek. A beneficial result of the relocation of Trail 5 will be the wetlands on the existing route south of Mulligan Creek will be allowed to recover from ORV use, assuming that this existing trail segment will be blocked.

Snowmobile use in the winter may be disturbing to some species of mammals that reside in the area year around, such as moose, gray wolf, white-tailed deer, and bobcats. Black bears are in hibernation and most birds have migrated south for the winter, so these species are not affected by snowmobile usage. Noise is the primary disturbance to wildlife from snowmobiles, although visual disturbance is likely an important secondary impact to more

sensitive species like gray wolves. Heavy snow cover on the ground and in the trees that is the norm in this area in winter absorbs sound and minimizes the distance of the noise disturbance from snowmobiles.

Secondary impacts related to visual disturbances from snowmobiles is limited to a relatively narrow band adjacent to each side of the trail, due to the dense tree and shrub cover that is prevalent in the area. Snowmobile use is primarily during the daylight hours, although nighttime use is also common. Most wildlife species are adapted to seeing snowmobiles in winter and unless snowmobilers stop to harass wildlife they quickly pass by without bothering them. Moose, white-tailed deer, wolves, and other wildlife will utilize snowmobile trails as travel corridors because it allows them to travel much easier than in the deep snow in the woods.

The cumulative effects of the Trail 5 relocation should be minimal due primarily to MDNR regulating the establishment of snowmobile trails that are provided funding to local clubs for maintenance, primarily for daily or weekly grooming during the snow season. The equipment used for grooming is very expensive and local clubs are not likely to be able to afford to purchase, operate, and maintain this equipment without MDNR funding assistance. As such, the establishment of new trails is very limited and the Trail 5 relocation is not likely to cause construction of additional trails or any more use by snowmobiles or ORVs than presently exists.

5.68 Summary: Snowmobile Trails

Although the CR 595 project would require the relocation of Trail 5 snowmobile trail, the MDNR has indicated that the relocation of Trail 5 will be an overall improvement to the trail. There should be no cumulative or long-term negative effects associated with the relocation of Trail 5.

The unavoidable wetland impact for the Trail 5 relocation is 0.35 acre, and will be mitigated as part of the CR 595 project. The wetland permit for the trail relocation will be obtained by Moose Country Snowmobile Club as a separate permit application, but the cost of the trail relocation will be paid for by the CR 595 project.

5.69 Affected Environment: Aesthetic and Visual Character

Visual character of the area that will be affected by the alternatives can generally be divided into urban landscapes and undeveloped landscapes. The visual character within the City of Marquette consists of high density residential development interspersed with commercial and industrial businesses. Along US-41 the visual character is dominated by commercial development becoming increasingly concentrated near the outskirts of Marquette, Negaunee, and Ishpeming. Beyond the developed areas, the visual character is largely defined by rugged topography, mixed second growth deciduous and coniferous forests, streams, rivers, lakes and wetlands. This natural landscape is occasionally interrupted by commercial logging operations, mining operations, utility corridors and low-density residential development. The undeveloped portions of the study area are laced with numerous snowmobile and off-road vehicle (ORV) trails, logging roads, unimproved county roads and seasonal recreational dwellings commonly referred to as camps.

US-41 is a four-lane paved road between the cities of Marquette and Negaunee with portions having a center turn lane. CR 550 is a paved two-lane road with some sections that have been upgraded in recent years. Other roads range in visual character from 24-foot wide unpaved roads to narrow two-track roads also used by snowmobiles and off-road vehicles. The views from the existing roads within the study area, with the exception of US-41, are generally enclosed by forested vegetation with more open views associated with rivers, reservoirs and wetland crossings. Waterfalls can be seen from CR 550 and CR 510. CR 550 offers occasional views of Lake Superior.

5.70 Environmental Consequences: Aesthetic and Visual Character

Implementation of the proposed alternative will require new construction or upgrades to the existing road system and improvements such as widening, grading, paving and clearing to provide a safe, all-season road surface. The consequences of aesthetic and visual character resulting from implementation of proposed alternatives will be limited to the immediate vicinity of the road improvements. These consequences are described more fully below.

5.70.A. CR 550 Route

Implementation of CR 550 route will require reconstruction of a portion of Triple A Road and CR 510 including widening, horizontal and vertical re-alignments, and upgraded stream crossings. These improvements will create a wider cleared road corridor with woodland vegetation set back further from the road surface than is currently present on both Triple A Road and CR 510. Additional aesthetic impacts will result from periods of increased heavy truck traffic in close proximity to existing trail networks, camps, and residential areas. Part of CR 550 may be upgraded if this route is implemented. The result would be increased truck traffic through Marquette, Negaunee, and Ishpeming.

5.70.B. CR 510-Red Road-Sleepy Hollow Route

Implementation of the CR 510-Red Road-Sleepy Hollow route would also require reconstruction of portions of Triple A Road, CR 510, Red Road, Sleepy Hollow Road and Wolf Lake Road. Reconstruction will include upgrading the existing roads to all-season road design standards and will require widening, straightening, and paving that will result in increased clearing on either side of the existing roads. At some locations the views from these roads will be more open and the closed forest canopy, where present, over the existing road right-of-way will be removed. Additional aesthetic impacts will result from increased heavy truck traffic in close proximity to existing trail networks, seasonal camps and residential dwellings that border Red Road, especially on the north shoreline of the Dead River Storage Basin, and along Wolf Lake Road. All municipal areas are avoided on this route.

5.70.C. CR 595 Route

Implementation of this proposed route consists of a combination of upgrades to existing county roads, unimproved roads, two-track trails, and construction of new road segments. Most of the existing roads and trails will need to be widened and/or straightened and paved to meet all-season design standards and accommodate heavy truck traffic. The impacts to the aesthetics and visual character of the existing roads includes removal of the existing tree canopy in certain areas to accommodate grading that will be needed to establish a safe

vertical and horizontal road alignment. Clearing will be needed to construct new road segments. Additional aesthetic impacts will result from increased heavy truck traffic in close proximity to existing trail networks, seasonal camps, and residential dwellings along Wolf Lake Road. All municipal areas are avoided on the CR 595 route.

5.71 Summary: Aesthetic and Visual Character

All of the proposed alternatives will have impacts to existing visual resources due to road improvements to meet all-season design standards and accommodate heavy truck traffic. These improvements may include one or more of the following: widening, straightening, paving, and/or clearing.

The CR 595 alternative will result in the greatest change to existing visual resources due to the creation of more open corridors, as well as the degree of road improvements that will be needed to upgrade existing unpaved roads and two-tracks. The CR 550 route will have the least amount of change to existing visual resources since most of the roads along this route are paved and improved, thus resulting in the least amount of change to visual character necessary to accommodate heavy truck traffic. The visual impacts resulting from the construction of the CR 510-Red Road-Sleepy Hollow Road route includes increased road widths and a wider cleared corridor. Implementation of the CR 510-Red Road-Sleepy Hollow route will result in increased truck traffic in close proximity to existing trail networks, seasonal camps and residential dwellings (especially along the north shore of the Dead River Storage Basin).

5.72 Affected Environment: Hazardous Waste Sites

Assessment of potential hazardous waste sites within the study area involved a review of State and Federal databases containing sites of environmental concern. These databases included National Priority List (NPL) sites, Resource Conservation and Recovery Act (RCRA) sites, Active Underground Storage Tank (UST) sites, Closed UST sites, Leaking UST (LUST) sites, Closed LUST sites, and listed sites in the State of Michigan Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act (NREPA), 1994 PA 451, as amended. An explanation of the types of sites of potential environmental concern that were investigated is provided.

Active Underground Storage Tank Facilities (UST) are facilities regulated under NREPA Part 211, (Underground Storage Tank Regulations) where there is at least one tank at a facility that is not closed in place or removed. There may be closed tanks or active non-regulated tanks (such as heating oil tanks) present at a facility. In contrast, closed USTs are those where all tanks that are regulated under NREPA Part 211 are closed. There may be non-regulated active tanks at the facility, such as heating oil tanks, or tanks that are smaller than the regulatory cutoff.

An open LUST Site is a location where a release has occurred from an underground storage tank system regulated under NREPA Part 213, Leaking Underground Storage Tanks, and where corrective actions have not been completed to meet the appropriate land use criteria. An open LUST site may have more than one confirmed release. Similarly, a closed LUST site is a location where a release has occurred from an underground storage tank system, and where corrective actions have been completed to meet the appropriate land use criteria.

The MDEQ may or may not have reviewed and concurred with the conclusion that the corrective action meets applicable environmental criteria.

A Part 201 Listed site is a location that has been evaluated and scored by the MDEQ using the Part 201 scoring model. The location is or includes a "facility" as defined by NREPA Part 201, Environmental Remediation, where there has been a release of a hazardous substance(s) in excess of the Part 201 residential criteria, and/or where corrective actions have not been completed under Part 201 to meet the applicable cleanup criteria for unrestricted residential use. The Part 201 List does not include all of the sites of contamination subject to regulation under Part 201 due the fact that owners are not required to inform the MDEQ about the sites and can pursue cleanup independently. Sites of environmental contamination that are not known to MDEQ are not on the list, nor are sites with releases that have resulted in low environmental impact.

Past and present activities at Resource Conservation and Recovery Act (RCRA) sites and Superfund sites have sometimes resulted in releases of hazardous waste and hazardous constituents into soil, ground water, surface water, sediments, and air; requiring the investigation and cleanup, or remediation, of these hazardous releases.

Query results derived from Federal and State environmental databases which include NPL, RCRA, UST, and LUST databases are shown on Figure 5-16. The majority of the identified contaminated sites are associated with commercial and industrial facilities along US-41. The majority of the RCRA, Closed LUST, Closed UST, and the deleted NPL sites will represent minimal risk of encounter as a result of road improvement activities. Active UST sites and Open LUST sites may pose the greatest potential for encountering contamination within existing road right-of-way. Further environmental investigations may be necessary to accurately evaluate the level of potential risk associated with contaminated sites identified along this corridor.

5.73 Environmental Consequences: Hazardous Waste Sites

Assessment of potential hazardous waste sites within the study area involved a review of State and Federal databases containing sites of environmental concern. These databases included NPL sites, RCRA sites, Active UST sites, Closed UST sites, LUST sites, Closed LUST sites, and NREPA listed sites. The search yielded a diverse group of facilities, and may require further evaluation on a case-by-case basis which may potentially include Phase I and Phase II level investigations. For example, one RCRA site is a Lowe's Home Improvement store located on US-41. This site is not anticipated to be affected by increased vehicular traffic along the corridor or proposed roadway improvements. In contrast, sites located immediately adjacent to the area of disturbance associated with construction, widening, clearing and grading of a route may require further investigation. Locations of specific sites relative to the routes are shown in Figure 5-16.

5.73.A. CR 550 Route

The section of the CR 550 route located within the City of Marquette may encounter contamination associated with 14 Open LUST sites, eight Closed LUST sites, three Part 201 sites, 14 Active UST sites, 17 Closed UST sites, 42 RCRA sites, and one deleted NPL site. These locations, with the exception of the RCRA sites, are shown on Figure 5-16.

According to the EPA, a deleted NPL site known as the Cliff/Dow Dump is located in a wooded area off CR 550 west of the Dead River (Figure 5-15). The Royal Oak Charcoal Company disposed of hazardous substances, primarily volatile organic compounds (VOCs) and Polycyclic Aromatic Hydrocarbons (PAHs) from 1954 to the mid-1960s (EPA 2010). This resulted in groundwater contamination. The contaminated fill was ultimately excavated and disposed in an off-site landfill. As a result of this remediation, the site was deleted from the National Priorities List on October 18, 2000.

5.73.B. CR 510-Red Road-Sleepy Hollow Route

No state or federally registered hazardous waste sites are expected to be encountered along this route.

5.73.C. CR 595 Route

No state or federally registered hazardous waste sites will be encountered along this route.

5.74 Summary: Hazardous Waste Sites

State and Federally listed hazardous waste sites are primarily located in the areas containing moderate to high population densities. The CR 550 route exhibits the highest number of potential encounters with State and Federally listed hazardous waste sites and may require further Phase I and Phase II level investigations of specific sites within the area of disturbance for road improvement or construction. The CR 595 and the CR 510-Red Road-Sleepy Hollow routes are unlikely to encounter any known State and Federally listed hazardous waste sites.

LEGEND
Study Area
Proposed CR 595
NPL Site
Active LUST
Closed LUST
Active UST
Closed UST
Part 201 Sites
Base data provided by:
Michigan Center for Geographic Information
Miles
Figure 5-16
Hazardous Waste Sites
Lake Superior
Lake Independence
CR 550
CR 510
Triple A Road
PROPOSED CR 595
Powell
Michigamme
Champion
Ishpeming
Marquette
Silver Lake
Dead River Basin
Negaunee
Ely
Wolf Lake Road
US-41
Sands

6.0 PUBLIC AGENCIES CONTACTED

Table 6-1 provides the public agencies have been contacted for information related to the preparation of this document and the primary reason(s) for the contact.

Table 6-1. Public Agencies Contacted During the CR 595 Project Planning

Agency Contacted	General Purpose of Contact
Department of Environmental Quality – Water Resources Division	Guidance and coordination for preparation of the application for MDEQ permit.
Department of Natural Resources – Fisheries and Wildlife Divisions	Guidance and coordination on fisheries and wildlife.
Department of Natural Resources - Forest Management Division	Trail 5 relocation and forest fire response.
Marquette County Emergency Management	Emergency response data and information for the study area.
Michigan State Police Negaunee Post	Benefits of CR 595 for State Police responsibilities.
Michigan State Police, Director's Office	Finding of Necessity for CR 595 (response letter in Appendix G)
Marquette County Sheriff	Benefits of CR 595 for County Sheriff responsibilities.
Bell Hospital EMS-Ishpeming	Response times to Eagle; importance of CR 595 route and having two access routes to Eagle Development Project.
Michigan Department of Transportation	Traffic information, road location and design approvals, primary county road designation.
Federal Highway Administration	National Functional Classification; approval of CR 595 as a major collector, rural route.
U.S. Fish & Wildlife Service	Consultation about using MiRAM as the wetland assessment methodology.
U.S. Environmental Protection Agency	Consultation about using MiRAM as the wetland assessment methodology. Contact through Senators Levin and Stabenow regarding the CR 595 project being considered to be a new application rather than an extension of the Woodland Road LLC application (response letters in Appendix I).

7.0 PUBLIC INPUT

Public input for the proposed CR 595 project was obtained during MCRC meetings and public hearings. Public hearings or meetings were held by MCRC on various occasions for the proposed CR 595 project, not including regular MCRC Board meetings where CR 595 may have been discussed. The dates of the public hearings and meetings are listed below. Copies of the minutes of these meetings are included in Appendix A.

October 7, 2010: A public hearing was held by MCRC at the Ishpeming Township Hall for the purpose of discussing MCRC becoming involved in the planning and permitting for a new primary county road to be known as CR 595.

