Trunk Highway 1/169 Improvement Project (Eagles Nest Lake Area)

Environmental Assessment and Environmental Assessment Worksheet (EA/EAW)

Prepared by:
Minnesota Department of Transportation (MnDOT) and the Federal Highway Administration

December 2014

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ENVIRONMENTAL ASSESSMENT

Trunk Highway 1/169
Eagles Nest Lake Area Project
S.P. No. 6904-46
Federal Project Number Not Available At This Time

St. Louis County, Minnesota
Sections 13-17 and 19-21, Township 62 North, Range 14 West

Submitted Pursuant to 42 USC 4332 and Minn. Statute 116D by the U. S. Department of Transportation, Federal Highway Administration and the Minnesota Department of Transportation
for

Transportation infrastructure maintenance and safety improvements to Highway 1/169 from approximately 0.1 mile west of Sixmile Lake Road to approximately 0.1 mile east of Bradach Road. The total project length is approximately 5.7 miles.

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Figure 1 – State/County and USGS Location Map

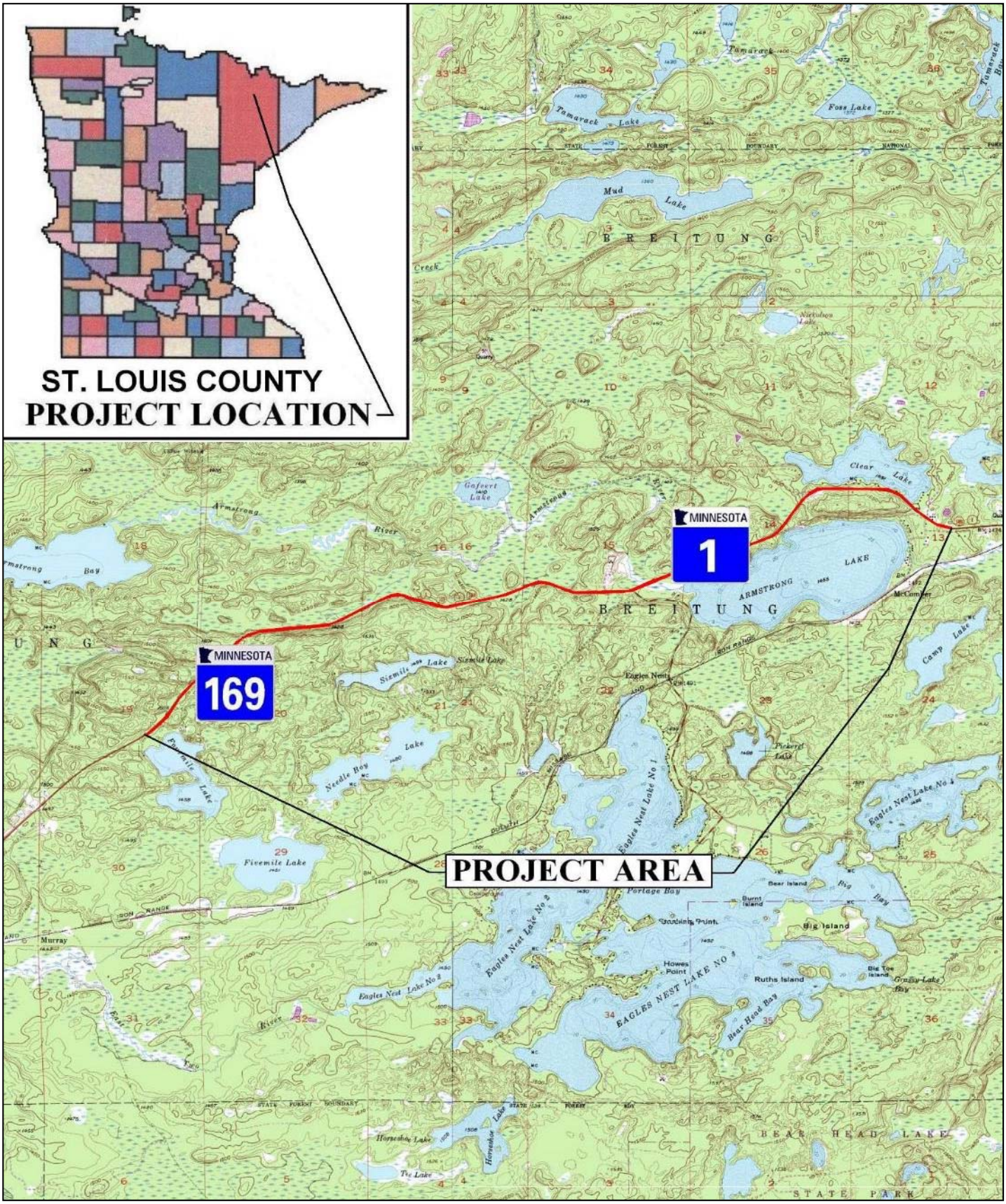
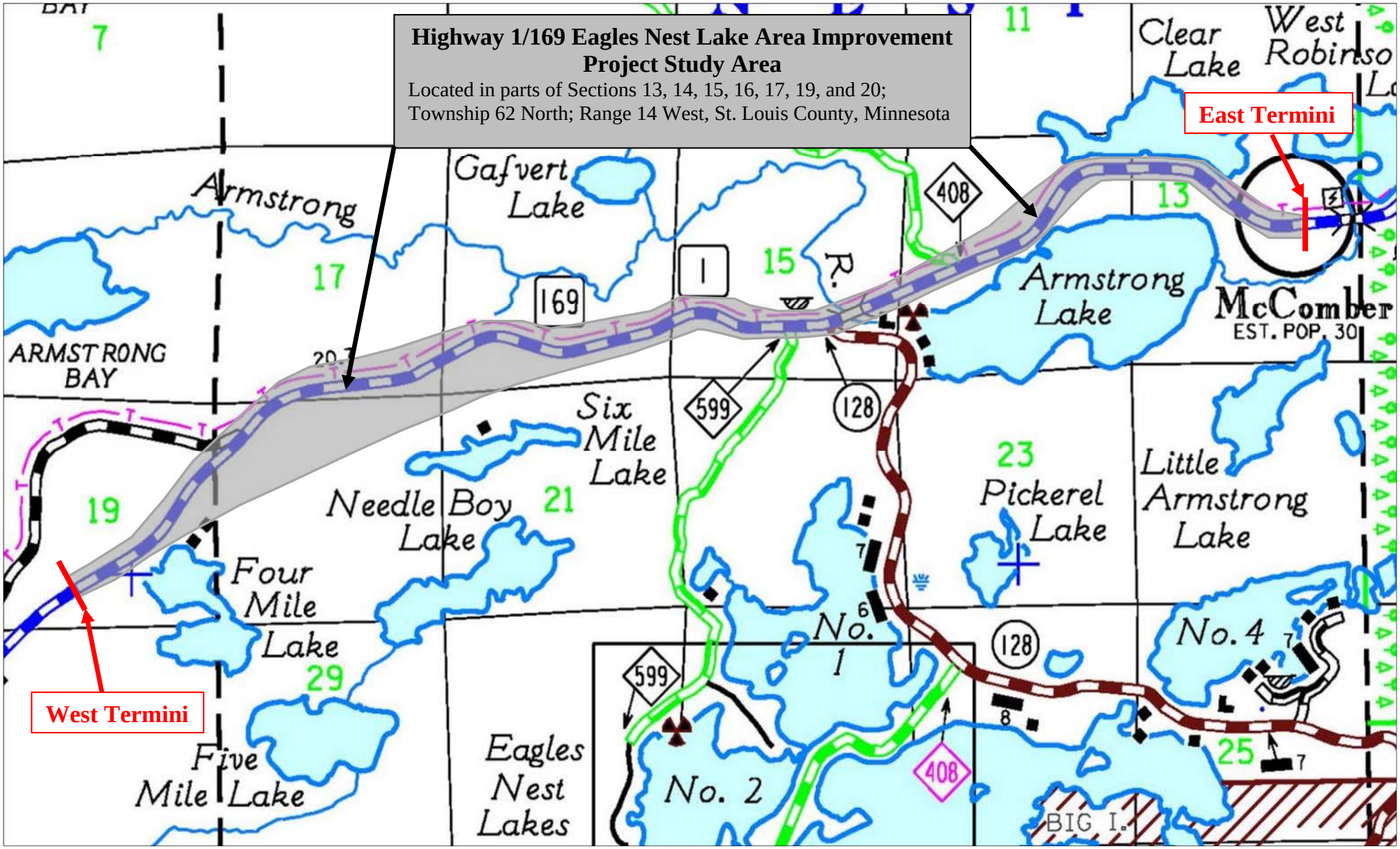


Figure 2 – Project Study Area Map



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I. REPORT PURPOSE

This Environmental Assessment (EA) provides background information including:

- Need for the proposed project
- Alternatives considered
- Environmental impacts and mitigation
- Agency coordination and public involvement

This EA was prepared as a part of the National Environmental Policy Act (NEPA) process and state environmental review process to fulfill requirements of both 42 USC 4332 and M.S. 116D. At the federal level, the EA is used to provide sufficient environmental documentation to determine the need for an Environmental Impact Statement (EIS) or that a Finding of No Significant Impact (FONSI) is appropriate. At the state level, the EA document is used to provide sufficient environmental documentation to determine the need for a state EIS or that a Negative Declaration is appropriate.

At the state level, this document also serves as an Environmental Assessment Worksheet (EAW). Minnesota Rules 4410.1300 allows the EA to take the place of the EAW form, provided that the EA addresses each of the environmental effects identified in the EAW form. This EA includes each of the environmental effects identified in the EAW form.

The Minnesota Department of Transportation (MnDOT) is the proposer and the Responsible Governmental Unit (RGU) for the state environmental review process.

MnDOT has received High Priority Project (HPP) federal funding to improve the condition of the transportation infrastructure, safety, and operations along this segment of Highway 1/169. MnDOT has been working in cooperation with the Federal Highway Administration (FHWA) on the development of this project and environmental documentation to address FHWA's National Environmental Policy Act (NEPA) requirements.

This document is made available for public review and comment in accordance with the requirements of 23 CFR 771.119 (d) and Minnesota Rules 4410.1500 through 4410.1600.

II. PROJECT PURPOSE AND NEED

A. PROJECT BACKGROUND

The proposed Trunk Highway 1/169 Eagles Nest Lake Area Improvement Project is located in rural St. Louis County, in northeastern Minnesota (see Figures 1 and 2 above). The project area stretches along approximately 5.7 miles of Minnesota Trunk Highway 1/169 (hereafter referred to as Highway 1/169).

The project study area is located within a segment of Highway 1/169 that has been functionally designated as a minor arterial roadway. This segment connects the cities of Ely, Soudan, and Tower. These towns are regionally important as employment centers, commercial nodes, tourism destinations, and places of higher density residential development.

In the project study area, Highway 1/169 is a 2-lane roadway with a posted speed limit of 55 mph. The highway alignment is generally rolling and includes numerous turns/curves as it winds through the landscape. Several at-grade public road intersections are located along the corridor and are controlled with side street stop control (stop signs).

In 1999, as a result of citizen concerns with the safety of the highway from Virginia to Winton, a Highway 1/169 Task Force was formed that included representatives from several local units of government (county, city, and township officials/staff), business organizations, and the general public. Technical support to this grass-roots public Task Force was provided by MnDOT and the Arrowhead Regional Development Commission (ARDC). The group's mission statement indicates "the Trunk Highway 1/169 North Improvement Task Force seeks to ensure a safe, efficient, and aesthetically pleasing highway that addresses present and future needs between Virginia and Winton, Minnesota". The Task Force identified transportation safety concerns along the Highway 169 corridor from Virginia to Ely. Safety in the vicinity of Eagles Nest Lake were identified by the Task Force as a substantial concern that specifically should be addressed. Over the past several years, numerous low-cost improvements have been implemented throughout the Highway 1/169 corridor. However, following completion of the Task Force report, little has been done in the Eagles Nest Lake area because the improvements needed to address the issues involve substantial investment and have been cost prohibitive.

In addition to identifying and recommending improvements to the highway, the Task Force worked with congressional leaders to secure funding for the desired improvements. In 2005, the Task Force was successful in obtaining $18.4 million in Federal High Priority Project (HPP) funding, as part of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) legislation for the construction of safety improvements between Virginia and Ely. MnDOT will be using a portion of this funding to implement the project in the Highway 1/169 Eagles Nest Lake area.

Sections I.B and C below provide a detailed description of transportation problems that need to be addressed by the project alternatives.

B. PURPOSE OF THE PROPOSED ACTION

The primary purpose of the Highway 1/169 Project in the Eagles Nest Lake study area is to address long term infrastructure conditions and safety concerns along the segment of Highway 1/169 from approximately 0.1 miles west of Sixmile Lake Road to 0.1 miles east of Bradach Road. The pavement condition in the study area has exceeded the expected design life and is in need of replacement. Also, the project has been designated to receive federal funding for safety improvements, based on the identification of this segment of Highway 1/169 as a priority for safety improvements in studies undertaken by the Highway 1/169 Task Force.

In addition, this segment of highway has some areas where horizontal and vertical curves do not meet current MnDOT highway design standards, and there are locations where limited passing opportunities hinder mobility of faster moving vehicles being able to safely get around slower moving vehicles (e.g. logging trucks and vehicles pulling recreational trailers).

C. NEED FOR PROPOSED ACTION

The Project Need identifies transportation deficiencies or problems that need to be addressed. The identified needs for this project have been defined with respect to their relative importance as project objectives (primary vs. secondary). The primary needs are those problems that were the basis for initiating this project. Secondary needs are opportunities for system improvements within the project study area that may be able to be addressed or enhanced, if feasible, concurrent with addressing the primary needs.