October 18, 2010: A public hearing was held by MCRC at the Road Commission offices prior to adopting the resolution to proceed with the CR 595 project.

In August 2011, draft MDEQ wetland/stream permit application documents and route maps were provided for public inspection at a number of public offices in Marquette County. Four public information workshops were held on August 30 and 31, 2011 to receive public input and answer any questions on the proposed CR 595. The August 30, 2011 workshops were held at Lakeview Arena in Marquette; one in the afternoon and one in the evening. The August 31, 2011 workshops were held at the Ishpeming Township Hall; one in the afternoon and one in the evening. Approximately 100 people attended the workshops and 36 formal written comments were received by MCRC from the public. MCRC prepared written responses to all of the formal comments. The comments received and the responses are provided in Appendix D.

September 19, 2011: MCRC held its regular monthly meeting at Ishpeming Township Hall in order to accommodate the number of people expected to attend and offer comments on the CR 595 project, which was on the agenda for MCRC Board action. Public comments were received and the Board voted unanimously to make revisions to the project and submit the application for permit to the MDEQ as soon as possible.

8.0 WETLAND MITIGATION

Avoidance and minimization of wetland impacts has been a primary focus during the planning and design of the proposed CR 595 in order to provide a road alignment that will meet regulatory criteria for permit issuance. Design criteria modifications in the location of the road and the road design have been made for the sole purpose of avoiding or minimizing impacts to wetlands to the greatest extent possible. Higher quality wetlands (e.g. bogs and undisturbed riparian wetlands) have been avoided to the extent possible. Wetland impacts have been minimized to the extent possible by decreasing road fill depths (i.e. lowering road grade); increasing the side slopes of the road embankment fill in wetlands to reduce the base width of the road embankment (which requires installation of guardrail in these sections) and adjusting the horizontal alignment of the road in efforts to minimize wetland encroachment.

The primary method of wetland mitigation for the CR 595 project will be the creation of a minimum of 48.41 acres of new wetlands to offset the unavoidable impacts to wetlands that would result from the project. In order to provide some additional wetland mitigation as a contingency, 49.4 acres of wetland are proposed to be created.

Wetland impacts by watershed and wetland type are provided in Table 8-1. Although wetland restoration will be accomplished in several small areas (but cumulatively significant), as explained in the following paragraph, there will be no credit sought for this restoration activity. There is no wetland preservation proposed by the MCRC for the CR 595 project.

Impacted emergent wetland types will be replaced at a ratio of 1.5 to 1 (1.5 acres of emergent wetland created for each acre of emergent wetland impacted). Scrub-shrub wetlands are also to be replaced at a ratio of 1.5 to 1. Forested wetland areas will be replaced at a ratio of 2 to 1. These wetland replacement ratios are specified by Part 303 and the Administrative Rules.

Table 8-1. Wetland Impacts by Watershed and Wetland Type.

Watershed	Wetland Type/Impacts (acres)			Total Impact (acres)
	Emergent	Scrub-Shrub	Forested	
Escanaba River	2.19	0.40	5.28	7.86
Michigamme River	0	0	0.62	0.62
Dead River**	2.45	0.20	11.39	14.04
Yellow Dog River**	1.19	0	2.09	3.28
Falls*	0	0	0.01	0.01
Totals	**5.83**	**0.60**	**19.38**	**25.81**

*East Branch Salmon Trout River restoration
**Includes Snowmobile Trail 5 relocation

8.01 Wetland Restoration

Some wetlands along the CR 595 route that have been filled in the past, primarily for trail/road construction, will be restored to their original grade and planted with a native wetland seed mix. These are mostly areas on the existing road system that will be cut off by the proposed road alignment; therefore they will no longer be needed for landowner access. On the proposed CR 595 project there are 29 separate areas that total approximately 3.53 acres of wetland to be restored. As mentioned above, MCRC is not proposing any credits for wetland mitigation from these wetland restoration areas. Table 8-2 lists the areas where

historic wetland fill will be removed to restore these wetlands and restore hydrologic flow in the wetlands.

Table 8-2. Wetlands to be Restored as a Result of Construction of the Proposed CR 595.

Wetland Designation	Watershed	Wetland Type	Restoration Area Sq Ft	Restoration Area Acres	Sheet #
C3	Escanaba	FO/SS	23,390	0.54	6
A61	Escanaba	FO/SS	2,631	0.06	8
A60	Escanaba	FO/EM	18,693	0.43	8
A60	Escanaba	FO/EM	2,540	0.06	8
A58	Escanaba	FO/SS	30,270	0.69	9
A56	Escanaba	EM	3,622	0.08	10
A54	Escanaba	FO/SS	14,841	0.34	10
E23	Dead	FO/SS	1,076	0.02	18
E23	Michigamme	FO/SS	4,536	0.10	19
E17	Dead	FO/EM	1370	0.03	21
E13	Dead	FO	1,488	0.03	22
E9	Dead	FO/EM	2,266	0.05	23
E2	Dead	FO/SS	3,330	0.08	24
E2	Dead	FO/SS	1,985	0.05	24
E1	Dead	FO	3,733	0.09	24
A15	Dead	FO/SS	1,073	0.02	28
A16	Dead	FO/SS	1,538	0.04	28
A17	Dead	FO/SS	479	0.01	28
B40	Dead	EM/SS	5,857	0.13	29
B37	Dead	FO/EM	3,379	0.08	30
B12	Dead	EM	269	0.01	31
B3	Dead	FO/SS	1,359	0.03	32
B1	Dead	EM/SS	1,824	0.04	33
L6	Yellow Dog	FO	3,688	0.08	35
L2	Yellow Dog	FO/EM	6,211	0.14	36
L2	Yellow Dog	FO/EM	12,519	0.29	36
TOTALS			**153,967**	**3.53**	

8.02 Wetland Creation

The proposed CR 595 will unavoidably impact 25.81 acres of wetland, including 0.44 acre of isolated, non-contiguous wetlands, which are not regulated by Part 303 but have been included in the impact totals simply to avoid questions over the regulatory status of these wetlands. Also included in the 25.81 acres of impact is 0.35 acre of wetland impact for the Trail 5 snowmobile trail relocation and 0.01 acre of wetland impact for the East Branch Salmon Trout River stream mitigation project. The impacted wetlands likely provide ecosystem functions such as flood control by the hydrologic absorption of and storage capacity of the wetland, and wildlife habitat by providing breeding, nesting and feeding grounds and cover for many forms of wildlife.

Creation of a total of 49.4 acres of new wetland is proposed, which is one acre more than the minimum required acreage (48.41 acres) for wetland mitigation. Figure 8-1 shows the

locations of the five wetland mitigation sites; Table 8-3 provides a breakdown of the proposed created wetlands by watershed and wetland type totaling 49.4 acres.

Five wetland mitigation sites are located in three of the four watersheds involved in the proposed CR 595 project. Due to the landscape characteristics and resultant lack of suitable wetland mitigation sites in the Dead River watershed, a portion of the wetland mitigation for the Dead River watershed is proposed at the Yellow Dog River watershed wetland mitigation site, and another portion is proposed at the Escanaba River watershed site. Also, due to the amount of wetland impact in the Michigamme River watershed (0.62 acre), the wetland mitigation for those impacts is proposed in the Escanaba River watershed, relatively close to the wetland impact. It is anticipated that these wetland mitigation sites will replace the value and functions lost with the impacts to existing wetlands, by providing similar ecosystem types in similar positions in the regional landscape.

The wetland mitigation sites have been studied by A. Lindberg & Sons, Inc., CEC and KME to determine the sites' suitability for creating wetlands. Piezometers were installed in 2008 and 2010 to monitor groundwater tables at the locations of potential wetland mitigation sites. Soil borings have been advanced to determine soil characteristics. Surveys were conducted to obtain topographic data for site design and excavation volumes. As a result, the confidence level in the probability of success of the five wetland mitigation sites is high.

The proposed wetland mitigation design plans require that topsoil is salvaged from the project and used for final grade establishment in the created wetlands to decrease the chance of having non-native plant species introduced into the landscape. Any mulch used on the project must be certified weed-free mulch for the same purpose. All proposed wetlands will be seeded and planted with a native wetland flora seed mix.

8.02.A. Yellow Dog River Watershed

The Yellow Dog River mitigation site (Figure 8-2) is located in upland between two existing forested wetlands. Current vegetation is coniferous forest. Soils within the proposed wetland footprint are Paquin sand, 0-6% slopes and Paquin-Finch sands, 0-5% slopes. The topography of the site slopes gradually from southwest to northeast, with a significant drop-off at the northeast extent towards an existing wetland. Four piezometers were installed in 2008 with an additional 8 installed in 2010. Monitoring of these piezometers suggests that the excavation of 8 to 10 feet of soils will bring the finish grade into appropriate proximity with the groundwater table to support wetland. A total of 8.1 acres of wetland creation are proposed in this watershed, consisting of 3.2 acres of emergent wetland, 0.7 acre of scrub/shrub wetland and 4.2 acres of forested wetland. Of the 8.1-acre total, 2.4 acres of wetland mitigation is proposed to replace wetlands unavoidably impacted in the Dead River watershed.

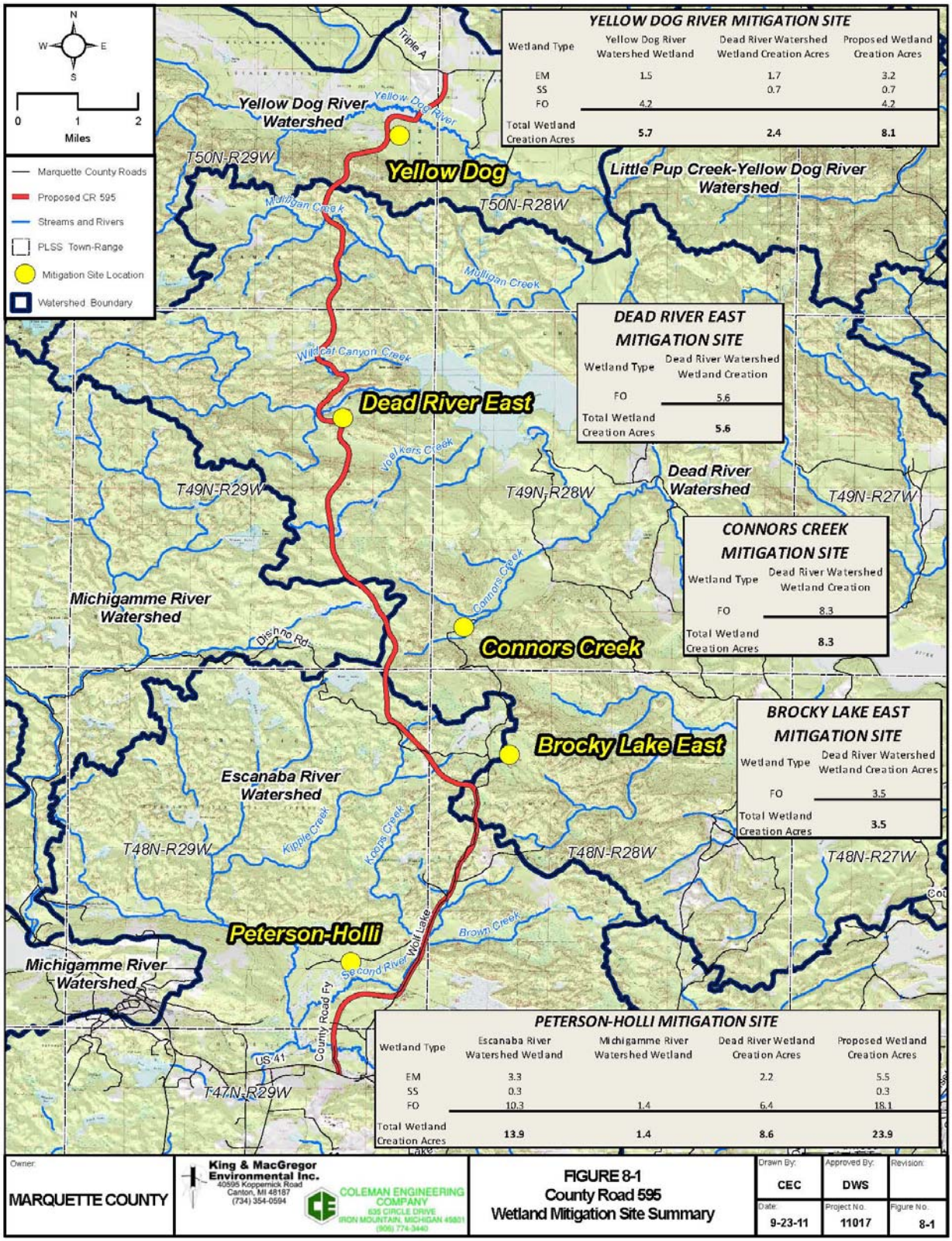

N
W
E
S
0
1
2
Miles
Marquette County Roads
Proposed CR 595
Streams and Rivers
PLSS Town-Range
Mitigation Site Location
Watershed Boundary
YELLOW DOG RIVER MITIGATION SITE
Wetland Type | Yellow Dog River Watershed Wetland | Dead River Watershed Wetland Creation Acres | Proposed Wetland Creation Acres
EM | 1.5 | 1.7 | 3.2
SS | | 0.7 | 0.7
FO | 4.2 | | 4.2
Total Wetland Creation Acres | 5.7 | 2.4 | 8.1
DEAD RIVER EAST MITIGATION SITE
Wetland Type | Dead River Watershed Wetland Creation
FO | 5.6
Total Wetland Creation Acres | 5.6
CONNORS CREEK MITIGATION SITE
Wetland Type | Dead River Watershed Wetland Creation
FO | 8.3
Total Wetland Creation Acres | 8.3
BROCKY LAKE EAST MITIGATION SITE
Wetland Type | Dead River Watershed Wetland Creation Acres
FO | 3.5
Total Wetland Creation Acres | 3.5
PETERSON-HOLLI MITIGATION SITE
Wetland Type | Escanaba River Watershed Wetland | Michigamme River Watershed Wetland | Dead River Wetland Creation Acres | Proposed Wetland Creation Acres
EM | 3.3 | | 2.2 | 5.5
SS | 0.3 | | | 0.3
FO | 10.3 | 1.4 | 6.4 | 18.1
Total Wetland Creation Acres | 13.9 | 1.4 | 8.6 | 23.9
Yellow Dog River Watershed
Yellow Dog
Little Pup Creek-Yellow Dog River Watershed
Dead River East
Dead River Watershed
Connors Creek
Brocky Lake East
Peterson-Holli
Michigamme River Watershed
Escanaba River Watershed
Triple A
Yellow Dog River
Mulligan Creek
Wildcat Canyon Creek
Voelkers Creek
Connors Creek
Dishno Rd
Kipple Creek
Koors Creek
Brown Creek
Wolf Lake
Second River
County Road Fy
US-41
T50N-R29W
T50N-R28W
T49N-R29W
T49N-R28W
T49N-R27W
T48N-R29W
T48N-R28W
T48N-R27W
T47N-R29W
Owner:
MARQUETTE COUNTY
King & MacGregor Environmental Inc.
40595 Koppernick Road
Canton, MI 48187
(734) 354-0594
COLEMAN ENGINEERING COMPANY
635 CIRCLE DRIVE
IRON MOUNTAIN, MICHIGAN 49801
(906) 774-3440
FIGURE 8-1
County Road 595
Wetland Mitigation Site Summary
Drawn By: CEC
Approved By: DWS
Revision:
Date: 9-23-11
Project No. 11017
Figure No. 8-1

Table 8-3. Proposed Created Wetlands for each Watershed and Wetland Type*

Mitigation Site	Watershed	Emergent (acres)	Scrub-Shrub (acres)	Forested (acres)	Total Wetland Created (acres)
Yellow Dog	Yellow Dog River (aka Falls)	1.5		1.2	5.7
Yellow Dog	For Dead River Watershed Impacts	1.7	0.7	0	2.4
Yellow Dog Site Total		3.2	0.7	4.2	**8.1**
Dead River East	Dead River	0	0	5.6	5.6
Brocky Lake East	Dead River	0	0	3.5	3.5
Connors Creek	Dead River	0	0	8.3	8.3
Dead River Sites Total		0	0	17.4	**17.4**
Peterson-Holli	Escanaba River Watershed	3.3	0.3	12.1	15.7
Peterson-Holli	For Dead River Watershed Impacts	2.2		4.75	6.95
Peterson-Holli	For Michigamme River Watershed Impacts	0	0	1.25	1.25
Escanaba River Site Total		5.5	0.3	18.1	**23.9**
Totals		**8.7**	**1.0**	**39.7**	**49.4**

*Includes mitigation for Trail 5 relocation and East Branch Salmon Trout River mitigation project.