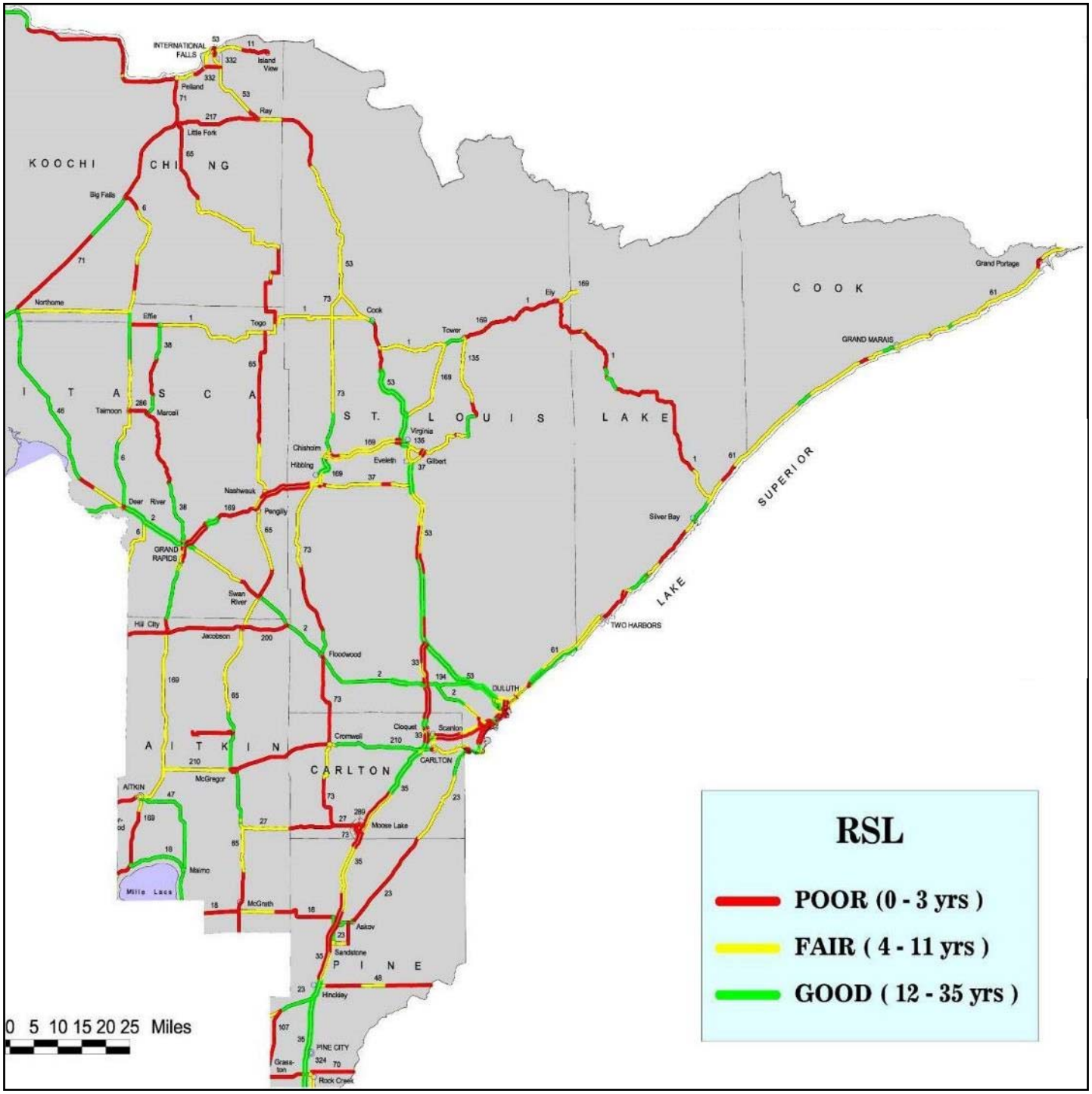
The need for the project is centered on the following:

- Primary Needs
  - Infrastructure Conditions
  - Safety Improvements
- Secondary Needs
  - Maintain Mobility
  - Geometric Design Deficiencies

Primary Need: Infrastructure Conditions

In recent years, the condition of the roadway pavement in the study area has deteriorated substantially. The roadbed and pavement have reached the end of their design life. According to the 2010 Pavement Conditions – Remaining Service Life (RSL) Map (see Figure 3), the segment of Highway 1/169 between Tower and Ely has a RSL rating of "Poor" (0-3 year service life).

Figure 3 – 2010 Pavement Conditions – Remaining Service Life (RSL) Map



The RLS is defined as the number of years until the Ride Quality Index (RQI), a measure of pavement smoothness, reaches a value where most roadway users begin to complain that a road's roughness is objectionable. The pavement along this segment of Highway 1/169 has several areas marked by extensive alligator cracking, pothole patches, transverse cracks, as well as, longitudinal cracking. Extensive rehabilitation improvements to the roadway are needed just to maintain the existing infrastructure in a safe driving condition.

Photo: Alligator cracking-to-potholes

Primary Need: Safety Improvements

As described in the Project Background section above, this project was initiated to identify and construct safety improvements in the Highway 1/169 Eagles Nest Lake area, as part of the Federal High Priority Project (HPP) funding included in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) legislation. This funding designation resulted from the efforts of the Trunk Highway 1/169 North Improvement Task Force and the findings of the studies initiated in 1999, which identified the Eagles Nest Lake section of Highway 1/169 as a particular concern. Because the legislation identified the use of the federal funds for Highway 1/169 safety improvements, there is a need to assess the corridor, as part of the development of alternatives, to identify potential safety improvements that could be made in this segment of the Highway 1/169 corridor.

Secondary Need: Maintain Mobility

Maintaining mobility on Highway 1/169 within the study area is needed in order for the highway to function consistent with its classification of a minor arterial, identified by MnDOT as a regionally important corridor within northeastern Minnesota. Maintaining mobility also reduces the incidence of unsafe driver behavior.

Highway 1/169 in the study area has an average daily traffic (ADT) volume of approximately 2,600 trips. Seasonal and weekend traffic peaks can more than double the ADT and result in a mix of passenger vehicles and heavy trucks/recreational vehicles using the highway. Some of the key existing characteristics of the highway that affect mobility (see Figure 4) include:

- Approximately 4.2 miles (75 percent) of the highway corridor in the study area is designated no passing for both directional lanes of traffic and another 1 mile (nearly 20 percent) has limited passing for 1 direction of traffic. The result of limited passing opportunity hinders traffic flow due to slower moving vehicles (i.e. heavy trucks, recreational vehicles, vehicles trailering boats or campers) that may cause driver frustration, attempts to pass when unsafe, and head-on collisions.
- Slower moving turning traffic creates conflicts with faster moving through traffic. Left turning vehicles create the greatest conflict since they tend to block the through lane when waiting for a safe opportunity to make left turn, increasing the potential for crashes (rear-end and right-angle/t-bone).

The mix of higher speed traffic (passenger vehicles) and slower-moving traffic (heavy trucks/recreational vehicles), combined with the extensive no-passing zone segments and limited turn lanes in the project area, create traffic platoons and periods of reduced mobility. The combination of traffic platoons/back-ups and lack of safe passing opportunities has led to the actions of some motorists taking risks and passing slower moving vehicles at unsafe times and locations. Left turning vehicles create the greatest conflict since they tend to block the through lane when waiting for a safe opportunity to make the left turn, increasing the potential for rear-end crashes and right-angle (t-bone) crashes.

Secondary Need: Geometric Design Deficiencies

The Highway 1/169 corridor was designed and constructed to the standards of the 1940s, when vehicles were generally travelling slower and there were fewer large vehicles (trucks, vehicles with trailers) compared to today's road users. Current highway geometric design standards reflect the needs of the size, type and speed of travel typical of today's users. A review of the existing Highway 1/169 corridor within the study area identified a number of sections within the corridor that do not meet current MnDOT highway design standards (see cross-section in Figure 5). Also, Figure 6 shows the general location of several sections of the existing road that are characterized by substandard horizontal and vertical alignments, including:

- Currently, there are fourteen vertical curves (crest[1] curves and sag[2] curves) that do not meet the minimum standards for a 55 mph design speed.
- This segment of Highway 1/169 also has eleven horizontal curves that do not meet the minimum requirements for a 55 mph design speed. As a result, several stretches of the highway have deficient stopping sight distance. These alignment deficiencies contribute to sight distance problems at intersections and driveway entrances.

[1] Crest vertical curves, when viewed from the side, are convex upwards. Examples include vertical curves at hill crests and locations where an uphill grade becomes less steep, or a downhill grade becomes steeper. The most important design criterion for these curves is stopping sight distance, which is the distance a driver can see over the crest of the curve. If a driver is unable to see an obstruction in the roadway, such as debris or animal, the driver may not be able to stop the vehicle in time to avoid a crash.

[2] Sag vertical curves, when viewed from the side, are concave. Examples include vertical curves at valley bottoms and locations where an uphill grade becomes steeper, or a downhill grade becomes less steep. The most important design criterion for these curves is headlight sight distance. When a driver is driving on a sag curve at night, the sight distance is limited by the higher grade in front of the vehicle. This distance must be long enough that the driver can see any obstruction on the road and stop the vehicle within the headlight sight distance.

Figure 4 – Existing Highway 1/169 Passing and Turn Lane Deficiencies

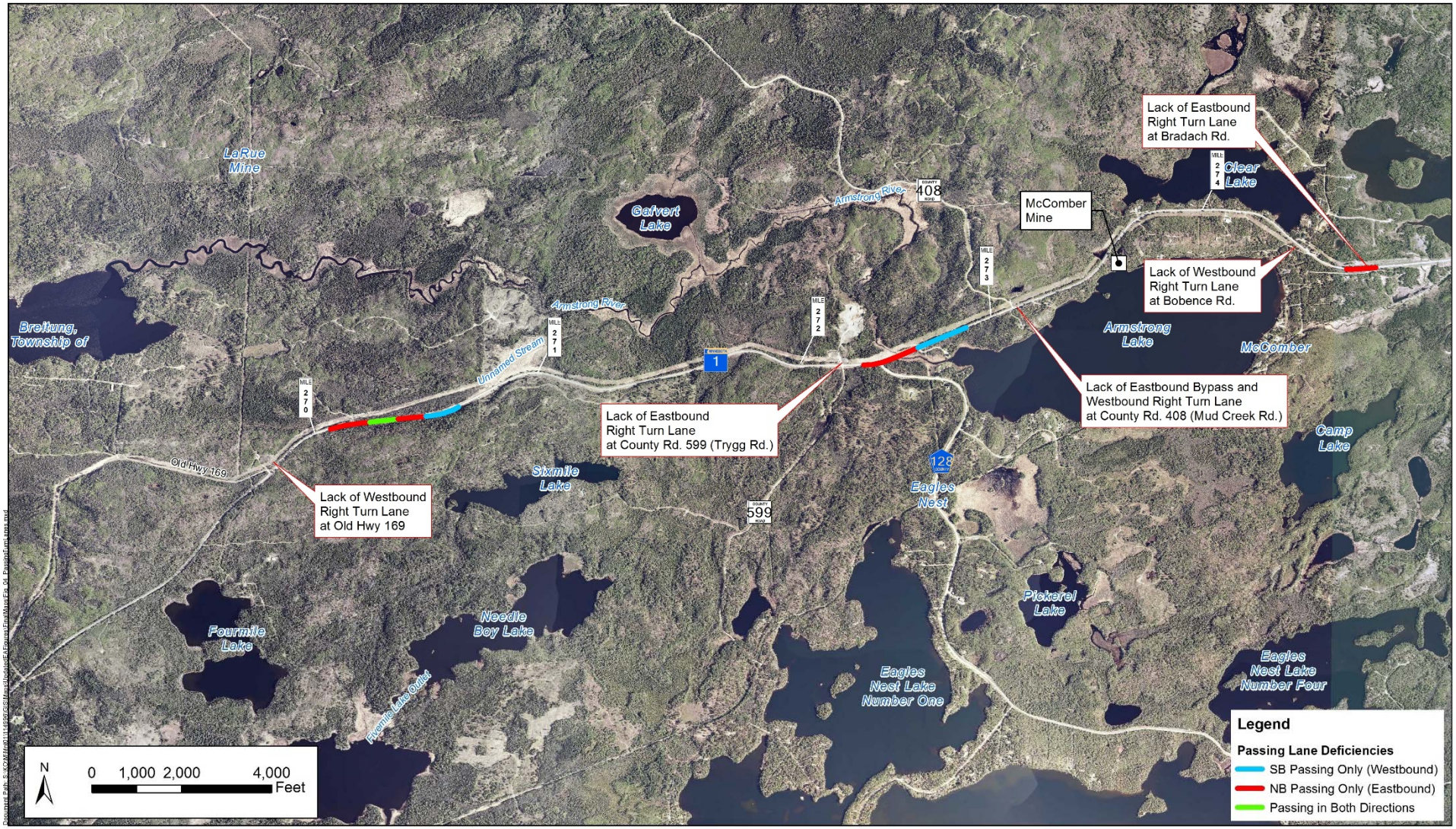
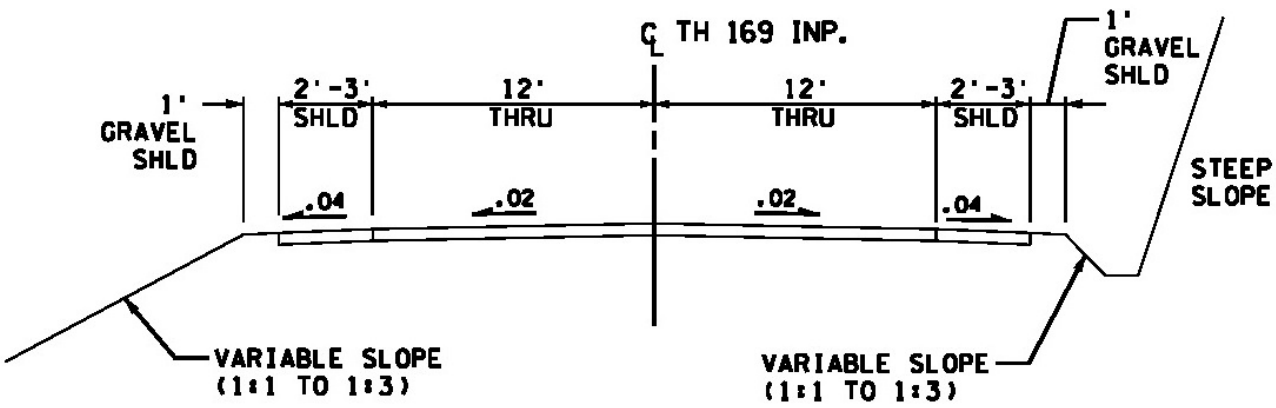


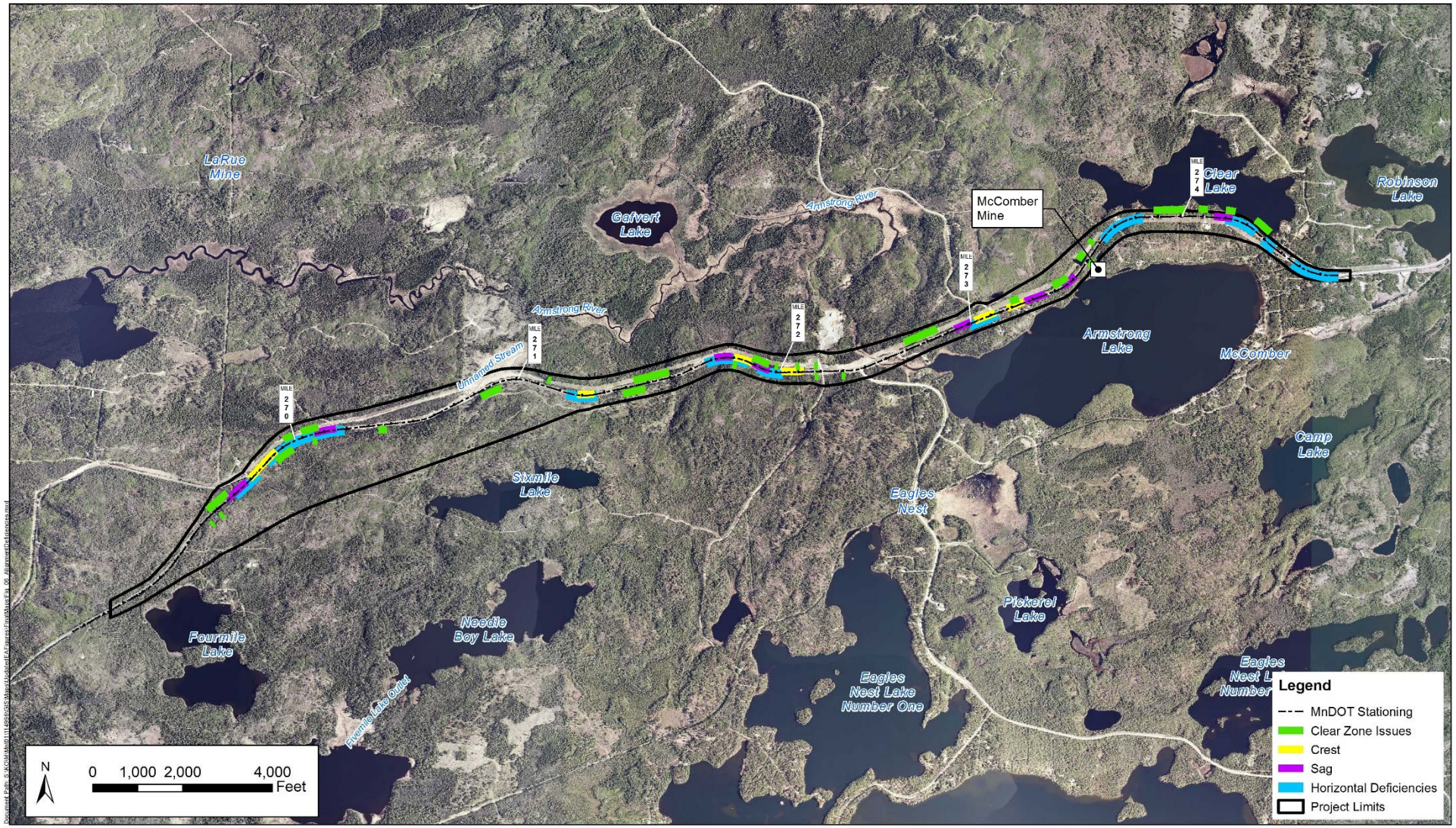
Figure 5 – Existing Highway 1/169 Cross Section – Eagles Nest Lake Project Area



The existing Highway 1/169 in the project area is characterized by

- Numerous horizontal and vertical curves, which limit sight distance and, therefore, limit safe passing areas (see Figure 6), resulting in drivers taking risks when passing;
- Narrow shoulders (typically 2-to3-feet wide paved, with 1-foot of gravel shoulder [see cross-section above]), which do not provide sufficient room for stopped vehicles to safely pull off to the side in an emergency, and do not provide an area for vehicles to escape, if an on-coming vehicle is in their lane (e.g., during a risky passing maneuver by an on-coming vehicle);
- Steep side-slopes (1:1 to 1:3) that do not provide an opportunity for vehicles to recover, if they go off the road; and
- Areas of inadequate clear zone/recovery zone (e.g., in the vicinity of existing rock cuts or woody vegetation – see Figure 6) that do not provide an opportunity for vehicles to recover, if they go off the road.