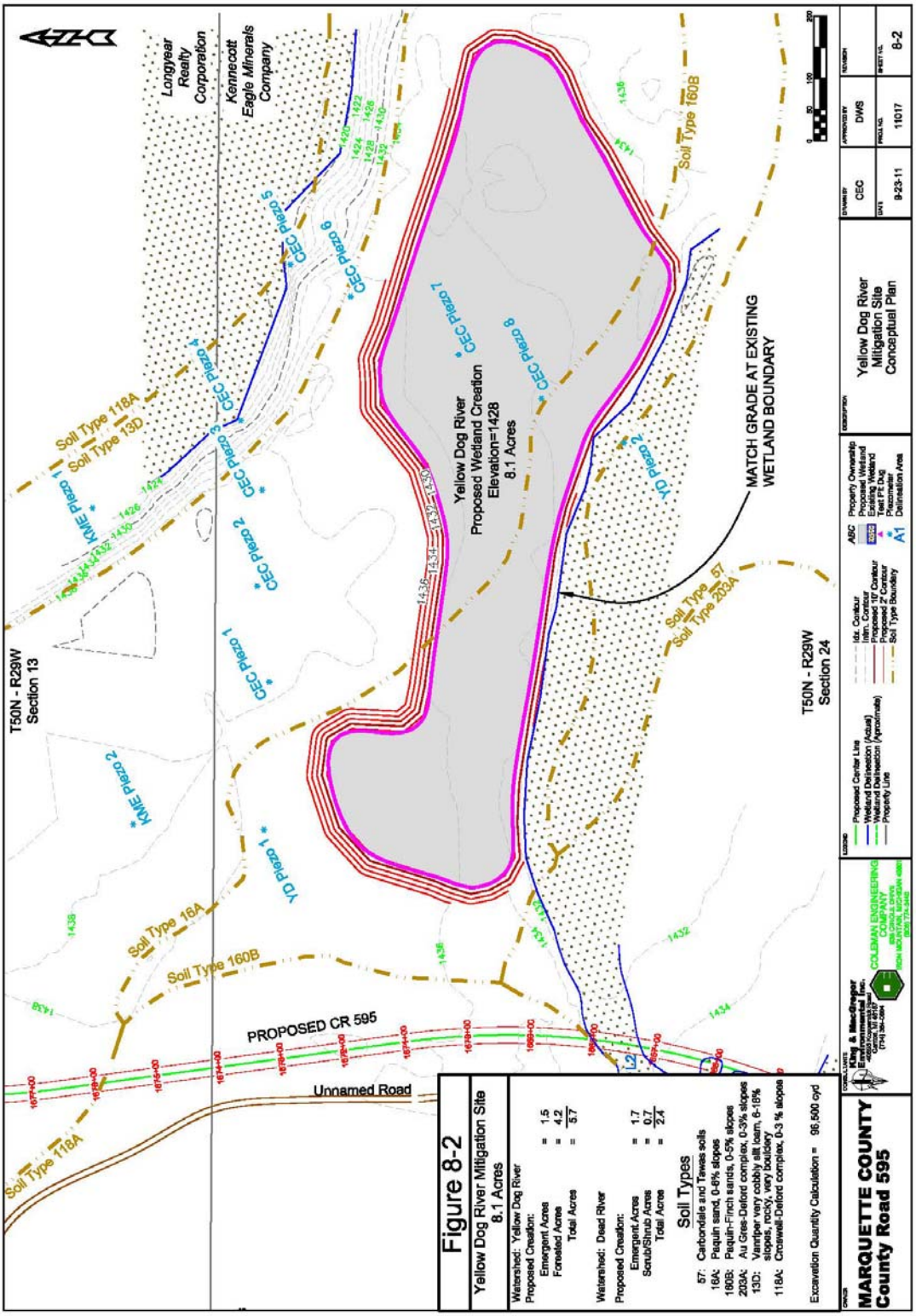


Figure 8-2
Yellow Dog River Mitigation Site
8.1 Acres
Watershed: Yellow Dog River
Proposed Creation:
Emergent Acres = 1.5
Forested Acres = 4.2
Total Acres = 5.7
Watershed: Dead River
Proposed Creation:
Emergent Acres = 1.7
Scrub/Shrub Acres = 0.7
Total Acres = 2.4
Soil Types
57: Carbondale and Tawas soils
16A: Pequin sand, 0-6% slopes
160B: Pequin-Finch sands, 0-5% slopes
203A: Au Gres-Deford complex, 0-3% slopes
13D: Vanriper very cobbly silt loam, 6-18% slopes, rocky, very bouldery
118A: Croswell-Deford complex, 0-3 % slopes
Excavation Quantity Calculation = 96,500 cyd
MARQUETTE COUNTY
County Road 595
Yellow Dog River
Mitigation Site
Conceptual Plan
Yellow Dog River
Proposed Wetland Creation
Elevation=1428
8.1 Acres
MATCH GRADE AT EXISTING
WETLAND BOUNDARY
PROPOSED CR 595
Unnamed Road
T50N - R29W
Section 13
T50N - R29W
Section 24
Soil Type 118A
Soil Type 13D
Soil Type 16A
Soil Type 160B
Soil Type 57
Soil Type 203A
Longyear Realty Corporation
Kennecott Eagle Minerals Company
CEC Plaza 1
CEC Plaza 2
CEC Plaza 3
CEC Plaza 4
CEC Plaza 5
CEC Plaza 6
CEC Plaza 7
CEC Plaza 8
YD Plaza 1
YD Plaza 2
KMX Plaza 1
KMX Plaza 2
Proposed Center Line
Wetland Delineation (Actual)
Wetland Delineation (Approximate)
Property Line
Idx. Contour
Intm. Contour
Proposed Wetland
Proposed 2' Contour
Soil Type Boundary
Property Ownership
Proposed Wetland
Existing Wetland
Test Pit Dug
Piezometer
Delineation Area
CEC
DWS
8-23-11
11017
8-2

8.02.B. Dead River Watershed

The Dead River East mitigation site (Figure 8-3) is located in upland immediately southwest of an existing forested wetland. Current vegetation is deciduous forest. Soils within the proposed wetland footprint are Keewaydin-Dishno complex, 6-18% slopes, including rock and boulder. The topography of the site slopes significantly from southwest to northeast. Six piezometers were installed in 2008. Monitoring of these piezometers suggests that the excavation of between 2 and 32 feet of soils will bring the finish grade into appropriate proximity with the groundwater table to support wetland. A total of 5.6 acres of forested wetland mitigation is proposed at the Dead River East location.

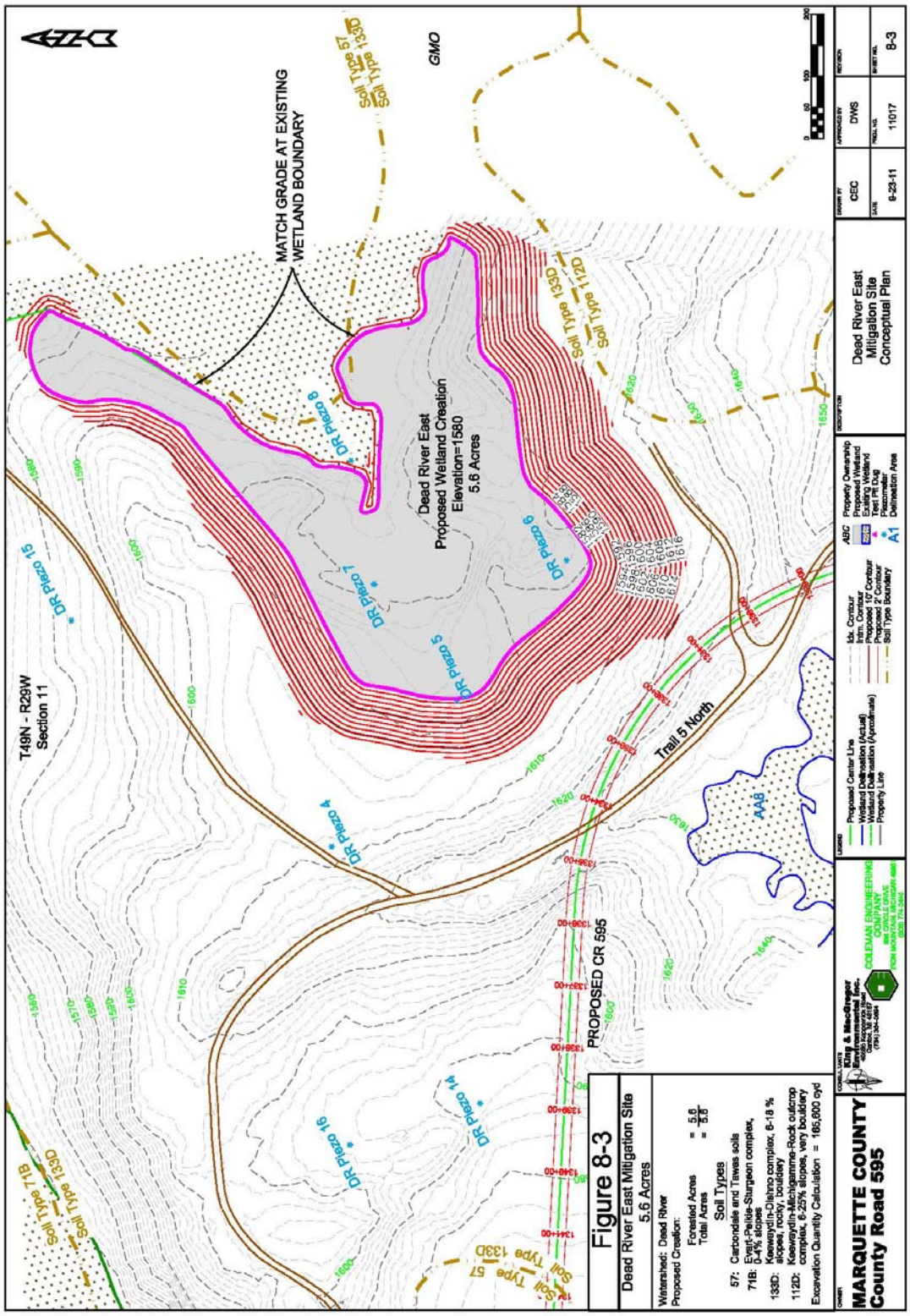
The Brocky Lake East mitigation site (Figure 8-4) is located in upland immediately north of an existing forested wetland. Current vegetation is young red pine plantation. Soils within the proposed wetland footprint are Keewaydin-Dishno complex, 1-6% slopes, including rock and boulder. The topography of the site slopes significantly from north to south. One piezometer was installed in the adjacent wetland in 2008. Monitoring of the piezometer suggests the excavation of between 2 and 8 feet of soils will bring the finish grade into appropriate proximity with the groundwater table to support wetland. A total of 3.5 acres of forested wetland mitigation is proposed at the Brocky Lake East location.

The Connors Creek mitigation site (Figure 8-5) is located in upland immediately west of an existing forested wetland. Current vegetation is young red pine plantation. Soils within the proposed wetland footprint are Keewaydin cobbly fine sandy loam with 1-6% slopes. The topography of the site slopes gradually from west to east. One piezometer was installed in 2008 and four piezometers were installed in 2010. Monitoring of these piezometers suggests that the excavation of between 5 and 13 feet of soils will bring the finish grade into appropriate proximity with the groundwater table to support wetland. A total of 8.3 acres of forested wetland mitigation is proposed at the Conners Creek location.

A total of 26.75 acres of wetland mitigation is required for the wetland impacts in the Dead River watershed. Of that total, 17.4 acres of wetland will be created within the Dead River watershed. Due to the lack of suitable sites within the Dead River watershed, 2.4 acres of wetland will be created in the Yellow Dog River watershed and 6.95 acres in the Escanaba River watershed wetland mitigation sites.

8.02.C.Escanaba River Watershed

The Peterson-Holli mitigation site (Figure 8-6) is located in upland and is adjacent to several small, state-unregulated wetlands, immediately north of an existing scrub/shrub and emergent wetland. Current vegetation is young red pine plantation. Soils within the proposed wetland footprint are Pence fine sandy loam on 0-6% slopes and Farquar gravelly sandy loam with 0-4% slopes. The topography of the site slopes gradually from north to south. Two piezometers were installed in 2008. Monitoring of these piezometers suggests that the excavation of between two feet and 10 feet of soils will bring the finish grade into appropriate proximity with the groundwater table to support wetland.