Figure 6 – Existing Highway 1/169 Alignment Deficiencies



III. ALTERNATIVES

This section summarizes the process for identifying the range of project alternatives; results of early project evaluation/screening of alternatives; and provides descriptions of the features of the alternatives evaluated in this EA. Appendix A of this EA includes the *Highway 1/169 Eagles Nest Project – Alternatives Development & Evaluation Technical Memorandum*, that details the project alternatives development and decision-making process.

Based on issues identified in early project studies and in stakeholder comments, the following list of guiding principles and supporting actions were used in defining and evaluating the range of alternatives:

- Alternatives considered must satisfy the primary purpose and need objectives, which include addressing the deteriorating pavement conditions and providing safety improvements within the project corridor. In addition, alternatives that address secondary needs (i.e., maintaining mobility and geometric design deficiencies) should also be developed and evaluated.
- To the extent practical, alternatives should avoid and minimize social, economic and environmental impacts.
- While not to be used as a determining factor, the alternatives evaluation process should consider ways to minimize short- and long-term costs.

A multi-step alternatives development, evaluation, and refinement process was followed during the early project development process including:

- Identification of Level 1 Alternatives
- Screening of Level 1 Alternatives
- Identification of Level 2 Alternatives
- Evaluation of Level 2 Alternatives
- Identification of Level 3 Alternatives
- Evaluation and Screening of Level 3 Alternatives
- Identification of Preferred Alternative

Identification of Level 1 Alternatives

As the first step in the process, a range of alternatives were developed to respond to the established project needs discussed in Section II., Purpose and Need. A safety audit of the project corridor was performed by MnDOT's Office of Traffic, Safety and Technology (OTST), to assess the existing roadway and recommend safety improvements that could be incorporated into the project to meet the safety needs. MnDOT's OTST reviewed crash data, geometric road design, clear zones, and other roadway characteristics and provided advice where design improvements can be best utilized to increase the safety for the travelling public.

Reviewing the crash data for 2004-2013, MnDOT's OTST noted that the largest issue is with lane departure type crashes. Although a large number of crashes occur at curves, the crash rate is not proportionally greater than the crash rate on other sections of Highway 1/169 (i.e. there are a number of lane departure crashes on tangent (straight) sections as well). Within the Eagles Nest Lake project area, lane departure crashes (run off the road, head-on, and sideswipes) represent over 84 percent of all crashes. The statewide average on 2 lane highways is closer to 33 percent

of all crashes. From 2004-2013, there were 37 crashes in the project area. Of these, 30 crashes (81 percent) were overturn, rollover, and collisions with trees, shrubs, and ditch banks – all items associated with leaving the roadway.

MnDOT's OTST noted that these crash data strongly suggest that the improvements in the project area should be focused on keeping drivers within their lane of travel, and reducing the consequences when a lane departure has occurred. Recommended countermeasures within the roadway surface suggested by OTST include (1) widening and paving shoulders to the full 8-feet on each side, (2) providing a 4-foot striped center median buffer between the opposing lanes, (3) centerline and edge-line rumble strips, (4) 6" ground-in pavement markings. Recommended countermeasures outside of the roadway surface include (1) recoverable ditch slopes (4H:1V) where possible, (2) maximizing the clear zone from obstructions, (3) when clear zones and recoverable slopes cannot be provided, a guardrail type system should be considered to reduce the severity of crashes once lane departure has occurred, especially in areas where a crash history exists, (4) curves should be given advanced warning signs, and oversized chevron signing should be provided on all curves. Details of the OTST review and recommendations are included in the *Highway 1/169 Eagles Nest Project – Alternatives Development & Evaluation Technical Memorandum,* included in Appendix A. These recommendations were used as the starting point for development of design concepts for the project Build Alternatives. However early in project design the environmental sensitivity of the area was recognized. In order to minimize impacts to wetlands and forests, the OTST recommendations were reviewed further by MnDOT design and safety staff to determine what modifications could be made to minimize impacts while still improving corridor safety. Based on this review, the four-foot striped center median buffer was eliminated, and shoulders were modified to 6-foot paved plus 2-foot gravel, to provide an 8-foot vehicle pull off area. In summary, all the build alternatives include the following safety improvements:

- Horizontal and vertical curve corrections
- Widened shoulders
- Reduced ditch slopes
- Improved clear zones
- Enhanced intersection sight lines
- Guardrail systems (where required)
- Improved signage

Three primary Level 1 Alternative corridors (Existing, South, and North) were initially identified, with potential alignments developed within each corridor. Figure 7 depicts the location of the 3 corridors considered.

- The Existing Corridor alignments closely follow the current Highway 1/169 roadway alignment. To address the primary and secondary needs of the project the Existing Corridor alignments include providing the basic safety improvements, plus some minor realignments in segments of the existing corridor with substantial geometric deficiencies and/or to avoid impacts to adjacent natural features (wetlands, bedrock outcrops, etc.).

- The South Corridor alignments include providing the basic safety improvements, plus more substantial roadway realignments in portions of the corridor to provide improved geometrics – most substantially at the west end of the project area that has been identified as a concern in the Task Force Report and in public comments.

- The North Corridor was developed to respond to environmental concerns about the South Corridor raised by property owners in the vicinity of Sixmile Lake and was assessed as an alternative to improve geometrics in the western end of the corridor.

Through the process of defining improvements within the 3 primary corridors, approximately 20 different iterations of concept alignments were defined and refined in an effort to balance the purpose and need objectives and minimize environmental impacts and costs. Ultimately, 1 alignment within each of the Existing, South, and North corridors was identified as the best representative of that corridor for an initial screening-level assessment (see Figure 7).

The individual alignments chosen within each of the 3 corridors were those with the least environmental impacts that met the primary needs and (to the extent possible) addressed secondary needs. The No-Build alternative was also assessed, as a basis for comparison of relative impacts and benefits.

The Level 1 alternatives included the following:

- No-Build Alternative – improvements limited to normal pavement maintenance along Highway 1/169. The No-Build Alternative is used as a basis of comparison, or benchmark for the Build Alternatives, and includes the impacts associated with doing nothing (e.g., related to project needs).
- Existing Corridor – follows the current highway alignment and includes the basic safety features (widening to 8-foot shoulders; 6-foot paved and 2-foot gravel), expanded clear zones, minor horizontal and vertical curve corrections) and added turn/passing opportunities.
- North Corridor – follows the current highway alignment with the exception of a 2 mile section at the western end of the project area, where it extends along a new alignment up to 400-feet north of the existing alignment. The North Corridor also includes the safety improvements included in the Existing Corridor.
- South Corridor – includes the largest amount of realignment, with the western third of the study area being on a new southern alignment. However, there are segments that are close to or use the existing corridor in the central and eastern portions of the study area. The South Corridor also includes the basic safety improvements included in the Existing and North corridors. The South Corridor includes slight alignment shifts in the east portion of the project area in order to maximize mobility with a 60-mph design speed that was achieved with straighter horizontal and vertical curves.

Screening of Level 1 Alternatives

The initial screening process was conducted at a level of detail sufficient to determine if any of the corridors and associated alignments included impacts that would not allow an alternative to be permitted based on substantive environmental regulations (e.g., the wetland impacts associated with the North Corridor alternative, as described below). The potential for environmental impacts associated with the Level 1 alternatives was vetted with project stakeholders. Several issues were raised including natural resource and water quality concerns, safety concerns, and constructability concerns (construction staging, detours, and emergency service access).

Figure 7 – Level 1 Corridors

Based on the analysis and input received, the North Corridor alternative was dismissed from further consideration due to substantially greater wetland impacts (approximately 32 acres compared to between approximately 6.6 and 17.3 acres with the other corridors), most of these impacts being to wetlands considered as having high wetland functions and values for water quality and wildlife habitat (see technical memorandum in Appendix A for further details).[3] Therefore, it is very unlikely that the North Corridor would meet the least environmentally damaging practicable alternative (LEDPA) criteria for Section 404[4] wetland permitting. Furthermore, the North Corridor does not result in substantially improved mobility and/or safety conditions over the other corridor alternatives being considered.

Identification of Level 2 Alternatives

Following the Level 1 screening process, additional coordination with project stakeholders was conducted that led to further refining of the Existing and South Corridor alternatives. These refinements resulted in the creation of 2 conceptual alignments for the Existing Corridor plus preparation of more detailed alternative concept plans (including proposed right-of-way and preliminary construction limits) for each of the Level 2 alternatives.

The 2 conceptual alignments identified for further consideration within the Existing Corridor in large part closely follow the current roadway alignment, but include realigning segments of the existing corridor to address design deficiencies and/or to minimize impacts to adjacent natural features (wetlands, bedrock outcrops, etc.), and to address constructability concerns including construction staging, detours, property access, and emergency service access during construction.

The primary difference between the two Level 2 Existing Corridor conceptual alignments is that Alternative 1 (Existing Corridor: Minimal Offset/Construct Under Traffic) shifts the alignment just enough north or south of the existing roadway to allow construction to occur while traffic is maintained on the existing roadway (although temporary/short-term detours – no more than two days in duration - would still likely be needed), while Alternative 2 (Existing Corridor: Remain on Existing and Detour Traffic) requires extended closures of the highway during construction (requiring a long detour throughout much of construction).

Alternative 3 (South Corridor: Reconstruct on New Alignment) is the South Corridor alignment retained through the Level 2 Alternatives evaluation process.

Evaluation of Level 2 Alternatives

A more detailed Level 2 evaluation of Alternatives 1, 2 and 3 was conducted based on a set of identified criteria that included transportation needs; key social, economic and environmental factors; and costs. An evaluation matrix was developed to provide a side-by-side comparison of how the alternatives rank within the same criterion. Table 1 highlights the factors that differentiate among the Level 2 Build Alternatives. [5] These are discussed below.

[3] Wetland functions include water quality improvement, floodwater storage, fish and wildlife habitat, aesthetics, and biological productivity. The value of a wetland is an estimate of the importance or worth of one or more of its functions to society

[4] See Section V.A.11.b.iv.a for more information regarding Section 404 regulations

[5] See Level 3 Alternatives, Step 4 (Identification of Preferred Alternative) for a discussion of the relative importance of the 'key' differentiating factors considered in alternatives evaluation and decision-making

Table 1 – Level 2 Alternatives Evaluation Matrix

EVALUATION CRITERIA		No-Build Alternative	Alternative 1 (Minimal Off-Set/ Construct Under Traffic)	Alternative 2 (Remain On Existing And Detour Traffic)	Alternative 3 (Reconstruct with New Alignment)
PRIMARY NEEDS					
Infrastructure Conditions	*Ability to Preserve or Enhance Infrastructure*	Poor (the existing pavement received a "poor" rating in a 2010 assessment)	Good (with new pavement)	Good (with new pavement)	Good (with new pavement)
Safety Improvements	*Ability to Implement Safety Features and Reduce Crashes*	Poor (existing narrow shoulders, steep slopes and inadequate clear zones remain)	Good (Enhanced safety features would be included)	Good (Enhanced safety features would be included)	Good (Enhanced safety features would be included)
SECONDARY NEEDS					
Maintain Mobility	*Total Length of Passing Zones (NB)* *Total Length of Passing Zones (SB)*	NB = 3,200' (0.6 miles) SB = 3,400' (0.6 miles)	NB = 6,100' (1.2 miles) SB = 6,400' (1.2 miles)	NB = 5,300' (1.0 miles) SB = 5,500' (1.1 miles)	NB = 13,300' (2.5 mi.) SB = 12,600' (2.4 mi.)
	Number of Turn Lanes/Bypass Lanes	2 existing RT Lanes 1 Existing Shoulder Bypass Lane	4 new RT Lanes 1 new Shoulder Bypass Lane	4 new RT Lanes 1 new Shoulder Bypass Lane	4 new RT Lanes 1 new Shoulder Bypass Lane
Geometric Design Deficiencies	*Ability to address design deficiencies*	No	Yes	Yes	Yes
	Shoulder Widths	4'	8'	8'	8'
	Minimum Design Speed (Horizontal)	55 mph	55 mph	55 mph	60 mph
	Minimum Design Speed (Vertical)	45 mph	55 mph	55 mph	60 mph
SOCIAL, ECONOMIC & ENVIRONMENTAL IMPACTS					
Right-of-way impacts	*New Right-of-way Needed*	None	35 acres	20 acres	113 acres
Transportation: Maintenance of Traffic[1]	*Ability to maintain traffic through the project area during construction*	No impacts	No full closure required Low level of traffic disruptions, temporary construction detours likely	Full closure required. High level of traffic disruption, lengthy construction detours. .	No full closure required. Low level of traffic disruptions, temporary construction detours likely.
Access to Bear Head Lake State Park	*Ability to maintain access to Bear Head Lake State Park via County Road (Cty Rd) 128 during construction*	No impact, existing access via Cty Rd 128 will be maintained	Minor impact; temporary detours may affect access via Cty Rd 128.	Major impact; Park access is from Cty Rd 128 via Hwy 1/169. Special constructing staging and detour signage would be required to maintain access from either the east (Ely) or west (Tower).	Minor impact; temporary detours may affect access via Cty Rd 128.
Section 106	*Adverse effects on historic properties*	No impacts	No impacts	No impacts	No impacts
Section 4(f) Compliance	*Section 4(f) impacts*	No impacts	No impacts	No impacts	No impacts
Floodplains	*Impact to existing floodplains*	No Impacts	No designated floodplain identified Armstrong Creek Crossing (new culvert may be needed)	No designated floodplain identified Armstrong Creek Crossing (new culvert may be needed)	No designated floodplain identified Armstrong Creek Crossing (new culvert may be needed)
Hazardous/Contaminated Materials	*Contaminated materials impacts*	None	No differentiating impacts anticipated – all identified properties are low risk	No differentiating impacts anticipated – all identified properties are low risk	No differentiating impacts anticipated – all identified properties are low risk

[1] *Potential detours will depend on final design and construction staging*

Blue shading = potentially more important differentiating factors among alternatives

Green shading = other differentiating factors

(Table 1 Continued)

EVALUATION CRITERIA		**No-Build Alternative**	**Alternative 1 (Minimal Off-Set/ Construct Under Traffic)**	**Alternative 2 (Remain On Existing And Detour Traffic)**	**Alternative 3 Reconstruct with New Alignment**
Air Quality	*Impacts to adjacent receptors*	No differentiating impacts anticipated	No differentiating impacts anticipated	No differentiating impacts anticipated	No differentiating impacts anticipated
Noise	*Proximity to Noise Receptors*	No change in proximity to receptors	Minor changes in proximity to receptors	Minor changes in proximity to receptors	Closer to receptors on Sixmile Lake
Visual Quality	*Change in visual environment*	No change	Moderate change with several minor realignments from the existing route	Minor change given less realignment from the existing route	More substantial change with new southern alignment.
Bedrock Excavation	*Volume of estimated rock removal*	None	69,000 cubic yards	127,000 cubic yards	266,000 cubic yards
Earthwork – Excavation	*Volume of estimated "cut" material*	None	278,000 cubic yards	214,000 cubic yards	212,000 cubic yards
Earthwork - Fill	*Volume of estimated "Fill" material*	None	694,000 cubic yards	539,000 cubic yards	1,266,000 cubic yards
Upland Forested Vegetation	*Estimated acres of clearing*	No impacts	48 acres	41 acres	84 acres
Wetlands	*Estimated acres of impact*	No impacts	13.25 acres (no temporary impacts)	6.59 acres (<1 ac. temp.)	17.27 acres (<1 ac. temp.)
Water Quality	*Accommodations to treat runoff and/or seepage from sulfide rock, if required*	No accommodations required	Yes	Yes	Yes
Business Impacts	*Impact of project on businesses in Tower and Ely*	No Impacts	No Impacts	Temporary impacts during construction associated with extended highway closure and lengthy detour routes.	No Impacts
Social/Community	*Community Disruption*	No impacts	Low Temporary detours would impact trip lengths and travel times between Tower and Ely for residents, school bus movements, and emergency service response	High Extended construction detours for the full project area would severely impact social and economic conditions due to longer trips and increased travel times between Tower and Ely for residents, school buses, and emergency service response.	Low Temporary construction detours would impact trip lengths and travel times between Tower and Ely for residents, school buses, and emergency service response.
	Environmental Justice	No impacts	No impacts anticipated; no populations identified; sparsely populated area	No impacts anticipated; no populations identified; sparsely populated area	No impacts anticipated; no populations identified; sparsely populated area
OTHER CONSIDERATIONS					
Municipal Support	*Local government support*	Low	Moderate	Low	High
Construction Cost Estimate [1/]	*2016$*	N/A	$17,300,000	$18,500,000	$21,600,000

1/ Includes estimated costs associated with rock excavation and wetland mitigation activities.

Blue shading = potentially more important differentiating factors among alternatives
Green shading = other differentiating factors

Alternative 1 - Existing Corridor (Minimal Offset/Construct Under Traffic)
Alternative 1 includes safety and mobility improvements in the form of additional passing opportunities, added right turn lanes and a new shoulder bypass lane at 1 location. Passing opportunities for the northbound lane increase by approximately 2,900-feet over the existing condition (No-Build Alternative) and the southbound lane gains 3,000-feet of passing opportunities. Alternative 1 has greater wetland impacts than Alternative 2 (13.25 acres vs. 6.59 acres for Alternative 2), but lower impacts than Alternative 3 (17.27 acres). Alternative 1 has the least amount of bedrock excavation (69,000 cubic yards).[6]

Alternative 1 results in moderate right-of-way impacts (35 acres) and upland forest impacts (48 acres).

Alternative 2 - Existing Corridor (Remain on Existing and Detour Traffic)
Alternative 2 follows the current roadway alignment to the greatest extent possible, thereby minimizing environmental impacts on certain natural resources. Several minor shifts in the alignment are still required in order to meet a 55 mph design speed and all current highway design standards. Similar to the other Build Alternatives, Alternative 2 provides additional passing opportunities, added right turn lanes, and a new shoulder bypass lane at 1 location. The passing opportunities for both the northbound and southbound lanes increase by approximately 2,100-feet each over the existing condition (No-Build Alternative). Alternative 2 has the lowest potential for impacts to wetlands (6.59 acres) and upland forest (41 acres) and the least amount of additional right-of-way needed (20 acres). The estimated bedrock excavation (127,000 cubic yards) is less than Alternative 3, but greater than Alternative 1.

Local agencies and the public raised several social and economic concerns associated with closing the highway to traffic during construction and detouring traffic on an alternative route as is proposed with Alternative 2. A summary of these concerns include:

- Duration of Construction: Construction of Alternative 2 is expected to require 2 full construction seasons. An estimate of required days of detour was generated based on preliminary design information and construction staging assumptions. The estimates indicate that Alternative 2 would require 84 to 140 days of closure/detour during construction, versus an estimated zero to 21 days for Alternative 1 and zero days for Alternative 3.

- Length of Detour: The project is located in an area of northeastern Minnesota that is primarily rural with limited roadways. Since there is a lack of supporting roadways in the area, a construction detour would need to close the highway through much of the project area. The identified detour route is the only viable option available to accommodate existing TH 1/169 traffic. In addition, the nature of the project improvements (vertical and horizontal curve and clear zone improvements), the surrounding landscape of the study area, and lack of other roadways limit the opportunities for shorter detours/minor bypasses or temporary closures. As a result, the only identified detour route would be lengthy as it would need to utilize segments of trunk highways and county roads. Figure 8 shows the Eagles Nest Lake Project Area, existing Highway 1/169 between the cities of Tower and Ely, and the detour route needed if the roadway were to be closed during construction. Table 2 charts the additional vehicle miles traveled between representative origin/destination points.

[6] See Section V.A.10.a. for a discussion of issues related to rock excavation.

Table 2– Potential Detour Distances (One-Way)

Origin	Destination	Distance Under Existing Condition	Distance Under Detoured Condition	Increased Length Due to Detour
City of Tower	City of Ely	21.5 miles	39 miles	17.5 miles
City of Tower	East Project Limit	11.5 miles	49 miles	37.5 miles
West Project Limit	City of Ely	15.6 miles	44.9 miles	29.3 miles
City of Virginia/ Twin Cities Traffic	City of Ely	47 miles	51 mi. (via Hwy 169 to Cty Rd 21)	4 miles

The detour information presented in Table 2 was used as the basis for calculating the estimated associated travel time and travel cost impacts associated with the traffic detour (See *Daily Detour Costs* technical memorandum included as part of the *Alternatives Development and Evaluation Technical Memorandum* in Appendix A of this EA).

Below is an estimate of detour days and associated costs by alternative:

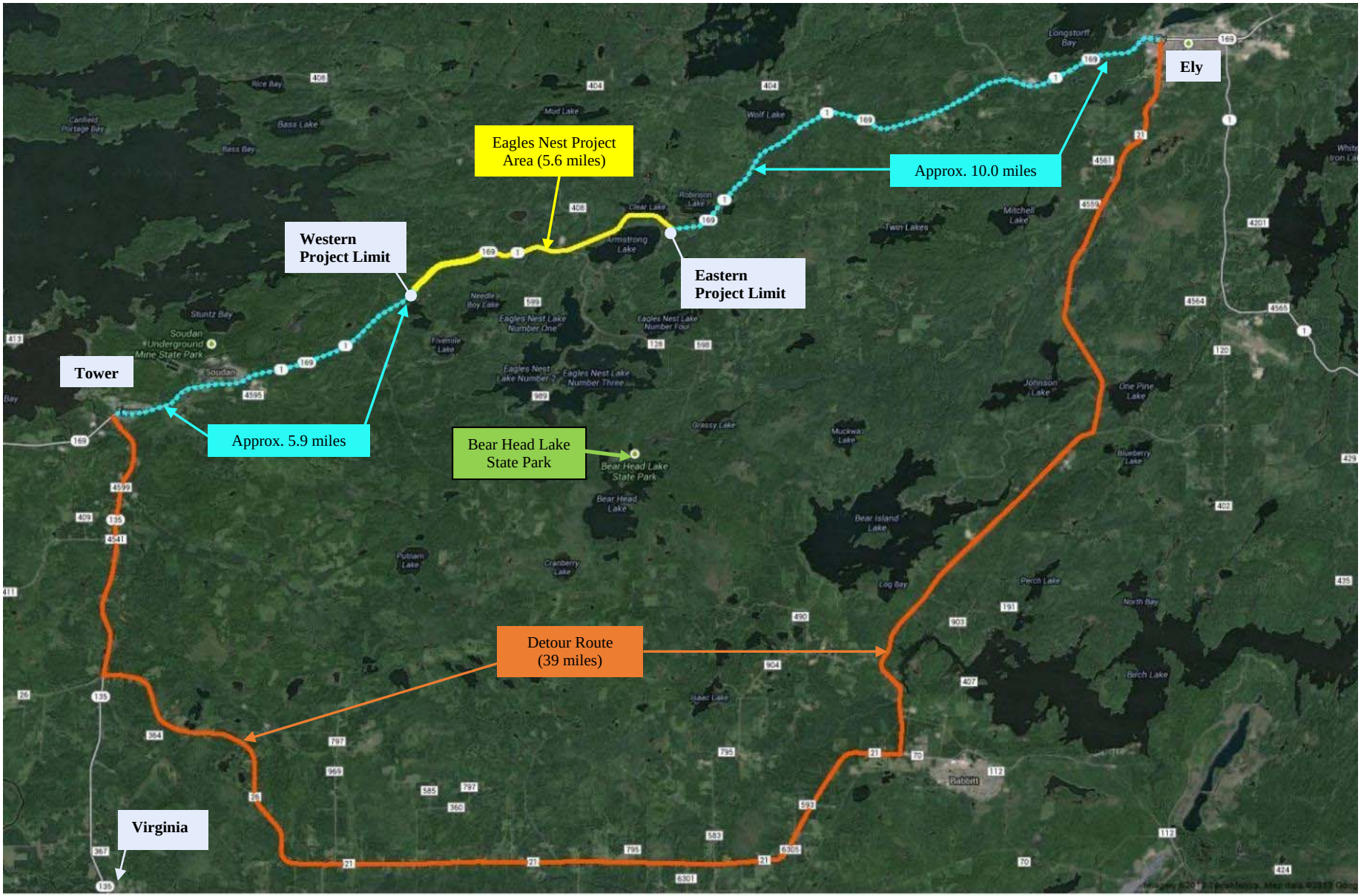
- Alternative 1: 0-21 detour days = $0 to $700,014;
- Alternative 2: 84-140 detour days = $2,800,056 - $4,666,760;
- Alternative 3: 0 detour days = $0

Community Disruption: Based on input received from project stakeholders at public meetings and in correspondence, adverse social and economic effects of the lengthy closure and detouring associated with Alternative 2 would include:

- disrupted and/or closed access to private properties;
- lengthy travel times and distances for residents living and working in the cities of Tower and Ely and the surrounding areas;
- limited access to local businesses, longer trips and added operating costs for school busing, as well as longer trips and added response time for emergency services/responders;
- restricting access to County Road 128 (the only access road to Bear Head Lake State Park) is also a key concern of the MNDNR.

The severity of community disruption and impacts from an extensive detour cannot be precisely quantified due to limited available data related to local economic conditions (sales receipts) travel patterns (origins/destinations), and frequency and location of emergency calls. However, input from project stakeholders provided the basis for assessing potential social and economic impacts of an extensive detour. According to local officials, an extended closure of the highway through the project area, as proposed with Alternative 2, would substantially impact tourist traffic through Tower, which would severely impact local businesses and the regional economy. In addition, the Bois Forte Band of Chippewa, tribal leaders have indicated similar economic concerns and provided documentation of business impacts from a detour on another segment of Highway 1/169 in the summer of 2013. The *Highway 1/169 Eagles Nest Project – Alternatives Development & Evaluation Technical Memorandum,* included in Appendix A includes correspondence from local governments, emergency service providers, and an area school district expressing concerns with an extended closure of the highway.

Figure 8 – Alternative 2 Detour Route



Alternative 3 – South Corridor (Reconstruct on New Alignment)

Alternative 3 includes additional safety and mobility improvements in the form of additional passing opportunities, added right turn lanes and a new shoulder bypass lane at 1 location. This alternative also utilizes a new alignment for the western 2.2 miles of the study area, which allows for traffic to continue on the existing roadway during construction. As shown in Table 1, the passing opportunities for the northbound lane increase by approximately 10,100-feet over the existing condition (No-Build Alternative) and the southbound lane gains an additional 9,200-feet of passing opportunity. The length of passing opportunities under Alternative 3 is the highest among the 3 corridors under consideration. Alternative 3 would result in the most wetland impacts (17.27 acres) and highest amount of right-of-way (113 acres) and upland forest impacts (84 acres). Bedrock excavation associated with Alternative 3 (266,000 cubic yards) is more than double that associated with Alternatives 1 and 2.

Identification of Level 3 Alternatives

West and East Corridor Division

Following the Level 2 evaluation process and in response to the input received from project stakeholders, the project team determined that the next step in the alternatives development and evaluation process needed to focus on the 'differentiating factors' related to need and social, economic and environmental impacts (see the highlighted factors in Table 1). The differentiating factors included passing opportunities, wetland impacts, upland forest vegetation impacts, bedrock excavation, and community disruption (detour length and duration). In reviewing these factors it became evident that there were opportunities for refinement of the Level 2 alternatives to address the purpose and need while further reducing social, economic, and environmental impacts. Dividing the study area into an eastern section and western section would allow for the development of hybrid alternatives that would utilize the western section of 1 alternative and the eastern section of another alternative. The dividing line between the east and west sections occurred at the point where the western re-alignment (for Alternative 3) re-joins the existing highway corridor (see Figure 9).

To address the extensive detour associated with Alternative 2, hybrid options were considered that would decrease the length of corridor requiring closure during construction (i.e. combining a section of Alternative 2 with a section from Alternative 1 or Alternative 3, which do not require closure for construction), without substantially increasing other environmental factors (especially wetlands, since Alternative 2 had the lowest wetland impacts of the 3 Build Alternatives). Wetland impacts were greater on the east sections of Alternatives 1 and 3, so the 'hybrid' options for Alternative 2 focused on use of the west portions of Alternatives 1 and 3 to allow for construction under traffic and reducing the duration for the construction detour. Wetland impacts for the west section of Alternative 1 were greater than the impacts for the west section of Alternative 3 (approximately 6.1 and 3.8 acres, respectively). In addition, the transportation benefits of Alternative 1 west were substantially less than those for Alternative 3 west (6,100-feet and 16,600-feet of northbound and southbound passing opportunity, respectively). Therefore, hybrid Alternative 2A (consisting of the west section of Alternative 3 and the east section of Alternative 2) was determined to have greater transportation benefits and less wetland impacts than other hybrid options, and was recommended for further assessment/comparison (see Table 3).