MATCH GRADE AT EXISTING WETLAND BOUNDARY
Soil Type 57
Soil Type 133D
GMO
Dead River East
Proposed Wetland Creation
Elevation=1580
5.6 Acres
DR Plazzo 8
DR Plazzo 7
DR Plazzo 6
DR Plazzo 5
DR Plazzo 4
DR Plazzo 3
DR Plazzo 2
DR Plazzo 1
Soil Type 112D
Soil Type 133D
T49N - R29W
Section 11
Trail 5 North
PROPOSED CR 595
AAB
Figure 8-3
Dead River East Mitigation Site
5.6 Acres
Watershed: Dead River
Proposed Creation:
Forested Acres = 5.6
Total Acres = 5.6
Soil Types
57: Carbondale and Tawas soils
718: Ewen-Pelkie-Sturgeon complex, 0-4% slopes
133D: Keweenaw-Dishno complex, 6-18 % slopes, rocky
112D: Keweenaw-Michigamme-Rock outcrop complex, 6-25% slopes, very bouldery
Excavation Quantity Calculation = 165,600 cyd
Property Ownership
Proposed Wetland
Existing Wetland
Forest Edge
Piezometer
Delineation Area
Idx. Contour
Intrm Contour
Proposed 10' Contour
Proposed 2' Contour
Soil Type Boundary
Proposed Center Line
Wetland Delineation (Actual)
Wetland Delineation (Approximate)
Property Line
Dead River East
Mitigation Site
Conceptual Plan
DESIGN BY: CEC
DATE: 9-23-11
APPROVED BY: DWS
PROJ. NO.: 11017
REVISION
SHEET NO.: 8-3
OWNER
MARQUETTE COUNTY
County Road 595
CIVIL/LAND
King & MacGregor
Environmental Inc.
COLEMAN ENGINEERING COMPANY
CIVIL & ENVIRONMENTAL

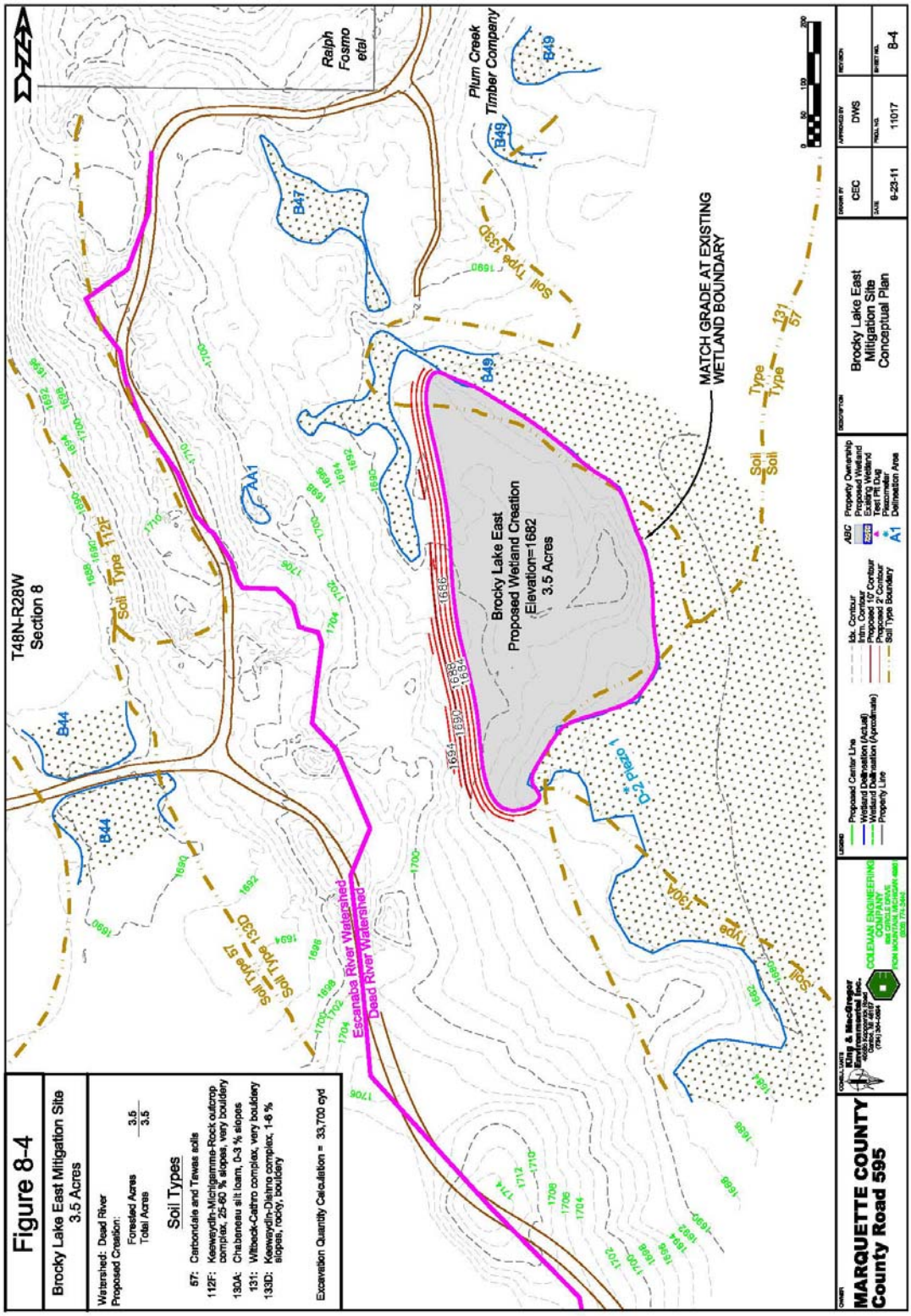


Figure 8-4
Brocky Lake East Mitigation Site
3.5 Acres
Watershed: Dead River
Proposed Creation:
Forested Acres 3.5
Total Acres 3.5
Soil Types
57: Carbondale and Tawas soils
112F: Keweywdin-Michigamme-Rock outcrop complex, 25-60 % slopes, very bouldery
130A: Chabeneau silt loam, 0-3 % slopes
131: Witbeck-Cathro complex, very bouldery
133D: Keweywdin-Dishno complex, 1-6 % slopes, rocky, bouldery
Excavation Quantity Calculation = 33,700 cyd
T48N-R28W
Section 8
Ralph Fosmo etal
Plum Creek Timber Company
Brocky Lake East
Proposed Wetland Creation
Elevation=1682
3.5 Acres
MATCH GRADE AT EXISTING WETLAND BOUNDARY
Escanaba River Watershed
Dead River Watershed
Soil Type 112F
Soil Type 57
Soil Type 133D
Soil Type 130A
Soil Type 131
Soil Type 57
B44
B47
B49
AA1
Piezo 2
MARQUETTE COUNTY
County Road 595
COLEMAN ENGINEERING COMPANY
Bing & MacGregor
Brocky Lake East
Mitigation Site
Conceptual Plan
CEC
DWS
9-23-11
11017
8-4

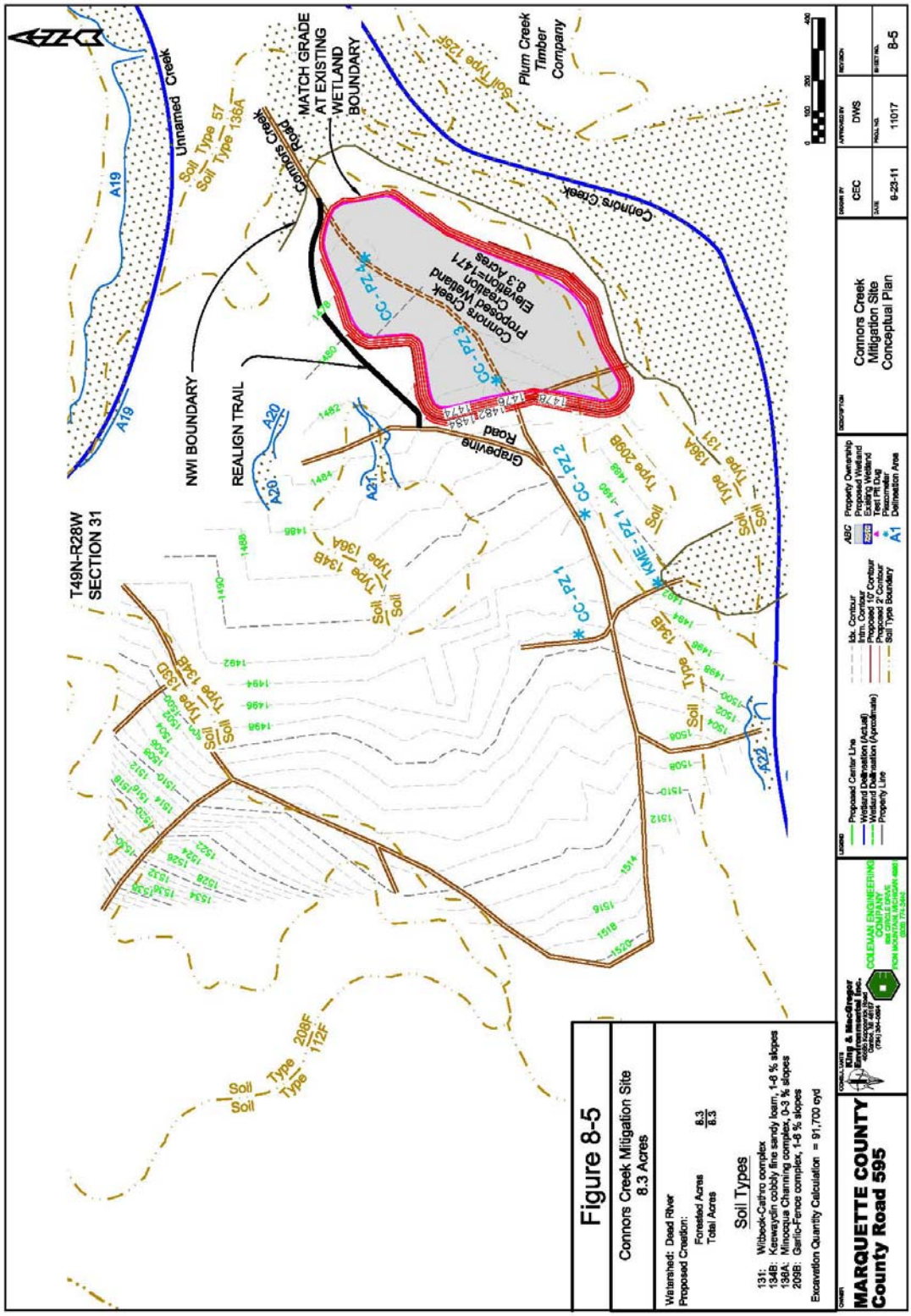


Figure 8-5
Connors Creek Mitigation Site
8.3 Acres
Watershed: Dead River
Proposed Creation:
Forested Acres 8.3
Total Acres 8.3
Soil Types
131: Witbeck-Cathro complex
134B: Kenwaysin cobbly fine sandy loam, 1-6 % slopes
136A: Minocqua Channing complex, 0-3 % slopes
209B: Garlic-Fence complex, 1-6 % slopes
Excavation Quantity Calculation = 91,700 cyd
MARQUETTE COUNTY
County Road 595
COLEMAN ENGINEERING COMPANY
Connors Creek Mitigation Site
Conceptual Plan
CEC
DWS
9-23-11
11017
8-5
Unnamed Creek
Connors Creek
Plum Creek Timber Company
MATCH GRADE AT EXISTING WETLAND BOUNDARY
NWI BOUNDARY
REALIGN TRAIL
Grapevine Road
T49N-R28W
SECTION 31
Connors Creek Proposed Wetland Elevation=1471 8.3 Acres
CC-PZ1
CC-PZ2
CC-PZ3
CC-PZ4
KMLE-PZ1
Soil Type 131
Soil Type 136A
Soil Type 134B
Soil Type 209B
Soil Type 112F
Soil Type 208F
Soil Type 125F
Soil Type 57
Soil Type 136A
A19
A20
A21
A22
Proposed Center Line
Wetland Delineation (Actual)
Wetland Delineation (Approximate)
Property Line
Idx. Contour
Intm. Contour
Proposed 5' Contour
Proposed 2' Contour
Soil Type Boundary
Property Ownership
Recorded Wetland
Existing Wetland
Test Pit Dug
Piezometer
Delineation Area

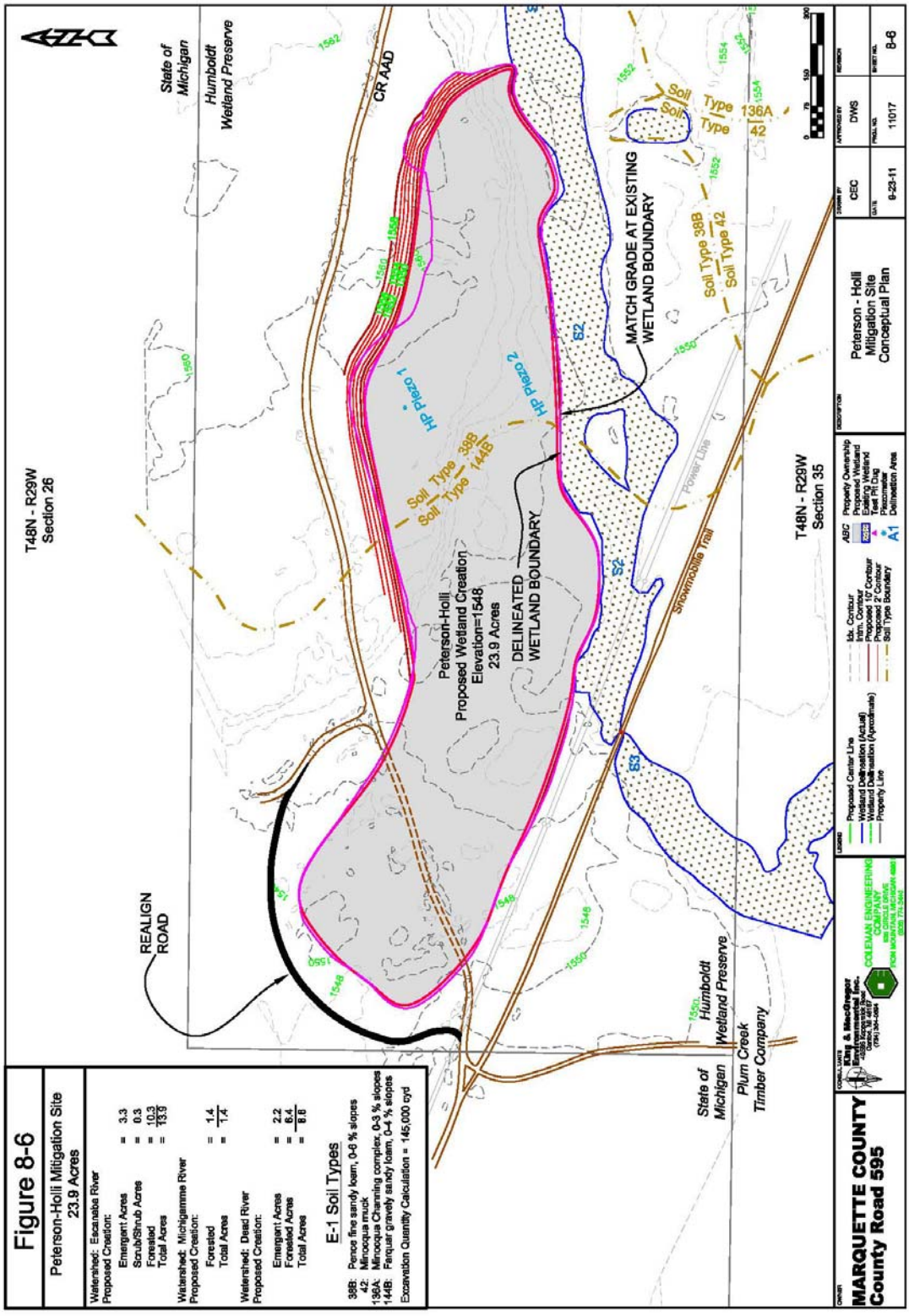


Figure 8-6
Peterson-Holli Mitigation Site
23.9 Acres
Watershed: Escanaba River
Proposed Creation:
Emergent Acres = 3.3
Scrub/Shrub Acres = 0.3
Forested = 10.3
Total Acres = 13.9
Watershed: Michigamme River
Proposed Creation:
Forested = 1.4
Total Acres = 1.4
Watershed: Dead River
Proposed Creation:
Emergent Acres = 2.2
Forested Acres = 6.4
Total Acres = 8.6
E-1 Soil Types
38B: Pence fine sandy loam, 0-6 % slopes
42: Minocqua muck
136A: Minocqua Channing complex, 0-3 % slopes
144B: Fenquar gravelly sandy loam, 0-4 % slopes
Excavation Quantity Calculation = 145,000 cyd
T48N - R29W
Section 26
T48N - R29W
Section 35
State of Michigan
Humboldt Wetland Preserve
CR AAD
REALIGN ROAD
Peterson-Holli
Proposed Wetland Creation
Elevation=1548
23.9 Acres
DELINEATED WETLAND BOUNDARY
MATCH GRADE AT EXISTING WETLAND BOUNDARY
HP piezo 1
HP piezo 2
Soil Type 38B
Soil Type 144B
Soil Type 42
Soil Type 136A
Soil Type 42
Snowmobile Trail
Power Line
Plum Creek Timber Company
Peterson - Holli
Mitigation Site
Conceptual Plan
CEC
DWS
6-23-11
11017
8-6
MARQUETTE COUNTY
County Road 595
King & MacGregor
COLEMAN ENGINEERING COMPANY