Figure 9 – Study Corridor – West and East Sections

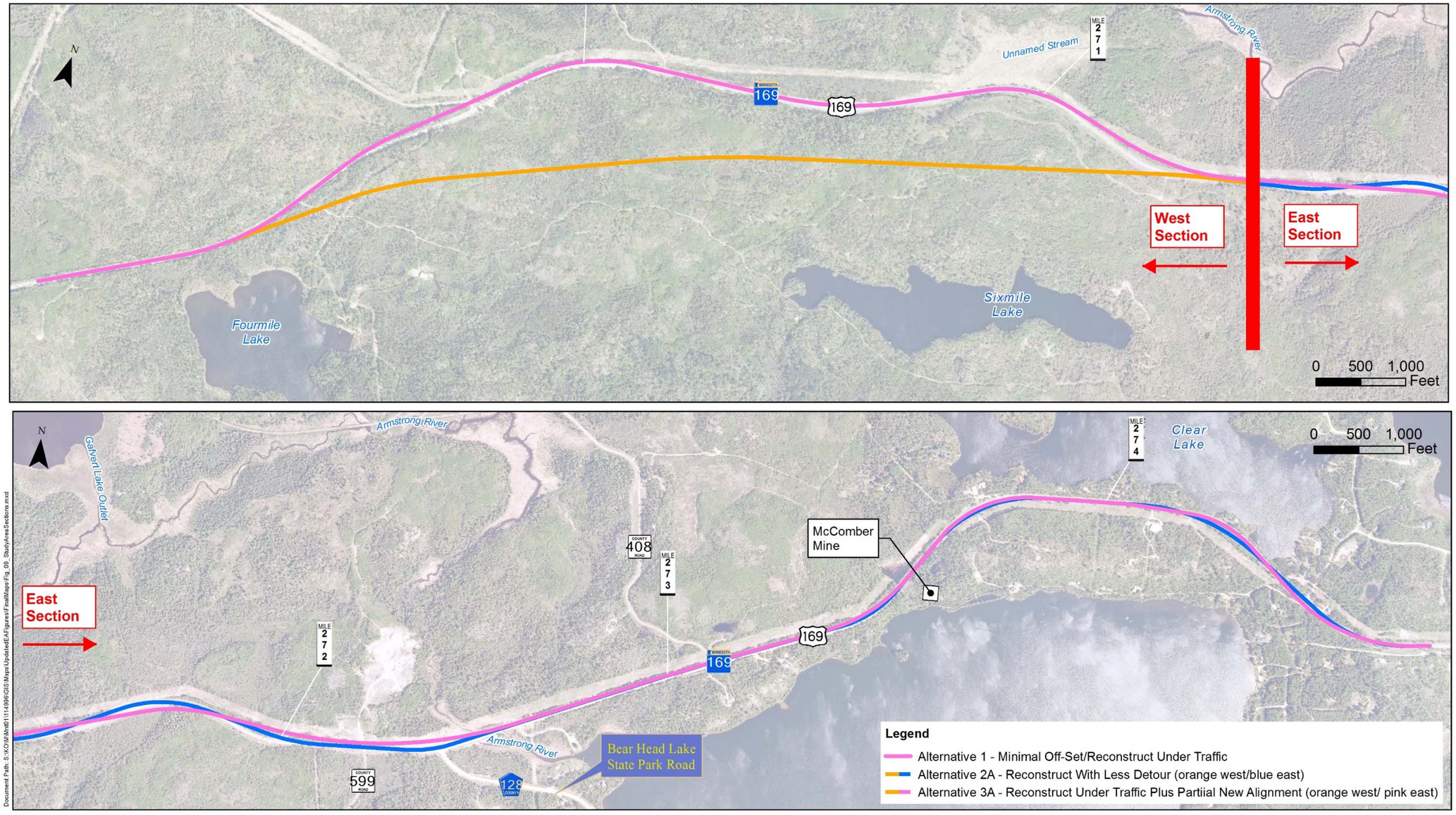


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Table 3 - Level 3 Alternatives: Differentiating Factors

Category	Alternative 1 - Existing Route (Construct Under Traffic)			Alternative 2 - Existing Route (Close Route & Detour Traffic)			Alternative 3 - South Route (Maximize Mobility)			Alternative 2A - Alt. 3 west/Alt. 2 East			Alternative 3A - Alt. 3 west/Alt. 1 East		
	West	*East*	*Total*	*West*	*East*	*Total*	*West*	*East*	*Total*	*West*	*East*	*Total*	*West*	*East*	*Total*
Passing Opportunities															
Northbound Lengths (ft.)	3,100'	3,000	***6,100'***	3,100'	2,200'	***5,300'***	8,800'	4,500'	***13,300'***	8,500' [1/]	2,200'	***10,700'***	8,800'	3,000'	***11,800'***
Southbound Lengths (ft.)	3,000'	3,400'	***6,400'***	2,100'	3,400'	***5,500'***	7,800'	4,800'	***12,600'***	7,200' [1/]	2,500' [1/]	***9,700'***	7,500' [1/]	3,400'	***10,900'***
Wetland Impacts (acres) [2/]	6.1 ac.	7.2 ac.	***13.3 ac.***	3.8 ac.	2.8 ac.	***6.6 ac.***	3.8 ac.	13.5 ac.	***17.3 ac.***	3.8 ac.	2.8 ac.	***6.6 ac.***	3.8 ac.	7.2 ac.	***11.0 ac.***
Forested Vegetation/Clearing (acres)	21.7 ac.	26.5 ac.	***48.2 ac,***	17.7 ac.	23.6 ac.	***41.3 ac.***	48.9 ac.	35.3 ac.	***84.2 ac.***	48.9 ac.	23.6 ac.	***72.5 ac.***	48.9 ac.	26.5 ac.	***75.4 ac.***
Rock Excavation	38,000 CY	31,000 CY	***69,000 CY***	11,000 CY	116,000 CY	***127,000 CY***	132,000 CY	134,000 CY	***266,000 CY***	132,000 CY	116,000 CY	***248,000 CY***	132,000 CY	31,000 CY	***163,000 CY***

Notes:

1) The Passing Sight Distances vary for Alternatives 2A and 3A compared to the East and West sections of Alternatives 1, 2 and 3 which they are comprised. The differences result from horizontal and vertical alignment adjustments required to link the East and West sections of each hybrid alternative.

2) Impact values have been rounded up to single decimal point.

3) Cell colors correlate to alignment colors in Figure 5

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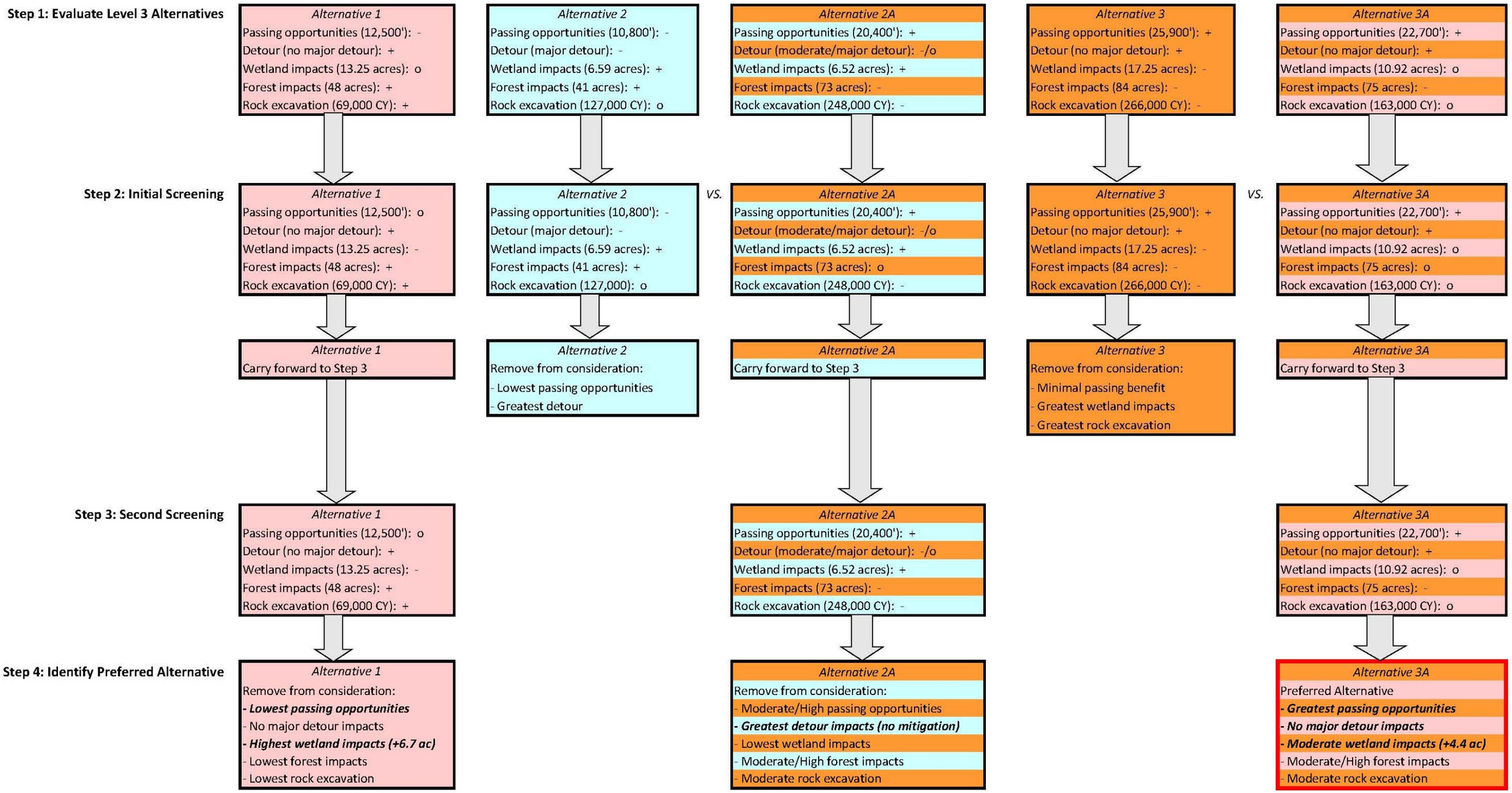
Figure 10 – Evaluation and Screening Sequencing for Level 3 Alternatives



Notes:

- Color shading correlates to the alignment colors on Figure 9.
- Wetland impacts in Step 4 reflect the amount greater than the least impact alternative (Alt. 2A).

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To decrease the substantial wetland and rock excavation at the east section of Alternative 3, hybrid options using the eastern section of Alternatives 1 and 2 combined with the western section of Alternative 3 were assessed. The combination of Alternative 3 west and Alternative 2 east was already used to make hybrid Alternative 2A described above. Combining the west portion of Alternative 3 (no detour and low wetland impacts) with the east section of Alternative 1 (no detour and fewer wetland impacts than Alternative 3 east) was determined to be a good hybrid alternative (Alternative 3A) to be carried forward for further assessment/comparison.

In summary, the Level 3 alternatives development process concluded that there were 2 additional alternatives that could better address the differentiating factors of concern for Alternatives 2 and 3, which include:

- Alternative 2A – Includes the western section of Alternative 3 and the eastern section of Alternative 2 (to decrease the length of detour, without substantially increasing wetland impacts).
- Alternative 3A –Includes the western section of Alternative 3 and the eastern section of Alternative 1 (to decrease wetland and rock excavation impacts compared to Alternative 3, while not substantially affecting the transportation benefits provided by Alternative 3)

Evaluation and Screening of Level 3 Alternatives

With 5 alternatives under consideration (Alternatives 1, 2, 3, 2A, 3A), a sequential evaluation and screening process was conducted in an effort to identify a Preferred Alternative. The four-step process is described below and illustrated in Figure 10.

Step 1: Evaluate Level 3 Alternatives

Quantifiable differentiating factors (passing opportunities, wetlands, forest vegetation, and rock excavation) shown in Table 3 plus the relative detour impacts were utilized to make comparative rankings (positive "+", neutral "o", and negative "-")[7] for the alternatives. The attributes of each alternative and comparative rankings are summarized below:

- Alternative 1 (Minimal Offset/Reconstruct Under Traffic)
  - lower level of passing opportunities (12,500-feet of passing zones) – "-" negative rating;
  - does not require a major construction detour – "+" positive rating;
  - moderate wetland impacts (13.25 acres) – "o" neutral rating;
  - lower forestland impacts (48 acres) – "+" positive rating;
  - lower rock excavation (69,000 cubic yards) – "+" positive rating
- Alternative 2 (Reconstruct on Existing and Detour Traffic)
  - lowest level of passing opportunities (10,800-feet of passing zones) – "-" negative rating;
  - requires a long duration construction detour – "-" negative rating;
  - lower wetland impacts (6.59 acres) – "+" positive rating;
  - lowest forestland impacts (41 acres) – "+" positive rating;
  - moderate rock excavation (127,000 cubic yards) – "o" neutral rating

[7] Neutral measure is for impacts that are not substantially more beneficial or adverse when compared to the other alternatives under consideration.

- Alternative 2A (Reconstruct with Less Detour: Alt. 3-west/Alt. 2-east)
  - more substantial passing opportunities (20,400-feet of passing zones) – "+" positive rating;
  - requires a moderate duration construction detour – "-/o" negative/neutral rating;
  - lower wetland impacts (6.52 acres) – "+" positive rating;
  - moderate forestland impacts (73 acres) – "o" neutral rating;
  - higher rock excavation (248,000 cubic yards) – "-" negative rating
- Alternative 3 (Construct on New Alignment)
  - The most passing opportunities (25,900-feet of passing zones) – "+" positive rating;
  - does not require a major construction detour – "+" positive rating;
  - highest wetland impacts (17.25 acres) – "-" negative rating;
  - highest forestland impacts (84 acres) – "-" negative rating;
  - highest rock excavation (266,000 cubic yards) – "-" negative rating
- Alternative 3A (Partial New Alignment plus Reconstruct Under Traffic: Alt. 3-west/Alt. 1-east)
  - more substantial passing opportunities (22,700-feet of passing zones) – "+" positive rating;
  - does not require a major construction detour – "+" positive rating;
  - moderate wetland impacts (10.92 acres) – "o" neutral rating;
  - moderate forestland impacts (75 acres) – "o" neutral rating;
  - moderate rock excavation (163,000 cubic yards) – "o" neutral rating

In addition, the detour days and associated cost estimates were updated to include Alternatives 2A and 3A, resulting in the values in Table 4:

Table 4 – Detour Days and Estimated User Costs for Build Alternatives

Alternative	Estimated Days of Detour	Estimated User Costs
Alternative 1	0-21 detour days	$0 to $700,014
Alternative 2	84-140 detour days	$2,800,056 - $4,666,760
Alternative 2A	50-70 detour days	$1,666,700 to $2,333,380
Alternative 3	0 detour days	$0
Alternative 3A	0-15 detour days	$0 to $500,010

Step 2: Initial Screening

Based on the Step 1 findings, Alternatives 2 and 3 were eliminated from further consideration given the following:

- Alternative 2 – provides the least amount of passing opportunities and has the most substantial construction period traffic detour impacts;
- Alternative 3 – when compared to Alternative 3A, provides only slightly greater passing opportunities, has the highest wetland impacts, and has the highest rock excavation quantities.

Step 3: Second Screening

Alternatives 1, 2A, and 3A were further compared against each other with continued focus on the differentiating factors. The second screening is illustrated on Figure 10 and summarized below. Figures depicting the preliminary design of these 3 Build Alternatives are included in Appendix G.

- Alternative 1 (compared against Alternatives 2A and 3A)
  - least amount of passing opportunities;
  - does not require a major construction detour;
  - highest wetland impacts;
  - lowest forest impacts;
  - lowest rock excavation quantities
- Alternative 2A (compared against Alternatives 1 and 3A)
  - higher amount of passing opportunities compared to Alternative 1; slightly lower passing opportunities than Alternative 3A;
  - only alternative that requires a major construction detour;
  - lowest wetland impacts;
  - higher forest impacts than Alternative 1; slightly lower impacts compared to Alternative 3A;
  - highest rock excavation quantities
- Alternative 3A (compared against Alternatives 1 and 2A)
  - The most passing opportunities;
  - does not require a major construction detour;
  - higher wetland impacts compared to Alternative 2A; lower wetland compared to Alternative 1;
  - highest forest impacts;
  - higher rock excavation compared to Alternative 1, but lower compared to Alternative 2A

Stakeholder/Agency Input for Step 3 Decision-Making: The results of the Step 3 screening assessment were presented to a number of project stakeholder groups including the TH 169 Task Force; at public meeting held in July 2014; federal elected officials' staff; and the Bois Forte Band of Chippewa. Input from the stakeholders indicated that most agreed that Alternative 3A reduces environmental impacts compared to Alternative 3 while still providing substantial transportation safety and mobility benefits. Most meeting attendees were concerned about potential social/economic impacts from Alternative 2A. Local stakeholders with concerns about the potential water quality impacts from rock excavation[8] also voiced concern about the project, since all of the build alternatives require rock excavation. In addition to the stakeholder meetings, MnDOT and FHWA staff also met with the United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE), who are serving as Cooperating Agencies,[9] to discuss the alternatives evaluation and screening process.

[8] See a detailed discussion of issues related to rock excavation in Section V.A.10.a of this EA.

[9] A cooperating agency is any Federal agency, other than the lead agency, that has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposed project or project alternative.

Step 4: Identification of Preferred Alternative

Based on the comparison of Alternatives 1, 2A and 3A presented in the Step 3 screening, stakeholder input, and the information gathered throughout the alternatives development and evaluation process, MnDOT has identified Alternative 3A as the Preferred Alternative for the project. The rationale for this decision is centered on the following key social, economic, and environmental factors:

- avoiding major/extended construction detours
- minimizing wetland impacts

These factors were deemed most important based on the analysis conducted and the substantial amount of stakeholder input received throughout the project development process. Based on this, the following conclusions were reached:

- In considering construction detours: The magnitude of this issue with respect to social and economic impacts was noted in the Evaluation of Level 2 Alternatives section. This factor is especially important to local stakeholders because of the length of the required detour (see Table 2); the travel time impacts to emergency service providers (and, therefore, potentially to public safety); time and cost impacts to school districts; the potential for economic impacts to area businesses; and the increased travel distance, time, and costs incurred by highway users (see Table 4). Several letters were received by jurisdictions in the study area detailing the specifics of the concerns associated with the construction detour. These letters are included in the *Highway 1/169 Eagles Nest Project – Alternatives Development & Evaluation Technical Memorandum*, found in Appendix A of this EA. Because there are no alternative detour routes (since there are few public roads in this area), no mitigation for these potential impacts has been identified. Alternative 3A and Alternative 1 do not require a long term construction detour which would be required with Alternative 2A.
- In considering wetland impacts: Consideration of wetland impacts is very important, since wetland regulations have specific requirements for consideration of avoidance and minimization of impacts, in addition to mitigation, as part of the wetland permitting process. Alternative 3A results in 10.92 acres of impacts. By comparison, Alternative 1 creates 13.25 acres of wetland impacts and Alternative 2A has 6.52 acres of impact. Though Alternative 2A has approximately 4.4 acres less wetland impact than Alternative 3A, it requires an extended construction period detour for which there is no mitigation. Therefore, since Alternative 1 would result in approximately 6.7 acres more impacts to wetlands than Alternative 2A, Alternative 3A minimizes wetland impacts while avoiding the substantial social and economic impacts of the Alternative 2A detour.

Also, the transportation benefits of each alternative were important considerations when comparing alternatives in Step 4. All of the alternatives considered in the screening process address the primary project needs, so primary needs are not a differentiating factor. The alternatives do vary in their ability to maintain mobility (a secondary need). It is not essential that the Preferred Alternative provides the highest level of mobility, especially if there are negative environmental impacts associated with the features that provide the additional mobility. However, since providing additional mobility by increasing the amount of passing opportunities also provides an incremental safety benefit, this factor was considered (in conjunction with the 2 environmental factors described above) in comparing the 3 alternatives in Step 4. Alternative 1 provides the least amount of passing opportunities (12,500-feet) and also has the most wetland impacts. Alternative 2A provides 20,400-feet of passing opportunities and has the lowest wetland impacts, but it is the alternative with the most substantial social and economic impacts due to extended

construction detours. Alternative 3A provides the most passing opportunities (22,700-feet) with fewer wetland impacts than Alternative 1 and less detour impacts than Alternative 2A.

Other differentiating factors were also considered in the assessment, but were not as key in the selection of the Preferred Alternative as the factors noted above:

- Rock Excavation: Increased rock excavation increases the potential to encounter acid-producing (sulfide-bearing) rock, which has been identified as a potential environmental concern by local stakeholders. However, this issue has not been identified as being critical to the alternatives screening process since, as described in Section V.A.10.a of this EA, discussions with state regulatory agency staff have identified a process for identifying the potential risk for encountering acid-producing rock and mitigation strategies/practices to avoid/minimize environmental harm. Since the potential impacts can be avoided, minimized and mitigated, the differences in rock excavation among alternatives was not considered to be a key deciding factor in the Preferred Alternative identification process.
- Forest/Vegetation Impacts: Increased forest/vegetation impacts could result in increased wildlife habitat impacts. However, no rare or unique ecosystems were identified in the project area and the project is located in an area of extensive forest cover of essentially the same types of forest as the forests affected by project alternatives. Since the forest types are not unique and since wildlife impacts could be mitigated (e.g., by limiting clearing activities to seasons that do not affect nesting), this impact was not a key deciding factor in the Preferred Alternative identification process. Based on consideration of the items described above, Alternative 3A was identified as the Preferred Alternative because: 1) it does not result in extensive logistical issues from detouring; 2) it has lower wetland impacts than the other alternative that avoids extensive detouring; and 3) it provides the most substantial transportation benefits, compared to the other 2 alternatives.

Description of Preferred Alternative

Alternative 3A (Partial New Alignment Plus Construct Under Traffic) has been identified as the Preferred Alternative for the Eagles Nest Lake Improvement Project. From the west, Alternative 3A begins approximately 0.1 miles west of Sixmile Lake Road and continues east to approximately 0.1 miles east of Bradach Road. The total project length is approximately 5.7 miles of which 3.5 miles are on the existing highway corridor and 2.2 miles are on a new alignment. The Preferred Alternative is a 2-lane rural highway section with a 55mph design speed. The roadway typical section includes 12-foot driving lanes, 8-foot (6-foot paved and 2-foot gravel) outside shoulders, recoverable ditch slopes (4:1) where possible, and wide clear zones. Right turn/bypass lanes will be included at key intersections. The rural highway section includes adjacent grass drainage ditches that will collect, infiltrate, and convey roadway runoff. Figures 11 through 15 on the following pages depict the preliminary design of the Preferred Alternative.

Beginning from the west project termini (near Sixmile Lake Road), the Preferred Alternative will follow the existing Highway 1/169 alignment for a short distance before splitting from the existing alignment onto a new southerly alignment for approximately the western third of the project area. This portion of the Preferred Alternative will provide extended passing opportunities in both southbound and northbound directions. The construction of a new alignment in this area requires clearing of existing vegetation and bedrock excavation in order to construct the highway alignment to improve safety. A new intersection will be constructed where the new Highway 1/169 alignment intersects Sixmile Lake Road. The old highway will also be connected to this new intersection. It should be noted that portions of the existing Highway 1/169 located north of the proposed new alignment are expected to be conveyed to a local jurisdiction (county or township) and remain in-place to provide access to existing private properties. Other portions of the existing

roadway may be utilized as part of the future Mesabi Regional Trail corridor that is in the early planning stages for expanding the trail through the Eagles Nest Lake area, if the Trail planning has progressed far enough to define if/how it would utilize the abandoned roadway. If the Trail plans are still undefined at time of final design for the Highway 1/169 project or if the Trail does not need the old roadbed, the final plans for the project would include removal of the existing pavement surface in locations where the roadway is not needed for local access. In locations where the pavement is removed the roadway corridor would be planted with native vegetation. The final design plans will further define the treatment for the portion of the existing highway corridor that will no longer be utilized as a result of the new alignment for the Preferred Alternative.

The Preferred Alternative rejoins the existing highway alignment just east of milepost 271 (see Figure 13). From this point the Preferred Alternative utilizes the existing highway alignment to the extent possible, but does require minor alignment shifts to the north and south in order to allow the transportation improvements to be constructed under traffic. These alignment shifts require bedrock excavation and vegetation clearing, but also enable traffic to remain on the existing lanes while the new highway section is being built. Once the new highway section is complete in this area, portions of the old highway (pavement and roadbed) may be removed and restored with native vegetation. Within the central portion of the Preferred Alternative (Figures 13 and 14), intersection improvements are proposed at County Road (CR) 599, CR 128/Bear Head Lake State Park Road, and CR 408. These improvements include turn and/or bypass lanes, which will enhance corridor mobility and improve safety conditions.

The eastern third of the Preferred Alternative (Figures 11 and 12) again utilizes the existing highway alignment to the extent possible, but does require minor alignment shifts in order to allow the corridor remain open to traffic during construction. Again several areas of bedrock excavation and vegetation clearing is required. Due to greater levels of development (primarily near Armstrong Lake and Clear Lake), several driveway modifications will be required to match the new highway alignment.

Assessment of Alternatives Impacts in This EA

In addition to describing the potential social, economic and environmental impacts for the Preferred Alternative for this project – Alternative 3A – Section V of this EA also describes the impacts of the other two Level 3 Alternatives (Alternatives 1 and 2A). This information is being provided to support the Level 3 screening and evaluation/decision-making process described above, and to provide information to address stakeholder comments/questions that have been conveyed to MnDOT to date regarding relative impacts and benefits – with the intent of providing a more comprehensive record of the alternatives decision-making process. Figures depicting the preliminary design of the three Build Alternatives, used as the basis for assessing impacts, are included in Figures 11-15 (for the Preferred Alternative) and in Appendix H (for Alternatives 1 and 2A).

Figure 11 – Preferred Alternative Preliminary Layout – Sheet 1 of 5

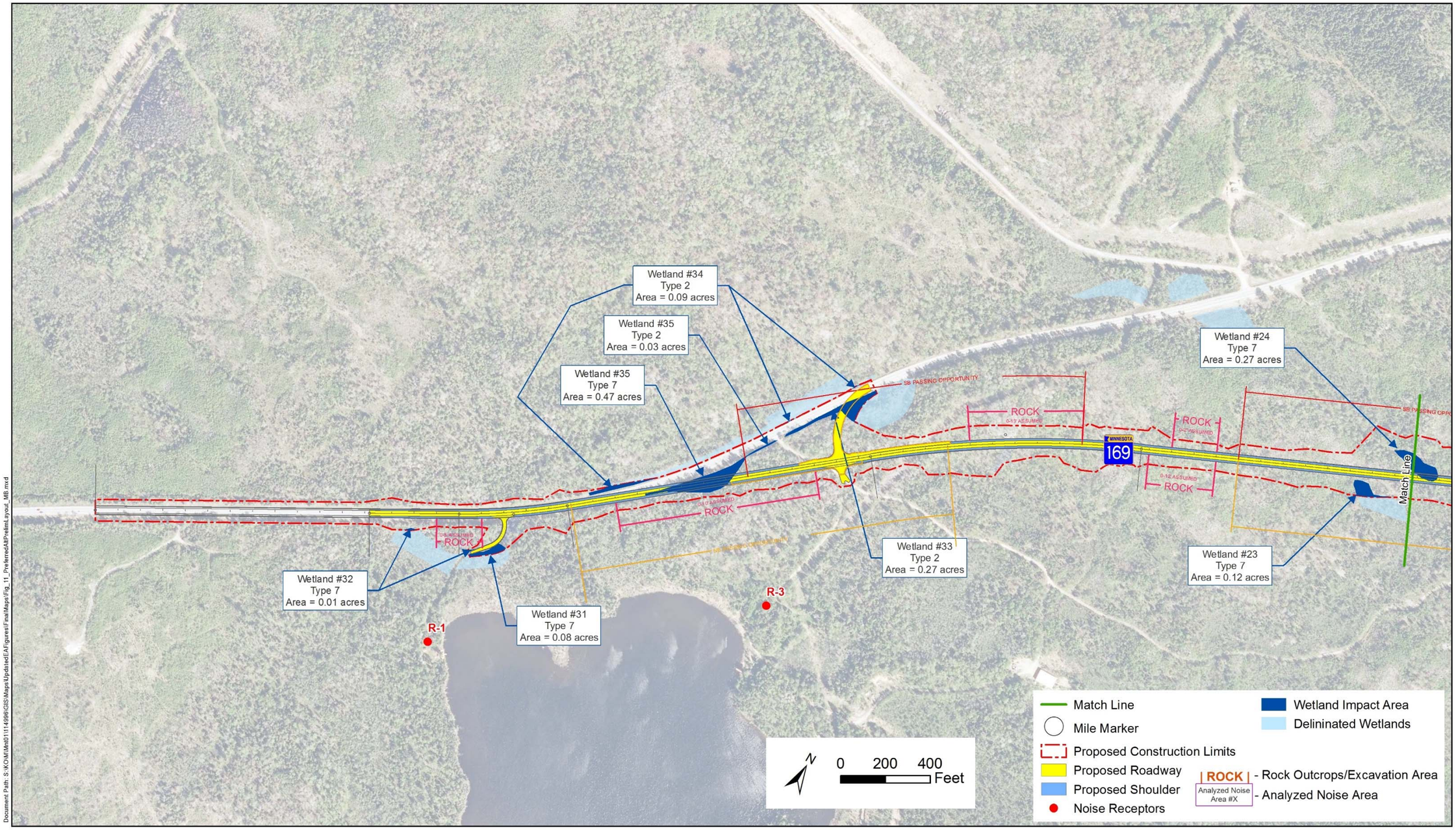

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Figure 12 – Preferred Alternative Preliminary Layout – Sheet 2 of 5