A total of 23.9 acres of wetland mitigation is proposed in the Escanaba River watershed, consisting of 5.5 acres of emergent wetland, 0.3 acre of scrub/shrub wetland and 18.1 acres of forested wetland. Of the 23.9 acres of mitigation in the Escanaba River watershed, 1.25 acres will be for wetland impacts in the Michigamme River watershed and 6.95 acres for impacts in the Dead River watershed.

8.03 Wetland Mitigation Monitoring Plan

A detailed wetland mitigation plan showing the location of vegetative sampling transects, sample plots, photograph points, monitoring wells, and staff gages will be provided to MDEQ following approval of the proposed mitigation site locations. MCRC will monitor the wetland mitigation sites for a minimum of five years following the year that construction is completed. The following protocols are proposed:

1. Measure surface water inundation and groundwater levels in each wetland mitigation site continuously during the growing season with remote data loggers. Hydrology parameters will be measured and data will be collected at sufficient sample points to accurately depict the water regime at each wetland type.

2. Vegetation will be evaluated in sample plots located along transects in each mitigation area between July 15 and August 31 in each monitoring year. The number of sample plots necessary within each wetland type shall be determined by use of a species-area curve or other approach approved by MDEQ. The minimum number of sample plots for each wetland type will be no fewer than five. Sample plots will be located on the sample transect at evenly spaced intervals or by another approach acceptable to MDEQ. If additional or alternative sample transects are needed to sufficiently evaluate each wetland type, they will be approved in advance in writing by MDEQ.

The herbaceous layer (i.e. all non-woody plants and woody plants less than 3.28 feet (one meter) in height) will be evaluated using a 3.28-foot by 3.28-foot (one square meter) sample plot. Shrub and tree species greater than 3.28 feet (one meter) in height will be sampled using a 30-foot radius sample plot. The data recorded for each herbaceous layer sample plot shall include a list of all living plant species, and an estimate of percent cover in 5 percent intervals for each species recorded, bare soil areas, and open water relative to the total area of the plot. The number and species of surviving, established, and free-to-grow trees and shrubs will be recorded for each 30-foot radius plot.

Plot data and a list of all the plant species identified in the plots and otherwise observed during monitoring will be provided. Data for each plant species must include common name, scientific name, wetland indicator category from the U.S. Fish and Wildlife Service's "National List of Plant Species That Occur in Wetlands" for Region 3, and whether the species is considered native according to the Michigan Floristic Quality Assessment (Michigan Department of Natural Resources, 2001). Nomenclature shall follow Voss (1972, 1985, and 1996) or Gleason and Cronquist (1991).

The location of sample transects and plots will be identified in the monitoring report on a plan view showing the location of wetland types. Sample transects will be permanently staked at a frequency sufficient to locate the transects in the field.

3. Any open water, bare soil, areas dominated by invasive non-native species, and areas without a predominance of wetland vegetation that are greater than 0.01 acre in size (436 square feet) will be delineated with GPS locations shown on the wetland mitigation plans.

4. Sightings or evidence of wading birds, songbirds, waterfowl, amphibians, reptiles, and other animal use (lodges, nests, tracks, scat, etc.) within the wetland noted during monitoring will be documented. The number, type, and date of the sightings will be provided.

5. Inspect the site during all monitoring visits for oil, grease, man-made debris, and all other contaminants and report any such findings.

6. Rate the water clarity in the mitigation wetland (e.g., poor, fair, good, excellent).

7. Provide annual photographic documentation of the development of the mitigation wetland during vegetation sampling from permanent photo stations located within the mitigation wetland. At a minimum, photograph stations shall be located at both ends of each transect. Photos must be labeled with the location, date photographed, and direction the photograph was taken.

8. Provide one-time photographic documentation during placement of at least six (6) inches of soil obtained from the A-horizon of an organic or loamy surface textured soil.

9. Provide the number and type of habitat structures placed and representative photographs of each structure type.

10. Provide a written summary of data from previous monitoring periods and include discussion of changes or trends based on all monitoring results including a calculation of the acres of each wetland type established.

11. Provide a written summary of any areas dominated by invasive, non-native species, and areas without a predominance of wetland vegetation that have been identified and provide potential corrective measures to bring such areas into compliance with the performance standards.

The monitoring report, which compiles and summarizes all data collected during the monitoring period, shall be submitted annually by MCRC. Monitoring reports shall cover the period of January 1 through December 31 and be submitted to MDEQ prior to January 31 of the following year.

Three printed and bound copies of the annual monitoring report and an electronic copy will be provided to MDEQ, Upper Peninsula District Office, Water Resources Division, and 420 Fifth Street, Gwinn, MI 49841.

8.04 Wetland Mitigation Site Performance Standards

If any of the mitigation wetlands do not meet the following performance standards by the end of the monitoring period, or are not satisfactorily progressing during the monitoring period, MCRC may be required by MDEQ to take corrective actions.

1. Construction has been completed in accordance with MDEQ-approved plans and specifications referenced in the permit.

2. By the end of the monitoring period the mitigation wetland will be characterized by the presence of water at a frequency and duration sufficient to support a predominance of wetland vegetation and the wetland types specified in the mitigation plans have been established.

3. A layer of high-quality soil from the A-horizon of an organic or loamy surface texture soil shall be placed over the entire created wetland area at a minimum thickness of 6 inches.

4. The mitigation wetland shall be free of oil, grease, debris, and all other contaminants.

5. A minimum of six wildlife habitat structures consisting of at least three types have been placed per acre of mitigation wetland. At least 50 percent of each structure shall extend above the normal water level. The types of acceptable wildlife habitat structures are as follows:

a. Tree stumps placed horizontally within the wetland. Stumps shall be a minimum of six feet long (log and root ball combined) and 12 inches in diameter.

b. Logs placed horizontally within the wetland. Acceptable logs shall be a minimum of 10 feet long and six inches in diameter.

c. Whole trees placed horizontally within the wetland. Acceptable whole trees shall have all of their fine structure left intact (i.e., not trimmed down to major branches for installation) and be a minimum of 20 feet long (tree and root ball) and a minimum of 12 inches in diameter at breast height (DBH).

d. Snags, which include whole trees left standing that are dead or dying, or live trees that will be flooded and die, or whole trees installed upright in the wetland. A variety of tree species should be used for the creation of snag habitat. Acceptable snags shall be a minimum of 20 feet tall (above the ground surface) and a minimum of 12 inches DBH. Snags should be grouped together so as to provide mutual functional support as nesting, feeding, and perching sites.

e. Sand mounds at least 18 inches in height and placed so that the sand mounds are surrounded by a minimum of 30 feet of water measuring at least 18 inches in depth. The sand mound shall have at least a 200 square foot area that is 18 inches above the projected high water level and located to receive maximum amounts of sunlight.

6. Mean percent cover of native wetland species in the herbaceous layer at the end of the monitoring period shall be not less than 80 percent for forested, scrub-shrub, and emergent wetlands.

The total percent cover of wetland species in each plot shall be averaged for plots measured in the same wetland type to obtain a mean percent cover value for each wetland type. Plots within identified extensive (i.e. areas greater than 0.01 acre in size) open water and submergent vegetation areas, bare soil areas, and areas without a predominance of wetland vegetation shall not be included in this average. Wetland species refers to species listed as Facultative and wetter (FAC, FAC+, FACW-, FACW, FACW+, and OBL) on the U.S. Fish and Wildlife Service's "National List of Plant Species That Occur in Wetlands" for Region 3.

Extensive (i.e. areas greater than 0.01 acre in size) open water and submergent vegetation areas having no emergent and/or floating vegetation shall not cumulatively exceed 20 percent of any of the mitigation wetlands. Extensive areas of bare soil shall not cumulatively exceed five percent of any of the mitigation wetlands.

7. The mitigation wetland supports a predominance of wetland vegetation in each vegetative layer (i.e. forested, scrub-shrub, and emergent) represented by a minimum of 15 native wetland species at the end of the monitoring period. The total number of native wetland plant species shall be determined by a sum of all species identified in sample plots of the same wetland type.

8. At end of the monitoring period, the mitigation wetland supports a minimum of:

a. 300 individual surviving, established, and free to grow trees per acre in the forested wetland that are classified as native wetland species and consisting of at least three different species.

b. 300 individual surviving, established, and free to grow shrubs per acre in the scrub-shrub wetland that are classified as native wetland species and consisting of at least four different species.

c. A minimum of eight (8) native emergent wetland species of grasses, sedges, or rushes.

9. The mean percent cover of invasive species including, but not limited to, *Phragmites australis* (common reed), *Lythrum salicaria* (purple loosestrife), and *Phalaris arundinacea* (reed canary grass) shall in combination be limited to no more than 10 percent within each wetland type. Invasive species shall not dominate the vegetation in any extensive area of a mitigation wetland (i.e. any area greater than 0.01 acre in size).

If the mean percent cover of invasive species is more than 10 percent within any wetland type or if there are extensive areas of the mitigation wetland in which an invasive species is one of the dominant plant species, MCRC shall submit an evaluation of the problem to the MDEQ. If MCRC determines that it is not feasible to reduce the cover of invasive species to meet the above performance standard MCRC must submit an assessment of the problem, a control plan, and the projected percent cover that can be achieved for review by MDEQ. Based on this information, MDEQ may approve an alternative invasive species standard. Any alternative invasive species standard must be approved in writing by MDEQ.

8.05 Wetland Mitigation Alternative Concept

Approximately 25 percent of Marquette County is wetland according to the MDEQ Final Wetland Inventory. Extensive areas of bedrock outcrops are also present in the county. Much of the remaining uplands in parts of the county are valuable for timber production, some of which are world-class hardwoods. Creating additional wetlands for wetland mitigation by converting uplands, while meeting statutory criteria, may not be a wise resource decision. For this purpose, an alternative mitigation concept is presented in this application for permit for consideration by the MDEQ at the appropriate time during the application review process.

It has been widely recognized by MDEQ, environmental groups, and others that some road locations and existing crossings of streams in northwest Marquette County need to be reconstructed to minimize the impacts to streams. For that reason, the stream mitigation for the CR 595 project is proposed. The relocation of a portion of Triple A Road, the removal of three existing culverts in the East Branch Salmon Trout River and restoration of the stream in those locations, and the construction of one clear-span bridge over the East Branch Salmon Trout River would be a significant stream mitigation project and is described in detail in the Section 9.4 of this report However, additional, similar stream restoration projects on CR 510 would likely result in more environmental benefit in terms of the natural resources improvements than creating wetlands.

The impacts of the existing CR 510 on portions of the Big Garlic River, Lost Creek, Big Pup Creek, and other streams along CR 510 are evident. The stream in some areas flows directly adjacent to the road, sometimes on both sides of the road. The existing culverts appear to be inadequately sized, and some are perched and therefore may be blocking fish movements within the stream. Stream bank erosion and sedimentation entering the stream are existing, on-going issues due to the location of the streams adjacent to the existing road, or due to inadequate culvert sizes.

Stream relocation and stream restoration projects are expensive. Replacing culverts with larger structures such as Conspan® bridges or box culverts is costly, but provides long-term solutions to stream habitat degradation. Relocation of roads in this area is complicated due to the steep topography and the presence of wetlands; however it does appear to be possible with certain construction cost limitations.

MCRC proposes to coordinate with MDEQ in regard to the feasibility of an additional and alternative mitigation concept for this project. The goal is to satisfy Part 303 and its the Administrative Rules for wetland mitigation while at the same time accomplishing stream restoration projects in the area that would have more substantial benefit to wetlands, streams, and existing upland resources.

MCRC proposes to determine the approximate cost of the wetland mitigation as proposed in this application for permit in coordination with MDEQ, including land costs, construction costs, planting costs, and monitoring costs. Any reduction in costs associated with a reduced wetland creation requirement would then be used as the budget for the stream restoration project(s) in lieu of wetland creation, which could be prioritized by MDEQ. The budget would include engineering and environmental costs. MCRC would then proceed with preliminary design of the project(s) starting with the highest priority project. Preliminary plans and estimated costs could be reviewed by MDEQ and decisions made on plan revisions and authorization to proceed with an application for permit for the stream restoration. If permits can be issued by MDEQ, then final stream restoration construction plans can be completed and the project(s) bid for construction.

Such stream restoration project(s) would result in tangible benefits to the natural resources of Marquette County. Improvement of stream habitat and quality for fish and other aquatic organisms could be much more beneficial than creating mitigation wetlands in an already wetland-rich landscape. Otherwise, such stream improvement project(s) may not otherwise be accomplished for many years.

9.0 STREAM MITIGATION

Stream mitigation for the proposed CR 595 project is multi-faceted and entails studies conducted during the design phase of the project, implementation of special design criteria, and stream mitigation projects that will be implemented during construction. The stream mitigation plan includes the following four components:

- The implementation of aspects of Stream Simulation Methodology for stream crossing design;
- The proper replacement of inadequately sized existing culverts or bridges;
- The design of the proposed road to direct runoff to uplands and wetlands and not directly into streams; and,
- A significant stream restoration project where the East Branch Salmon Trout River crosses Triple A Road that is proposed as mitigation for unavoidable stream impacts on the proposed CR 595.

The combination of the four components of stream mitigation will result in a significant improvement to the stream environments in the study area.

The CR 595 project has 22 stream crossings regulated by Part 301; 6 clear-span bridges and 16 concrete box culverts. The list of 6 clear-span bridges includes the 2 Conspan® bridges that span the streams. In addition, the East Branch Salmon Trout River stream mitigation project on Triple A Road will be a clear-span bridge and is included on the list of stream crossings for this project. Table 9-1 lists the stream crossing structures in the proposed CR 595 project.

Table 9-1. Stream Crossings on the CR 595 Project.

Crossing Number	Stream (culvert identification)	Station	Plan Page #	Proposed Structure	New (N) or Replacement (R) Structure
1	Middle Branch Escanaba River	122+75	1	60’ Span Bridge	N
2	Second River	261+00	6	58’ Span Bridge	R
3	Trembath Lake Outlet (E6)	311+91	8	12’ Span x 5’ Rise Box Culvert	R
4	Unnamed (E99)	426+47	12	6’ Span x 4’ Rise Box Culvert	N
5	Kipple Creek (E102)	453+07	12	12’ Span x 6’ Rise Box Culvert	N
6	Unnamed Tributary to Kipple Creek (E105)	491+08	14	6’ Span x 4’ Rise Box Culvert	N
7	Unnamed Tributary to Kipple Creek (E109)	517+10	15	6’ Span x 4’ Rise Box Culvert	N
8	Unnamed Tributary to Dishno Creek (M1)	1130+96	18	6’ Span x 4’ Rise Box Culvert	R
9	Unnamed Tributary to Voelkers Creek (D28)	1219+67	21	6’ Span x 4’ Rise Box Culvert	N
10	Voelkers Creek (D29)	1225+61	21	10’ Span x 5’ Rise Box Culvert	R
11	Dead River	1352+75	25	24’ Span x 10’ Rise Conspan® Bridge	R
12	Wildcat Canyon Creek (D44)	1404+15	27	7’ Span x 5’ Rise Box Culvert	R
13	Wildcat Canyon Creek (D46)	1418+55	28	6’ Span x 6’ Rise Box Culvert	R
14	Tributary to Wildcat Canyon Creek (D47)	1423+19	28	6’ Span x 4’ Rise Box Culvert	R
15	Wildcat Canyon Creek (D48)	1430+13	28	8’ Span x 6’ Rise Box Culvert	R
16	Unnamed Tributary to Mulligan Creek (D57)	1506+70	31	10’ Span x 6’ Rise Box Culvert	R
17	Unnamed Tributary to Mulligan Creek (D59)	1513+27	31	6’ Span x 4’ Rise Box Culvert	R
18	Unnamed Tributary to Mulligan Creek (D60)	1522+93	31	5’ Span x 3’ Rise Box Culvert	R
19	Unnamed Tributary to Mulligan Creek (D61)	1527+21	31	4’ Span x 3’ Rise Box Culvert	R
20	Unnamed Tributary to Mulligan Creek (D64)	1557+00	32	4’ Span x 3’ Rise Box Culvert	N
21	Mulligan Creek	1565+25	33	36’ Span x 11’ Rise Conspan® Bridge	N
22	Yellow Dog River	1712+00	38	55’ Span Bridge	R
23	East Branch Salmon Trout River	30+00	SM6	65’ Span Bridge	R

As recommended by MDNR fisheries biologists in comments submitted on January 19, 2010 for the Woodland Road project, the project design team has implemented the following BMPs from the U.S. Department of Agriculture 2008 Stream Simulation Working Group for the CR 595 project:

- Roadside ditches will not discharge directly to streams. Stormwater runoff will be directed to a vegetated buffer area or other discharge location, both during and after construction.

- All disturbed slopes will be stabilized to minimize sediment production and silt fence will be installed to contain any soil erosion until maintenance can be performed.

- Chronic disturbance of road fill will be avoided during road maintenance to maintain stable road embankments and ditches.

- Road maintenance will include re-vegetating or replacement of rip rap as needed to maintain stable slopes and ditches.

- Road drainage is directed away from the road slope whenever possible and cross-road drainage culverts are proposed to maintain existing stormwater runoff patterns to the extent possible.

- The entire proposed road will be paved, which will substantially minimize erosion and sediment transport into streams. Other measures such as diversion channels, downspouts, outfalls, curbing, and vertical road alignments to avoid low points and subsequent discharge being at stream crossings are also proposed to keep road runoff from directly entering streams.

9.01 Stream Simulation Methodology

The first component of stream mitigation for the proposed CR 595 is the assessment of each regulated crossing using aspects of Stream Simulation Methodology that is being adopted by MDEQ and MDNR in the permitting process. The Stream Simulation Methodology seeks to maintain ecosystem processes at stream crossings by maintaining or creating an unfragmented stream bottom and bank edge habitat through the stream crossing bridge or culvert. This methodology has not been widely implemented in Michigan, especially for transportation projects, and the application of the methodology on the CR 595 project will be valuable experience for MDEQ, MDNR, and the MCRC and their consultants.

Two KME personnel that have training in natural stream channel design conducted field surveys for each of the stream crossings on the proposed CR 595. CEC surveyors worked with KME in the field to conduct the surveys to gather the specific elevations and other survey data needed for the Stream Simulation process. Once field data were gathered, KME worked closely with CEC engineers to design each stream crossing to ensure compliance with the Stream Simulation Methodology. The report summarizing the data gathered for the CR 595 stream crossings using aspects of Stream Simulation Methodology is provided in Appendix L. Data such as bankfull width of the streams at proposed crossings, streambed slope, and location of riffles are provided on the stream crossing detail drawings in this application for permit.

The implementation of aspects of Stream Simulation Methodology will ensure that each of the 22 stream crossings and the East Branch Salmon Trout River stream restoration project proposed will have minimal long-term impact on the stream and near-stream habitat and, as such, is stream mitigation that is implemented in the design and construction phases of the project.

9.02 Replacement of Improperly Sized or Installed Stream Crossing Structures

The second step in the stream mitigation plan is the proper replacement of inadequately sized existing culverts or bridges. Of the 22 regulated stream crossings in the CR 595 project, 15 are existing stream crossings and seven will be new crossing locations. Of those 15 existing crossings, all of them are considered to be inadequately sized or are having degrading effects on the stream habitat. Table 9-1 above shows the stream crossing structures that will be replaced as part of the CR 595 project. In addition, as explained in section 9.4, the East Branch Salmon Trout River stream mitigation project will result in the replacement of three existing culverts with a new clear-span bridge and the restoration of the stream where the three existing culverts are to be removed.

The removal of the 15 existing stream crossing structures and replacing them with bridges or box culverts that have been properly designed using aspects of Stream Simulation Methodology will substantially improve the stream habitat and wildlife movement along the stream corridors. A concerted effort was made during the planning and design of the proposed CR 595 to locate the proposed road to cross streams at existing locations in order to 1) minimize the disruption to stream/wetland corridors and, 2) to remove existing inadequately sized or improperly installed bridges and culverts as an important component of stream mitigation.

9.03 Direct Road Runoff Away From Streams

A prime design requirement that is a form of stream mitigation is to direct stormwater runoff from the proposed CR 595 into uplands, or in some cases wetlands, to avoid runoff outlets directly into streams. Bridges do not have downspouts from the deck into streams and the bridge elevations direct water away from the stream. Curbs are proposed on bridges and culverts where necessary to direct runoff away from the stream to appropriate discharge locations.

A related practice to protect streams will be to implement every reasonable measure during construction to avoid introduction of sediment into streams. This will be accomplished with the deployment of Best Management Practices for soil erosion control and proper maintenance of those practices until each site is permanently stabilized.

9.04 Stream Mitigation Project

The fourth component of the stream mitigation plan is the relocation of a portion of Triple A Road and the removal and restoration of three existing culvert crossings on the East Branch Salmon Trout River. The road relocation will reduce the number of stream crossings over the East Branch Salmon Trout River on Triple A Road from three to one. The proposed new stream crossing is a 65-foot span box beam bridge that will span the bankfull width of the East Branch Salmon Trout River and will not disturb the natural stream bottom or banks. The plans for the stream restoration project are included in the plan and profile drawings.

The three existing 36-inch diameter culverts that pass the East Branch Salmon Trout River under Triple A Road will be removed upon completion of the road relocation and the portion of the existing road embankment that may contribute to the degradation of the stream will be removed. The streambed will be restored using natural stream channel design to ensure the long-term stability of the stream in the restored sections. The overbank areas adjacent to the stream will also be graded to naturalize the stream corridor and restore a proper floodplain adjacent to the stream. Portions of the existing Triple A Road right-of-way that are not necessary for landowner access will be abandoned and reverted to the appropriate landowners.

This stream restoration project is a significant undertaking. The project will rectify a situation that has had negative impacts on the East Branch Salmon Trout River for many years and will create a more reliable secondary road access to the Yellow Dog Plains.

The East Branch Salmon Trout River stream mitigation plans are provided in Appendix H.

10.0 REGULATORY ANALYSIS

This section provides an analysis of the criteria and standards from NREPA (1994 PA 451) Part 301 (Inland Lakes and Streams), Part 303 (Wetland Protection), and the Administrative Rules promulgated under these statutes and the compliance of the proposed project with NREPA.

10.01 Analysis of Compliance with Part 301: Inland Lakes and Streams

The following section of Part 301 provides the criteria that must be met in order for MDEQ to issue a permit under this part.

> ***324.30106 Prerequisite to issuance of permit; specification in permit.***
>
> *The department shall issue a permit if it finds that the structure or project will not adversely affect the public trust or riparian rights. In passing upon an application, the department shall consider the possible effects of the proposed action upon the inland lake or stream and upon waters from which or into which its waters flow and the uses of all such waters, including uses for recreation, fish and wildlife, aesthetics, local government, agriculture, commerce, and industry. The department shall not grant a permit if the proposed project or structure will unlawfully impair or destroy any of the waters or other natural resources of the state. This part does not modify the rights and responsibilities of any riparian owner to the use of his or her riparian water. A permit shall specify that a project completed in accordance with this part shall not cause unlawful pollution as defined by part 31.*

The key permit issuance criteria in 30106 are:

- The department shall issue a permit if it finds that the project will not adversely affect the public trust or riparian rights;
- The department shall consider the possible effects of the proposed action upon the inland lake or stream and upon waters from which or into which its waters flow and the uses of all such waters, including uses for recreation, fish and wildlife, aesthetics, local government, agriculture, commerce, and industry; and,
- The department shall not grant a permit if the proposed project or structure will unlawfully impair or destroy any of the waters or other natural resources of the state.

Criterion: The department shall issue a permit if it finds that the project will not adversely affect the public trust or riparian rights.

Response: In Michigan the concept of the "public trust" is derived from a common law doctrine applicable to "navigable" waters within the State. The doctrine has its origins in the Northwest Ordinance of 1787, which declared the navigable rivers of the territory to be public highways for travel. Upon statehood, Michigan was given ownership of the Great Lakes and of the navigable waters, all subject to the right of navigation.

Early on in Michigan's history conflicts developed between loggers and land owners over who had the right to use streams to float logs to market. The Michigan Supreme Court developed a log flotation test which relies upon use or capability of use for commercial logging as the basis for the test for navigability. The commercial logging test determines those waters impressed with the public trust since the public trust applies to navigable

waters. The common law log flotation test continues to be the law today. In practice, determining which waters are navigable and impressed with the public trust on small isolated streams is often difficult. Later case law expanded the public trust to include the right to hunt and fish and, more recently, the right to walk Great Lakes beaches lakeward of the ordinary high water mark.

It is clear some of the streams to be crossed by the CR 595 route are navigable. Some of the smaller streams are more difficult to determine navigability. There are some streams that are proposed to be crossed by CR 595 that are clearly too small to meet the test of navigability: those are private streams with no public rights of use. The purpose of this application for permit is not to determine which streams are navigable and which are not. This application for permit seeks to build a road that involves stream crossings, some of which cross streams impressed with the public trust. In all cases this application for permit treats streams as though they are public and seeks to avoid any interference with potential public use.

The Rules under Part 301, MCL 324.30101, *et seq*., more broadly define the public trust than does the common law. Specifically:

> R281.811
>
> Rule 1. (1)(g) "Public trust" means all of the following:
> (i). The paramount right of the public to navigate and fish in all inland lakes and streams that are navigable.
> (ii). The perpetual duty of the state to preserve and protect the public's right to navigate and fish in all inland lakes and streams that are navigable.
> (iii). The paramount concern of the public and the protection of the air, water, and other natural resources of this state against pollution, impairment, and destruction.
> (iv). The duty of the state to protect the air, water, and other natural resources of this state against pollution, impairment, or destruction.

Applying even these broader "public trust" standards to the construction of CR 595 does not present an obstacle to issuing the permit. The public's right to fish and navigate navigable streams will not be impaired. The road will improve access to many streams allowing the public to more easily enjoy the opportunity to fish the streams. The road design will not interfere with stream navigation. And it will, in some instances, replace inadequate culverts or bridges with larger structures allowing for the free flow of waters. Larger streams will be crossed with clear-span bridges that will not interfere with stream use and will provide wildlife passage.

However, some streams within the project area are not navigable or public. This application for permit has treated all streams as though they are public and designed to protect existing and future public uses. Care has been used in the design of road crossings to protect stream flow and control storm water runoff from the roads to avoid direct discharge into streams. The design has been created to minimize impacts on the natural resources of the area. The new and replaced stream crossings will not pollute or impair the waters they cross and the riparian rights of the property owners will be protected.

For the reasons stated above, the MCRC believes that this criterion of Part 301 is met.

Criterion: The department shall consider the possible effects of the proposed action upon the inland lake or stream and upon waters from which or into which its waters flow and the uses of all such waters, including uses for recreation, fish and wildlife, aesthetics, local government, agriculture, commerce, and industry.

Response: As a result of the planning and design of the project using aspects of Stream Simulation Methodology, the placement of the regulated stream crossing structures will have minimal effect on the flow, quality, or use of the streams involved. As such, the use of these waters for recreation will not be affected. The impacts on fish and wildlife that utilize the streams will be negligible due to the clear-span structures, maintenance of normal flows, and prevention of sediment from entering the streams. Stream mitigation will be implemented to compensate for unavoidable stream impacts that may result from the project. Impacts on the four watersheds involved in the project have been shown to be very minimal.