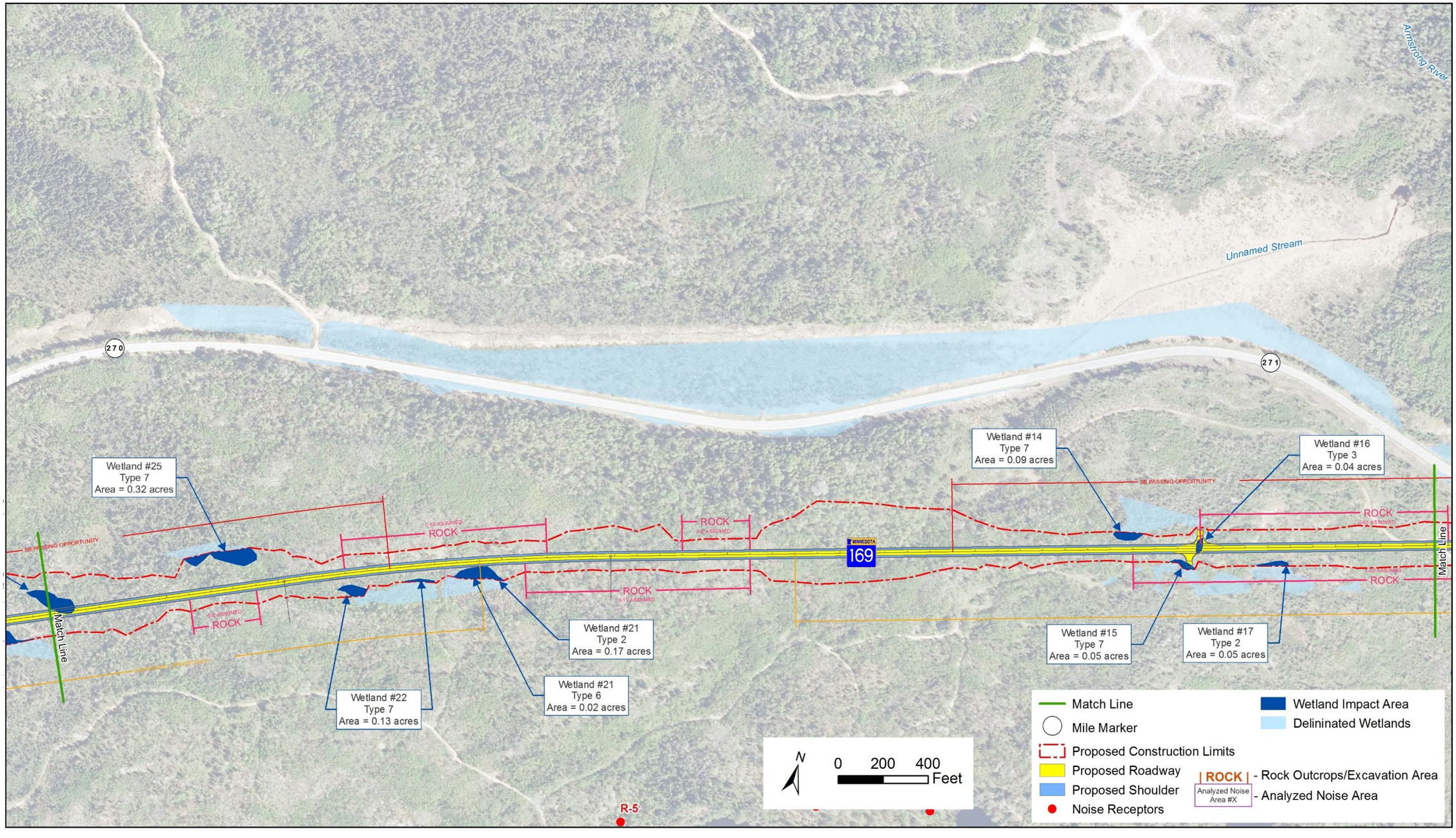

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Figure 13 – Preferred Alternative Preliminary Layout – Sheet 3 of 5

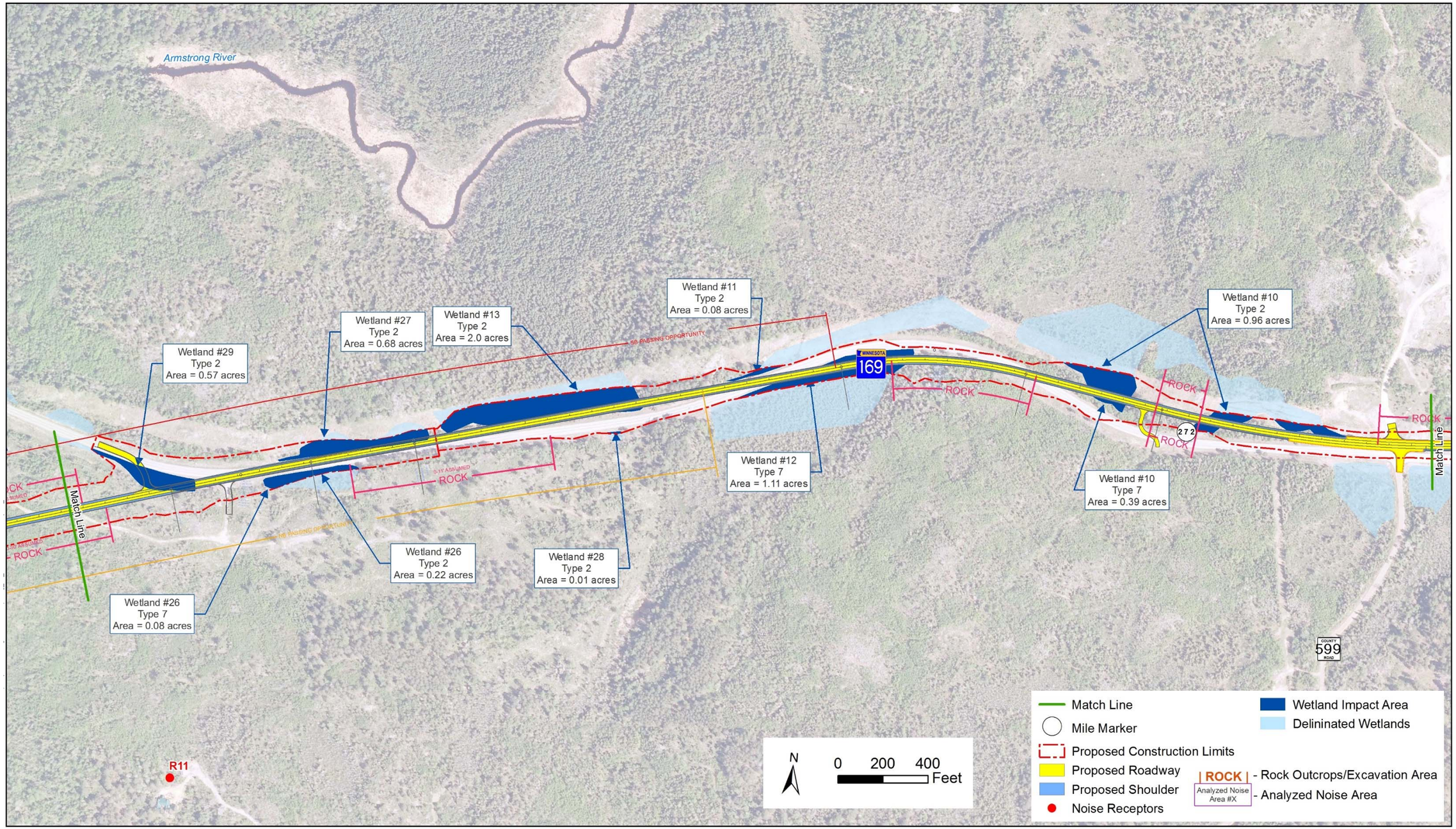

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Figure 14 – Preferred Alternative Preliminary Layout – Sheet 4 of 5

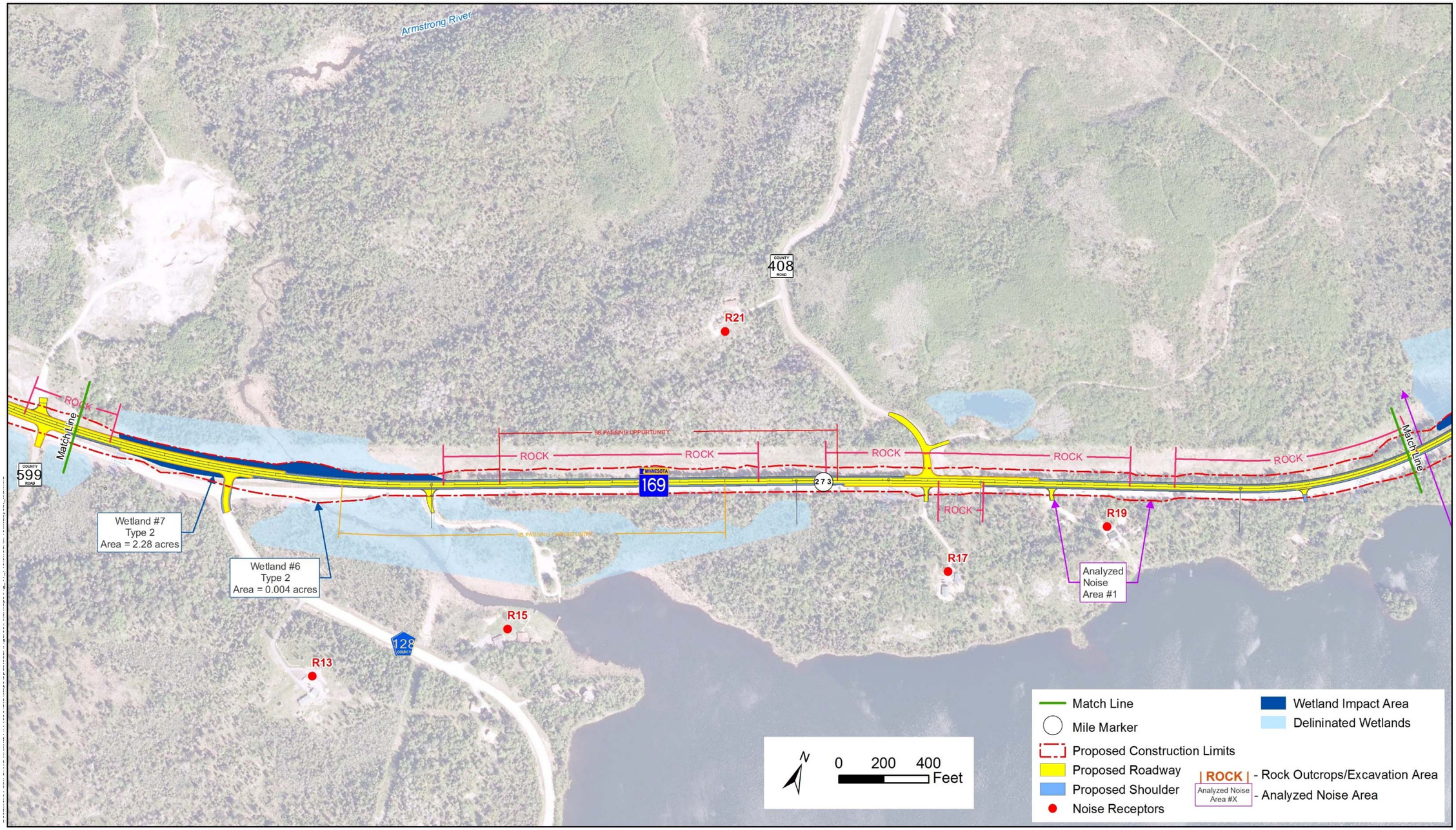

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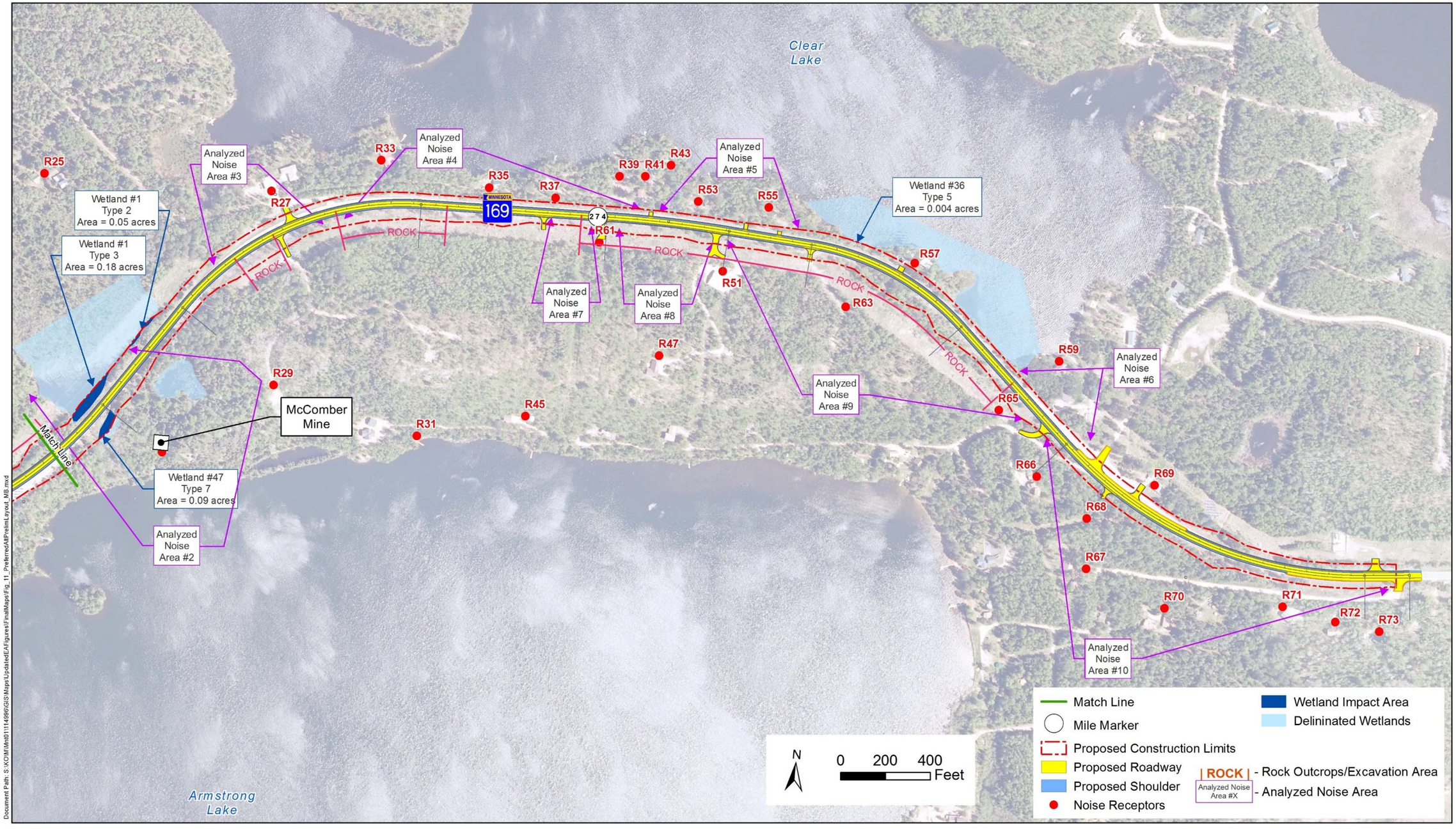
Figure 15 – Preferred Alternative Preliminary Layout – Sheet 5 of 5



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A. BENEFIT COST ANALYSIS

In August 2014, a benefit/cost (B/C) analysis was completed for the three project alternatives retained for analysis in the Level 3 Assessment discussed above. The purpose of a B/C analysis is to bring all of the direct effects of a transportation investment into a common measure (dollars), and to allow for the fact that benefits accrue over a long period of time while costs are incurred primarily in the initial years of the project. The primary elements that can be monetized for transportation projects are travel time, changes in vehicle operating costs, changes in crashes, and remaining capital value. Projects are considered cost effective if the B/C ratio is greater than 1.0. The B/C Analysis can provide an indication of the economic desirability of an alternative, but results must be weighted by decision-makers along with the assessment of other effects and project impacts. This analysis that was completed for the three Build Alternatives being considered evaluates the difference in transportation user costs against the No-Build Alternative. The B/C results for the Build Alternatives are shown below in Table 5. Additional details are provided in the B/C Memorandum in Appendix B.