Aesthetics may be affected depending on the particular stream crossing location, but aesthetics is a very subjective criterion and deemed to not be a major concern. Local government will not be negatively affected by the proposed road and will, in fact, receive significant positive effects from increased tax revenues that will be a direct result of the construction of the proposed CR 595. In addition, township citizens will gain better access to both private lands and public lands. The positive implications of CR 595 on public safety by reducing heavy truck traffic in urbanized areas of Marquette County are significant to the local governments as well as the greatly improved access for emergency services that will provide for the health, safety, and welfare of the public.

Agriculture (i.e. forest management), commerce (i.e. employment and services needed for the economic development in northwest Marquette County), and industry (i.e. mining and aggregate production) will all be positively affected by the proposed project, of which the stream crossings are an integral and essential part.

The preceding explanation clearly demonstrates that the possible effects of the proposed action (i.e. the placement of stream crossing structures) upon the streams or waters into which they flow are minimal.

For the reasons stated above, the MCRC believes that this criterion of Part 301 is met.

Criterion: The department shall not grant a permit if the proposed project or structure will unlawfully impair or destroy any of the waters or other natural resources of the state.

Response: The proposed stream crossing structures will be constructed according to accepted road design standards and will comply with the requirements of Part 301 and the Administrative Rules for Part 301 and are therefore lawful. In fact, the implementation of aspects of Stream Simulation Methodology for the first time in Michigan on a large project ensures that “waters or other natural resources of the state” will not be “impaired or destroyed”. Also 15 of the 22 stream crossings will involve replacing existing structures, many of which are inadequately sized and will be improved by the placement of new structures.

It must also be emphasized that the 22 stream crossing structures will be box-beam bridges, Conspan® bridges, or concrete box culverts, all of which are sized larger than what the project engineers have determined would typically be necessary for passing the expected

stream flow. Upsizing of all structures has been done to additionally provide for wildlife passage and bankfull stream width accommodated within the new structures in accordance with aspects of Stream Simulation Methodology. There are no corrugated metal pipe culverts proposed for regulated streams on the CR 595 project

For the reasons stated above, the MCRC believes that this criterion of Part 301 is met.

The Administrative Rules promulgated for Part 301 provide additional regulatory criteria that must be met in order to receive a permit for the proposed project. The applicable section of the Administrative Rules is R281.814 and is shown below.

> ***R 281.814 Environmental assessment.***
> *Rule 4. In each application for a permit, all existing and potential adverse environmental effects shall be determined and the department shall not issue a permit unless the department determines both of the following:*
> *(a) That the adverse impacts to the public trust, riparian rights, and the environment will be minimal.*
> *(b) That a feasible and prudent alternative is not available.*

The findings of Rule 4 for the proposed project are presented in Table 10-1.

Table 10-1. Existing and Potential Adverse Environmental Effects and Findings from R281.814 for the Stream Crossings in the Proposed CR 595 Project.

Existing and Potential Adverse Environmental Effect	Existing Effect	Potential Effect
Adverse effects to the public trust	Although there may be some adverse effects to the public trust with the existing stream crossings, those effects are minimal.	Some of the streams to be crossed by the proposed CR 595 are navigable and impressed with the public trust. However, all streams to be crossed by the proposed road have been designed to have minimal effect on the public trust as described in section 3.2 of this document.
Adverse impacts to riparian rights	Although there may be some adverse effects to riparian rights associated with the existing stream crossings, those effects are minimal.	The proposed stream crossings will be on MCRC right-of-way but most will be adjacent to private property. The landowners enjoy riparian rights on these streams as provided by law. The proposed stream crossings will not negatively impact riparian rights because the structures have been designed and will be installed to provide more than adequate waterway area through the structures for the streams involved and will ensure there are no negative impacts on riparian rights.
Adverse impacts to the environment	The various potential environmental impacts for the CR 595 project are explained in the following parts of this table.	
Altered stream flow regime causing erosion	Some existing stream crossing structures are causing negative impacts on stream resources, including erosion, perched culverts that impede fish passage, and increased flow velocities due to inadequately sized culverts.	Proposed structures have been designed based on hydraulic calculations to ensure there is no alteration of the flow in the stream that could cause erosive velocities. Implementation of aspects of Stream Simulation Methodology will help to ensure that the proper stream environment will be present through the structures.
Stream sedimentation	Presently erosion into streams at the existing crossings is evident. Runoff is not directed away from streams but is naturally directed to the low point of the existing roads that is usually at streams.	Road design has taken into account the runoff from the proposed road and manages the runoff and suspended sediment to keep it from directly entering streams. Stormwater outfalls direct road runoff into areas away from streams. Curbing is proposed on bridges and culverts where needed to direct runoff off the bridge/culvert to outfalls or downspouts where the runoff is directed away from the streams.
Water quality degradation	Existing water quality degradation from the existing roads is primarily from sedimentation to streams. Traffic levels are very low on existing roads but the potential exists for a vehicle accident that could cause the release of hazardous materials to streams or wetlands.	Other than sediment, the other potential impacts to water quality can be caused by road salt and pollutants deposited on the roadway by vehicles. The measures implemented to minimize runoff from directly entering streams will alleviate any impacts from road salt and vehicle pollutant runoff. Future effects on water quality at the stream crossings on the proposed road would be from a vehicle accident that caused a spill of hazardous material into a stream. Expected quick response from emergency personnel would serve to minimize the effects of such an incident, but providing defensive and safe driver training and adherence to a spill prevention plan would also be a preventative factor.

Table 10-1 (continued). Existing and Potential Adverse Environmental Effects and Findings from R281.814 for the Stream Crossings in the Proposed CR 595 Project.

Existing and Potential Adverse Environmental Effect	Existing Effect	Potential Effect
Raising stream water temperatures	A primary factor in raising water temperatures is sedimentation; i.e. turbidity darkens the water and absorbs solar energy, thus warming the water. There have been no indications in stream surveys conducted for the road assessment that raising water temperatures is an issue. Beaver impoundments raise stream water temperatures and there are numerous areas where beaver have created impoundments that may have a negative impact on stream water temperatures.	The proposed CR 595 project will not cause turbidity in the streams and will not impound water; thus there is no reason to believe that the project will cause any increase in stream water temperatures.
Impacts to brook trout	Brook trout were not found in most streams in the stream survey. Brook trout in the Yellow Dog River were determined to be fish that were recently planted by the MDNR.	As explained above, the CR 595 project will not negatively affect water quality, stream habitat, stream flow, and will not raise stream water temperatures, all of which are critical to brook trout. Even if future stream management is undertaken in the area to make habitat better for brook trout (e.g. to remove beaver impoundments), the presence of the stream crossings will not have any negative long-term measurable effects on brook trout.
Impacts to other fish	Assemblages of warm-water or forage fish species are present in some of the streams to be crossed by the proposed CR 595, but some streams have few if any fish due to isolation by vertical gradients (e.g. waterfalls over rock outcrops), seasonal flow, predation, or other factors. The existing roads are not an apparent detriment to fish species.	The warm water and forage species of fish that were found in the stream surveys for the project assessment will not be affected in any substantial way by the construction of the road because of the design features that will prevent sedimentation in the streams, maintenance of existing flow regimes, protection of water quality and water temperature, as explained above.
A feasible and prudent alternative is not available	Existing roads do not meet the purpose and need for the proposed CR 595 as determined by MCRC, the governmental agency legally charged with the responsibility to make that determination. The public health, safety, and welfare is promoted by the proposed CR 595, as explained in this document.	The alternatives to the proposed CR 595 within or near the four-mile wide study corridor have been carefully evaluated and described in this document. Stream impacts have been avoided and minimized to the greatest practicable extent with the proposed route and stream mitigation is proposed to offset the unavoidable stream impacts. Use of other routes outside of the four-mile wide road study corridor do not meet the purpose and need for a new road and are considered “no-build” alternatives by the MCRC. When all aspects of the proposed project are objectively evaluated and the benefits balanced against the detriments of the proposed CR 595, the decision should be that CR 595 is the most feasible and prudent alternative in regard to Part 301 criteria.

For the reasons stated in this section, MCRC believes that the criteria for permit issuance found in Part 301 have been met.

10.02 Analysis of Compliance with Part 303: Wetland Protection

This section defines the criteria for issuance of a permit found in Part 303 and the Administrative Rules for Part 303 and provides a response to the criteria as pertinent to the proposed CR 595 project.

10.02.A. Legislative Findings: Section 324.30302

The administration of Part 303 requires the department to consider the criteria relating to wetlands as listed in subsection (1) in 324.30302. The criteria and responses to each criterion in subsection (1) are listed in Table 10-2.

Table 10-2. Legislative Findings in Section 324.30302 of Part 303.

Legislative Finding: Subsection (1)	Response as Pertaining to CR 595
(a) Wetland conservation is a matter of state concern since a wetland of 1 county may be affected by acts on a river, lake, stream, or wetland of other counties.	The unavoidable impacts to wetlands on the CR 595 project will not affect wetlands of other counties because there are no other counties downstream of the proposed project. Lake Superior is downstream of the proposed project.
(b) A loss of a wetland may deprive the people of the state of some or all of the following benefits from the wetland:	
(i) Flood and storm control by the hydrologic absorption and storage capacity of the wetland.	The capacity of the wetlands in the project area to store water will not be reduced by any measurable extent with the construction of CR 595. Hydrologic studies have been conducted for every stream crossing with more than 2 square miles of drainage area upstream of the crossings to ensure that the proposed road and structures do not have deleterious effects on stream flow or cause an increase in flood stage. In some areas where minor increases in flood stage are predicted, compensating cuts are proposed. The other crossings have been carefully evaluated for stream crossing structure hydraulic capacity also. The proposed CR 595 will not impair the ability of the wetlands to store flood water and the storage capacity will be minimally impacted. Road crossings of wetlands will have adequately sized culverts and bridges to pass flood flows. Equalization culverts are proposed in wetlands to ensure the free flow of water in wetlands. The proposed road will not substantially change the hydrologic character of the wetlands it crosses.
(ii) Wildlife habitat by providing breeding, nesting, and feeding grounds and cover for many forms of wildlife, waterfowl, including migratory waterfowl, and rare, threatened, or endangered wildlife species.	Wildlife habitat will be affected to some extent by the proposed CR 595 project. An estimated 180 acres of land will be changed for the construction of CR 595, requiring clearing, grading, excavation, and filling to construct the road. However, direct impacts to threatened or endangered wildlife species is not expected as a result of the construction of CR 595. With the exception of gray wolf, there have been no threatened or endangered wildlife species identified on the CR 595 project corridor. Gray wolf is in process of being delisted by the US Fish & Wildlife Service. Wildlife biologist James Hammill, a gray wolf expert, has opined that gray wolf should not be negatively affected by CR 595. The MDNR has determined that no critical wolf habitat (i.e. wolf den or rendezvous sites) is located within 5 miles of the proposed CR 595. In summary, impacts to wildlife species are expected to be minimal and may be most evident during road construction. Operation of the road will have some impacts on wildlife by direct mortality and disturbance, but mitigation measures are proposed to minimize those impacts. The unavoidable impacts to wildlife are considered to be acceptable in comparison to the benefits of the proposed road.
(iii) Protection of subsurface water resources and provision of valuable watersheds and recharging groundwater supplies.	There is no evidence to indicate that the proposed CR 595 project will impact any important groundwater recharge areas. The free flow of water and maintaining existing surface water flow have been carefully incorporated into the road design. There is no activity associated with the construction or operation of CR 595 that would involve pollution of subsurface water resources.

Table 10-2 (continued). Legislative Findings in Section 324.30302 of Part 303.

Legislative Finding: Subsection (1)	Response as Pertaining to CR 595
(iv) Pollution treatment by serving as a biological and chemical oxidation basin.	This is a valid function of wetlands, but the CR 595 project (1) is not expected to result in pollution to wetlands and, (2) will result in no net loss of wetlands due to the replacement of wetlands at a minimum replacement ration of 1.5:1. Wetlands in the project area presently have little opportunity to function for "pollution treatment" due to the lack of water quality stressors in this relatively undeveloped landscape. Therefore there should be no negative response for the CR 595 project for this criterion.
(v) Erosion control by serving as a sedimentation area and filtering basin, absorbing silt and organic matter.	Although the legislature in 1979 made the finding that wetlands "absorb silt", every effort is made to minimize any sediment inputs to wetlands on the CR 595 project. Measures will be implemented during construction to prevent sedimentation to wetlands and surface waters. The operation of CR 595 is not expected to be an ongoing source of sediment to wetlands because the entire road will be paved.
(vi) Sources of nutrients in water food cycles and nursery grounds and sanctuaries for fish.	Wetlands are important feeding areas for many species of wildlife and serve functions for fish in some situations where wetlands are adjacent to bodies of water and flooding provides access for fish. The CR 595 project has implemented extensive efforts in design to minimize wetland impacts, to provide for free flow of streams, and to improve stream habitats at existing stream crossings. Streams have been surveyed to document the fish species present. As a result of these efforts, there is no reason to expect that the project will have unacceptable impacts on water food cycles, nursery grounds, or sanctuaries for fish.
(c) Wetlands are valuable as an agricultural resource for the production of food and fiber, including certain crops which may only be grown on sites developed from wetland.	The only agricultural crops that grow on the wetlands in the general area of the proposed project are trees and blueberries. Trees are an important agricultural resource of this part of the Upper Peninsula and the timber companies that own much of the land actively manage and harvest timber from uplands and wetlands. Due to this resource, vast areas of timber company property are open to public recreation, which is a significant asset to the general public. Blueberry harvest is important to many U.P. residents and even people who travel to the area during blueberry season to harvest this crop. A diverse array of forest products from a number of species of trees are harvested from wetlands in the Project Service Area. The proposed road will facilitate access to the land for harvest of these agricultural products, as well as for the ancillary recreation provided by these lands.
(d) That the extraction and processing of nonfuel minerals may necessitate the use of wetland, if it is determined pursuant to section 30311 that the proposed activity is dependent upon being located in the wetland and that a prudent and feasible alternative does not exist.	Not applicable

For the reasons stated above, MCRC believes that the criteria of Section 324.30302 of Part 303 have been met.

10.02.B. Permit Approval Requirements: Section 324.30311

Section 324.30311 of Part 303 is a complex and detailed compilation of project reviews and permit issuance criteria. Section 30311(1) states, "A permit for an activity listed in section 30304 shall not be approved unless the department determines that the issuance of a permit is in the public interest, that the permit is necessary to realize the benefits derived from the activity, and that the activity is otherwise lawful."

The public interest determination is addressed below. In regard to the permit being necessary to realize the benefits derived from the activity, MCRC believes that the benefits of CR 595 to the public are substantial and that the route selected is the best route. Therefore, the permit is necessary to realize the stated benefits of the proposed road.

In regard to the activity being otherwise lawful, MCRC has made no findings in regard to any aspect of the proposed CR 595 project being unlawful. Therefore, the MCRC position is that the project meets this requirement.

10.02.C. Public Interest Determination

Section 30311(2) requires a comparison of the benefits which reasonably may be expected to accrue from the proposed project shall be balanced against the reasonably foreseeable detriments of the activity in order to make a determination of whether a proposed project is in the public interest. Table 10-3 provides an analysis of each of the standards listed in §30311(2) for the determination of public interest.

As shown in Table 10-3, the benefits of the proposed CR 595 far outweigh the detriments of the project, even considering that there will be some level of unavoidable wetland impact. MCRC has determined that the proposed CR 595 project is in the public interest, which was a prerequisite of MCRC proceeding with the project. The wetland impacts will be mitigated, so there should be no net loss of wetlands for the project. Given the documentation of the statutory criteria in Table 10-3, the MCRC position is that CR 595 is of paramount importance for the health, safety, and welfare of the public and that any adverse impacts to the public trust, riparian rights, and the environment will be minimal and that the criteria of Part 303 have been met and MCRC believes that a permit can be issued for the project by MDEQ.

10.02.D Findings of Necessity by Other State Agencies

Section 30311(3) states, "In considering a permit application, the department shall give serious consideration to findings of necessity for the proposed activity which have been made by other state agencies." MDOT and the Michigan Department of State Police have provided support for the CR 595 project because of the improvements to the health, safety, and welfare of the public. Their letters are included in the Appendices. In addition, other state agencies have explained the necessity of the proposed CR 595 in this assessment.

10.02.E Disruption to Aquatic Resources

Section 30311(4) states, in part, "A permit shall not be issued unless it is shown that an unacceptable disruption will not result to the aquatic resources. In determining whether a disruption to the aquatic resources is unacceptable, the criteria set forth in Section 30302 and subsection (2) shall be considered."

The findings of subsection (2) as made by MCRC are provided in the preceding Table 10-3. MCRC has presented a comprehensive description of the natural resources in the project area and the potential impacts that could result from the project, both positive and negative. The ecological studies have been conducted over a number of years and have addressed every aspect of the environment in the proposed road corridor. MDEQ must review the findings and all supporting material in this project assessment and make the final finding as to whether there is any unacceptable disruption to the aquatic resources.

Table 10-3. Public Interest Determination for the Proposed CR 595 as Defined in §30311(2).

Criteria from Section 30311 (2)	Benefit/ Detriment	Discussion
a) The relative extent of the public and private need for the proposed activity.	Benefit	MCRC has determined that CR 595 will provide an important benefit to the health, safety, and welfare of the public due to the improvements in access for emergency services and improvements for hauling commercial products resulting in improved safety. Significant economic impact to the central Upper Peninsula of Michigan will also result via the improved access to logging, mining, aggregate, and recreation areas. The mining industry will provide significant benefits to the entire State of Michigan through royalties paid for the extracted minerals, employment that the mine will provide, both direct and indirect, and purchases of goods and services. The forest products industry will also benefit because the proposed CR 595 will substantially improve hauling efficiencies in northwest Marquette County for this important industry. The proposed road will substantially minimize travel by large trucks on public roads in more urbanized areas of Marquette, Negaunee, and Ishpeming, which is in the public interest due to the positive impacts on public health and safety. The proposed CR 595 is substantially shorter than existing roads and will thus minimize the impacts from emissions and will save fuel and related vehicle costs. Private land owners, primarily timber companies but also many other landowners adjacent to the road will benefit from having a primary county road to access their properties.
b) The availability of feasible and prudent alternative locations and methods to accomplish the expected benefits from the activity.	Benefit	The alternative that meets the purpose and need for a new county road to serve northwest Marquette County is the proposed CR 595. A total of 20 route segments were evaluated within the four-mile wide road study corridor established by the Marquette County Board and MCRC. The use of existing roads, specifically CR 550 or CR 510 were determined by MCRC to be "no-action" alternatives due to them not meeting the purpose and need for CRC 595. The proposed road will provide a transportation corridor that will improve the health, safety, and welfare of the general public as well as serve an important area of economic development in Marquette County.
c) The extent and permanence of the beneficial or detrimental effects that the proposed activity may have on the public and private uses to which the area is suited, including the benefits the wetland provides.	Benefit	The extent of the wetland impacts is incremental over the length of the proposed road; i.e. no large wetland acreage will be impacted in one area; instead portions of wetlands mostly along existing roads will be affected by the road construction. The road design ensures that there is free flow of water in wetlands that are affected by the proposed road. Wetland losses will be replaced at a 1.5:1 or 2:1 ratio to ensure no net loss of wetlands as a result of the project. The land is mostly privately owned, most of which is timber company property. The new road will allow timber harvests to continue with much safer route for logging trucks to haul out forest products. Other existing uses of the land, such as hunting and fishing, will not be negatively affected by the proposed road but improved access for emergency access as well as hunting and fishing on the extensive lands open to the public in northwest Marquette County will be a definite benefit to the public from CR 595.
d) The probable impact of each proposal in relation to the cumulative effect created by other existing and anticipated activities in the watershed.	Benefit	The construction of another similar road in this area is highly unlikely, primarily because the proposed road will provide needed access to northwest Marquette County in conjunction with the large network of smaller private and public roads in the area. Logging roads will continue to be built as landowners harvest merchantable timber resources, but the presence of CR 595 will enable timber products to be removed on a safer and more efficient route than is now available. The presence of CR 595 will not cause more timber to be harvested or more mining to be conducted, therefore there are no cumulative impacts expected as a result of the construction of the road. There is a vast network of small private roads and some public roads in area and the construction of CR 595 is not expected to result in more road construction than would otherwise occur. Funding for other primary county roads in this area is highly unlikely to be available. The lack of electric power is another factor that will inhibit establishment of permanent residences along CR 595. As explained in this assessment, power companies are not expected to extend any power lines into this area if the road is built. There may be more public access into northwest Marquette County for recreation, but that is not considered to be a negative impact of the project.

Table 10-3 (continued). Public Interest Determination for the Proposed CR 595 as Defined in §30311(2).

Criteria from Section 30311 (2)	Benefit/ Detriment	Discussion
e) The probable impact on recognized historic, cultural, scenic, ecological, or recreational values and on the public health or fish or wildlife.	Benefit	According to the URS Corporation Phase I archaeological field survey, the proposed road will not affect any archaeological resources eligible to the National Register for Historic Places. Scenic values are subjective, but parts of the road go through land with scenic qualities. Recreational values of the private lands should be relatively unaffected; snowmobile trails will be relocated in some areas, but this is not a difficult problem due to the many logging roads in the area that are used for snowmobile trails. The proposed CR 595 will isolate transportation of commercial products from more urbanized areas more than existing routes and will have little negative effect on public health. In fact, removing heavy trucking from urban areas is a positive effect in regard to public health due to traffic safety, noise, and greenhouse gas emissions. The ecological, fish, and wildlife values will be affected to some extent as they are with any change in the natural environment, but the impacts should only be minimal and are not considered to be unacceptable or substantial as shown in the ecological studies that have been done for this project.
f) The size of the wetland being considered.	Benefit	The size of most of the wetland impacts is very small, with no large wetland impacts proposed. No significant wetland complexes will be substantially impacted as a result of the project. Given the location of the larger wetlands on the landscape, avoidance of these wetlands was not possible. The road crossing locations have been sited to minimize wetland impacts to the extent feasible. Given the length of the proposed CR 595 (21.4 miles) and the landscape in the area, the impact to 25.81 acres of wetland (including Trail 5 relocation and the East Branch Salmon Trout River stream mitigation project) is not substantial.
g) The amount of remaining wetland in the general area.	Benefit	According to the National Wetlands Inventory GIS data for Marquette Co. (from Michigan's Center for Geographic Information), the amount of palustrine wetland in Marquette County is about 300,000 acres; about 25% of the total land area. The 24.97 acres of wetlands proposed to be impacted only comprise only 0.008% of the wetlands in the County. However, there will actually be a net gain of wetlands as a result of the project due to the wetland replacement ratios of 1.5:1 or 2:1.
h) Proximity to any waterway.	Detriment	The proposed CR 595 will cross streams and therefore 22 new culverts and bridges will be constructed. The road design emphasizes crossing streams on good alignments to minimize the impacts on streams. Aspects of Stream Simulation Methodology have been employed to design stream crossings to minimize short- or long-term impacts on streams. Of the 22 stream crossings, 15 will be replacement of existing structures, many of which are in need of replacement to improve stream habitat and stream flow. Nevertheless, having no streams involved would be preferred over having to cross 22streams, so this is deemed to be a detriment of the project even though impacts will be minimal due to the proposed structure designs and locations. Wetland impacts adjacent to streams will be limited to the road footprint.
i) Economic value, both public and private, of the proposed land change to the general area.	Benefit	The economic value of the CR 595 project is very substantial, both to private business, industry, and to the public in Marquette County, the Upper Peninsula, and the State of Michigan. The proposed CR 595 will be a valuable asset to the local transportation network, primarily for logging, mining, aggregate, recreation, and landowner access. The "land change" to the general area will be minimal over the long term; an extensive network of largely unimproved public and private roads presently exists in the area and logging has been active in the area for over 150 years. The proposed CR 595 will provide a long-needed transportation access to an important area of mining, logging, and recreation in Marquette County and will substantially benefit the industries and related businesses involved in these activities.

10.02.F. Wetland Dependency and Feasible and Prudent Alternative Determination

The second part of 30311 (4) states, "A permit shall not be issued unless the applicant also shows either of the following:

(a) The proposed activity is primarily dependent upon being located in the wetland.
(b) A feasible and prudent alternative does not exist."

The applicant MCRC cannot show that the proposed activity is primarily dependent upon being located in the wetland. A road is not dependent upon being located in "the wetland" for its physical function; therefore this test is not met.

Thus, the applicant must show that a feasible and prudent alternative does not exist to the proposed CR 595 project. MCRC believes that it has met this standard and has shown that the proposed CR 595 is the most feasible and prudent alternative to meet the purpose and need for a new primary county road in northwest Marquette County. MCRC is the government agency in Marquette County legally responsible for the planning, construction, and maintenance of the transportation infrastructure; this includes determining the purpose and need for new county roads. This is a substantial responsibility that should carry significant weight in the review of the proposed project permit application, and as the MDEQ determines whether it concurs with the findings of MCRC in regard to the alternatives assessed for this project.

In 2010 the Marquette County Board of Commissioners, which is the governing body of the County, requested MCRC to evaluate the need for a new primary county road in a four-mile wide road study corridor in northwest Marquette County. MCRC, which is the governing body responsible for county roads, looked at a total of 20 different alternative route segments within or near the road study corridor. Each segment was evaluated to determine the most feasible and prudent alternative location for the proposed CR 595. In addition, MCRC moved and modified the horizontal and vertical road alignments and modified standard road design criteria so environmental impacts along the proposed CR 595 route could be avoided and/or minimized to the greatest extent possible. MCRC determined that the use of existing routes, i.e. CR 550, CR 510, CR 510-Red Road-Sleepy Hollow, and Dishno routes did not meet the purpose and need for the proposed CR 595 and, as such, are "no-build" alternatives.

For the reasons provided above and in this document, MCRC believes that it has demonstrated that a feasible and prudent alternative to the proposed CR 595 does not exist and that therefore this requirement of Part 303 has been met.

11.0 CONCLUSIONS

The proposed CR 595 project is a significant transportation infrastructure improvement that would serve the public safety needs of the community as well as provide needed access to an important mining, logging, and recreational area of northwest Marquette County. Existing roads do not provide for the public safety needs of the community or the level of service that the uses of the area now demand, and especially will demand when Eagle Development Project is in operation. The CR 595 construction would directly create an estimated 200 jobs and the related benefits to the area businesses would be significant. CR 595 would not only improve public safety in the area but it would greatly improve the operating efficiencies for mining and logging, and result in a more viable business environment.

As stated by the Michigan State Police Traffic and Safety Division, the proposed CR 595 would divert truck and other vehicle traffic away from urban areas of Marquette County, thereby reducing traffic congestion and improving public safety. CR 595 would also provide a critical access to the northwest part of the county that is upstream of a series of dams on the Dead River, which is a safeguard in case another flood event occurs such as what happened during the 2003 Silver Lake fuse plug failure. Emergency service personnel response times, public health, and safety will be improved. Year-around access would be assured with the proposed CR 595, as compared to circuitous routes and routes on seasonal roads that presently exist.

Impacts to wetlands are unavoidable with the proposed CR 595 project, but extensive planning and engineering design for the road has resulted in avoiding wetlands to the greatest extent practicable and in minimizing impacts as much as possible. The 25.81 acres of wetlands to be impacted by CR 595, the East Branch Salmon Trout River stream mitigation project, and the Trail 5 relocation only comprise 0.008 percent of the wetlands in Marquette County. Compared to the benefits and size of the project and the large amount of wetlands remaining in Marquette County, the area of wetland impact is minimal. In addition, the wetlands unavoidably impacted will be mitigated with no net loss of wetland acreage resulting from the project.

A wetland mitigation plan has been prepared based upon extensive field study of potential sites. The unavoidable impacts to wetlands would be replaced in order to provide for no net loss of wetland area. Wetland functions would be replaced by creation of mitigation wetlands. In addition, 3.53 acres of wetlands will be restored as part of the CR 595 project that are not being included in the wetland mitigation totals.

Stream impacts have been minimized to the extent practicable by implementing aspects of Stream Simulation Methodology as recommended by the MDNR and MDEQ. This methodology ensures that proposed bridges and culverts are sized to preserve the stream habitat, flow, and ecological function through each proposed crossing. The majority of the stream crossings will be replacement of existing stream crossings (i.e. 15 of the 22 stream crossings), most of which are inadequate and in need of replacement with properly designed and properly installed structures.

In addition, a stream mitigation project would be accomplished if the CR 595 project is permitted. The three substandard culverts in the East Branch Salmon Trout River under Triple A Road would be removed and a portion of Triple A Road rerouted, with only one

Triple A Road crossing of the East Branch, that being with a 65-foot box beam bridge. The stream banks and streambed would be restored where the three steel culverts presently exist, and portions of the existing roadbed would be removed to ensure protection for the stream from sedimentation and runoff.

Additional stream restoration could be accomplished if the MDEQ accepts the alternative wetland mitigation concept explained in Section 8.5 of this document. This concept is to provide needed stream restoration instead of creating wetlands in a wetland-rich landscape as mitigation for the unavoidable wetland impacts associated with the proposed CR 595 project. The net benefit to the natural resources of the area would be substantially greater as a result of the stream restoration projects compared to creating wetlands by converting upland habitats to wetlands.

In conclusion, the CR 595 project is important to the health, safety, and welfare of the public and is beneficial for the general public, businesses, the local and regional economy and local governmental agencies. The location of CR 595 meets local, state, and federal road planning guidelines. The public trust in the resources that would be impacted by the project has been protected to the extent feasible, and measures will be implemented to mitigate unavoidable impacts. The proposed CR 595 will improve emergency services and public access to thousands of acres of land open to public use for hiking, fishing, canoeing or kayaking, hunting, and gathering. Issuance of the permit and construction of CR 595 would fulfill many long-recognized needs of the community for many years.

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