Table 5 – Summary of Benefit-Cost Analysis

Scenario	Alternative 1	Alternative 2A	Alternative 3A
VMT & VHT Benefit	($546,227)	$136,600	$273,027
Crashes Benefit	$15,542,062	$15,622,073	$15,638,075
Operating and Maintenance Benefit	$3,639,153	$3,676,452	$3,683,912
Total Benefit	**$18,634,987**	**$19,435,125**	**$19,595,013**
Total Costs (Present Value)	$21,795,016	$25,369,787	$23,845,272
Remaining Capital Value (RCV)	$5,774,931	$7,064,451	$6,515,838
Total Cost – RCV	**$16,020,085[a]**	**$18,305,336 [a]**	**$17,329,434[a]**
Benefit-Cost Ratio	**1.16**	**1.06**	**1.13**

[a] calculated remaining capital value differs from total construction cost.

The preliminary analysis indicates that all 3 alternatives have a benefit cost ratio greater than 1.0. Meaning, the vehicle miles travelled (VMT) and vehicle hours travelled (VHT) and crash reduction benefits of the project are estimated to be greater than the costs associated with the construction of the alternatives.

At this level of analysis, the magnitude of the B/C ratio is not as important as the overall finding that the ratio is greater than 1. Further refinements to the VMT and VHT values are possible using different traffic models and methods. However, this basic analysis indicates that all three proposed Build Alternatives are economically viable.

IV. PROJECT COST, FUNDING & SCHEDULE

A. PROJECT COST AND FUNDING

The estimated construction costs ($2016 – not including engineering costs) of the Level 3 Screening Alternatives are as follows:

- Alternative 1 – $17.3 Million
- Alternative 2A – $20.2 Million
- Alternative 3A (Preferred Alternative) – $19.0 Million

The Highway 1/169 Eagles Nest Lake Area Improvement Project is funded through the use of Federal High Priority Project (HPP) funds and state funds. The project is listed in the current 2014-2017 State Transportation Improvement Program (STIP) under Fiscal Year 2017, Seq.#191. The funding sources listed for the proposed project in the current STIP are as follows (note; the referenced STIP reflects $2014):

Federal HPP Funds:	$15,336,737
State TH Funds	$2,863,263
Estimated Total Cost:	$18,200,000 (Alternative 3A – Preferred Alt.)

B. ANTICIPATED SCHEDULE

The project is anticipated to be completed according to the following schedule.

Environmental Assessment	November 2014
EIS Need Decision	January 2015
Right-of Way Acquisition	Jan. 2015- Nov. 2015
Construction Letting	Fall 2015/Spring 2016

V. SOCIAL, ECONOMIC, AND ENVIRONMENTAL IMPACTS

This section discusses environmental impacts of alternatives identified in the Alternatives section. It contains 2 sub-sections:

- State Environmental Assessment Worksheet (EAW)
- Additional Federal Issues

The EAW is a standard format used in Minnesota for environmental review of projects meeting certain thresholds outlined in Minnesota Rule 4410.4300. Federal environmental regulations not addressed in the EAW are addressed in separate sub-sections which follow the EAW.

A. ENVIRONMENTAL ASSESSMENT WORKSHEET (EAW)

The EAW form and Guidelines are available at the Environmental Quality Board's website at: http://www.eqb.state.mn.us/EnvRevGuidanceDocuments.htm.
The EAW form provides information about a project that may have the potential for significant environmental effects. The EAW Guidelines provide additional detail and resources for completing the EAW form.

Cumulative potential effects can either be addressed under each applicable EAW Item, or can be addresses collectively under EAW Item 19.

Note to reviewers: Comments must be submitted to the RGU during the 30-day comment period following notice of the EAW in the *EQB Monitor*. Comments should address the accuracy and completeness of information, potential impacts that warrant further investigation and the need for an EIS.

1. Project Title:

Highway 1/169 Eagles Nest Lake Area Improvement Project

2. Proposer:

Minnesota Department of Transportation

3. RGU:

Same as Proposer

Contact person: Duane Hill
Title: MnDOT District 1 -District Engineer
Address: 1123 Mesaba Avenue
City, State, ZIP: Duluth, MN 55811
Phone: 218-725- 2700
Email: Duane.Hill@state.mn.us

Contact person: Michael Kalnbach
Title: Project Manager
Address: 1123 Mesaba Avenue
City, State, ZIP: Duluth, MN 55811
Phone: 218-725-2745
Email: Michael.kalnbach@state.mn.us

4. Reason for EAW Preparation:

(check one)

Required:
☐ EIS Scoping
☒ Mandatory EAW

Discretionary:
☐ Citizen petition
☐ RGU discretion
☐ Proposer initiated

If EAW or EIS is mandatory give EQB rule category subpart number(s) and name(s):

EQB Rule: 4410.4300 Subp. 22A - Highway Projects "*construction of a road on a new location over one mile in length*" [since substantial re-alignment of a portion of the roadway is being proposed]

5. Project Location:

See Figure 1 and 2

County: St. Louis
City/Township: Eagles Nest Township
PLS Location (¼, ¼, Section, Township, Range): Pt. of Sec. 13, 14, 15, 16, 17, 19, 20, T62N R14W
Watershed: Vermilion River
GPS Coordinates: N/A (linear roadway project)
Tax Parcel Number: N/A (linear roadway project)

At a minimum attach each of the following to the EAW:

- County map showing the general location of the project (See Figures 1 and 2);
- U.S. Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries (photocopy acceptable); and (See Figure 1)
- Site plans showing all significant project and natural features. Pre-construction site plan and post-construction site plan. (See Preferred Alternative layouts in Figures 11-15 in Section III. Alternatives; Alternatives 1 and 2A are shown in the figures in Appendix H)

6. Project Description

a. Provide the brief project summary to be published in the *EQB Monitor*, (approximately 50 words).

The Highway 1/169 Eagles Nest Lake Area Project is located in rural St. Louis County, in northeastern Minnesota. The project area includes approximately 5.7 miles of Highway 1/169 from approximately 0.1 miles west of the Sixmile Lake Road intersection on the west to approximately 0.1 miles east of Bradach Road on the east. The project includes widening the shoulders, expanding the clear zones, adding turn/bypass lanes and passing opportunities, and realignment of portions of the highway.

b. Give a complete description of the proposed project and related new construction, including infrastructure needs. If the project is an expansion include a description of the existing facility. Emphasize: 1) construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes, 2) modifications to existing equipment or industrial processes, 3) significant demolition, removal or remodeling of existing structures, and 4) timing and duration of construction activities.

Section III. Alternatives, contains a complete description of the alternatives considered. Section IV.B lists the anticipated project schedule.

c. Project Magnitude:

Total Project Acreage (area within proposed right-of-way limits for each alternative)	Alternative 1: 136 acres Alternative 2A: 187 acres Alternative 3A: 194 acres
Linear project length	Approximately 5.7 miles
Number and type of residential units	N/A
Commercial building area (in square-feet)	N/A
Industrial building area (in square-feet)	N/A
Institutional building area (in square-feet)	N/A
Other uses – specify (in square-feet)	N/A
Structure height(s)	N/A

d. Explain the Project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries.

Section II, earlier in the document, provides a complete description of the project's purpose and need. The project will be carried out by the Minnesota Department of Transportation (MnDOT). Beneficiaries of the project will include motorists in the immediate area and region since the highway improvements are anticipated to improve safety conditions and traffic operations/mobility for the travelling public.

e. Are future stages of this development including development on any other property planned or likely to happen? ☐ Yes ☒ No If yes, briefly describe future stages, relationship to present project, timeline and plans for environmental review.

f. Is this project a subsequent stage of an earlier project? ☐ Yes ☒ No If yes, briefly describe the past development, timeline and any past environmental review.

7. Cover Types:

Estimate the acreage of the site with each of the following cover types before and after development:

A GIS land use/land cover dataset, obtained from St. Louis County, was used to estimate "Before" and "After" acreages for each alternative under consideration (see Table 6). For the 3 Build Alternatives, the analysis of cover types before and after were calculated for the area within the proposed right-of-way limits of each alternative. As a result, the total area impacted varies among the 3 alternatives. These estimations are based on preliminary design information and are subject to change throughout the design and construction phases of the project.

Table 6 – Project Study Area: Before and After Cover Type Estimates

Cover Type	Alternative					
	Alternative 1 Minimal Off-Set/Construct Under Traffic		Alternative 2A Reconstruct on Existing With Detour		Alternative 3A (Preferred Alternative) Reconstruct Under Traffic Plus Partial New Alignment	
	Before	After	Before	After	Before	After
Wetlands	13[a] ac.	0 ac.	7[a] ac.	0 ac.	11[a] ac.	0 ac.
Deep water/streams	0 ac.	0 ac.	0 ac.	0 ac.	0 ac.	0 ac.
Wooded/forest	48 ac.	0 ac.	73 ac.	0 ac.	75 ac.	0 ac.
Brush/Grassland/ Road Ditch	53 ac.	107 ac.	82 ac.	148 ac.	83 ac.	155 ac.
Cropland	0 ac.	0 ac.	0 ac.	0 ac.	0 ac.	0 ac.
Lawn/landscaping	0 ac.	0 ac.	0 ac.	0 ac.	0 ac.	0 ac.
Impervious Surface	22 ac.	29 ac.	25[b] ac.	39[c] ac.	25[b] ac.	39[c] ac.
Other	0 ac.	0 ac.	0 ac.	0 ac.	0 ac.	0 ac.
TOTALS	**136** ac.	**136** ac.	**187** ac.	**187** ac.	**194** ac.	**194** ac.

Source: St. Louis County Land Use/Cover GIS Data Layer
a Wetland impacts rounded to the nearest acre.
b Before condition includes impervious areas associated with the existing highway alignment and within the proposed new alignment areas.
c After condition does not reflect the possibility of removing portions of the existing highway if a new alignment is constructed.

8. Permits and Approvals Required:

List all known local, state and federal permits, approvals, certifications and financial assistance for the project. Include modifications of any existing permits, governmental review of plans and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure. *All of these final decisions are prohibited until all appropriate environmental review has been completed. See Minnesota Rules, Chapter 4410.3100.*

Table 7 – Project Permits and Approvals

Unit of Government	Type of Application/Permit	Status
Federal Agency		
Federal Highway Administration	Environmental Assessment Approval	Completed
	EIS Need Decision	To be completed
	Section 106 Determination	Complete
U.S. Army Corps of Engineers	Section 404 Permit – Individual Permit (IP)	To be requested
U.S. Fish & Wildlife Service	Endangered Species Act Section 7 Determination	On-going
State Agency		
MnDOT	Environmental Assessment Approval	Completed
	EIS Need Decision	To be completed
	Minnesota Wetland Conservation Act	To be requested

Table 7 continued

Unit of Government	Type of Application/Permit	Status
MN Department of Natural Resources	State Endangered Species Review	Completed
	Public Waters Work Permit	To be requested
	Water Appropriations Permit	To be requested
Minnesota Pollution Control Agency	National Pollutant Discharge Elimination System Construction Storm Water Phase II Permit	To be requested
	401 Water Quality Certification	To be requested

Cumulative Potential Effects may be considered and addressed in response to individual EAW Item Nos. 9-18, or the RGU can address all cumulative potential effects in response to EAW Item No. 19. If addressing cumulative effect under individual items, make sure to include information requested in EAW Item No. 19

Cumulative potential effects of the Highway 1/169 Eagles Nest Reconstruction Project are addressed in EAW Item No. 19.

9. Land use

a. Describe:

i. Existing land use of the site as well as areas adjacent to and near the site, including parks, trails, prime or unique farmlands.

The land use within the project vicinity is primarily open space consisting of forestlands, grasslands and water resources (wetlands, lakes). Scattered low density developments of rural residential units and seasonal residents surrounding lakes are also present in the project vicinity. Because mining activity has become an issue of public interest in northeastern Minnesota in recent years, available information on current and potential future mining activity was also reviewed. Although the TH 1/169 project corridor goes through or nearby parcels of land that have active state mineral leases, no mining activity is occurring or is proposed in the immediate project vicinity.

There are no designated parks or trails located within the immediate project area. The eastern boundary of the new Vermilion Lake State Park is located approximately 0.5 miles northwest of the western highway project termini. Bear Head Lake State Park is located several miles south of Highway 1/169. Access to Bear Head Lake Park is via County Road 128 (from Highway 1/169 within the project area) only.

A public boat landing is located along the northern shore of Armstrong Lake. An access driveway connects the boat landing to Highway 1/169.

According to the NRCS Web Soil Survey, none of the soils within the project area are identified as prime, unique, or of statewide importance. Additional information regarding soils found in the study area can be found under EAW Question 10b.

ii. Plans. Describe planned land use as identified in comprehensive plan (if available) and any other applicable plan for land use, water, or resources management by a local, regional, state, or federal agency.

Currently, there is no comprehensive plan that encompasses the entire study area for the Highway 1/169 Eagles Nest Lake Area Project. A Land Use Plan for Vermilion Lake covers only the very western portion of the study area. St. Louis County has an approved 2013 Annual Land Use Report, which summaries land use and building activities such as number and type of building permits issued. Planned land use in the area must comply with the allowed permitted and conditional uses for the designated zoning districts for the area (see EAW Item 9.a.iii below). Based on the current zoning designations, much of the surrounding area is planned to remain open space/undeveloped with low to moderate potential for scattered rural developments.

The St. Louis/Lake County Regional Railroad Authority has plans to extend the limits of the Mesabi Regional Trail through portions of north-central Minnesota. The trail corridor plan identifies a future trail extension through the Eagles Nest Lake Area. The St. Louis-Lake County Regional Railroad Authority is in the scoping and planning process for identifying a specific trail corridor between the new Vermilion State Park (located near the western termini of the Highway 1/169 project area) and County Road 128/Bear Head Lake State Park Road. MnDOT has been contacted regarding the possibility of using portions of the existing highway alignment for the trail extension if the highway improvements are constructed on a new alignment. Alternative 3A (Preferred Alternative) may provide an opportunity in the western segment of the project area. Further coordination would be required to determine if a portion of the existing alignment could be utilized for the extension of the Mesabi Trail. Additional information on the trail corridor and future plans available on-line at: http://www.mesabitrail.com/.

iii. Zoning, including special districts or overlays such as shoreland, floodplain, wild and scenic rivers, critical area, agricultural preserves, etc.

Figure 16 on the following page depicts the Eagles Nest Township Zoning map. Zoning districts in the project area include: Residential (RES-4 & -5) [low density residential], Multiple Use Non-Shoreland (MUNS), and Shoreland Mixed Use (SMU).

There are no designated floodplains, wild and scenic rivers, critical areas, agricultural preserves, or other special districts or overlays within the study area. Armstrong River currently passes under the highway corridor (via culvert). The river flows southeast between Lake Vermilion and Armstrong Lake. As indicated in the Flood Insurance Rate Map (Figure 17), the river does not have an associated floodplain or designated flood elevation.

b. Discuss the project's compatibility with nearby land uses, zoning, and plans listed in Item 9a above, concentrating on implications for environmental effects.

The project is compatible with nearby land uses, and is not likely to result in substantive changes in land use or land uses that are incompatible with current land use and zoning. The roadway improvements at the eastern two-thirds of the project corridor are essentially on the same alignment as the existing roadway, and would not result in relocations or other changes in land use at any existing developed parcels.

The western third of the project includes construction of a new roadway alignment through undeveloped, primarily forested land (as is the existing western section of roadway). A review of the existing development patterns in the project vicinity – i.e., development of land is occurring primarily along lakeshore areas, not in forested areas -- suggests that this new roadway alignment is not likely to result in substantial changes in adjacent land uses or increased development, since the new alignment does not provide access to lakefront property. If a landowner wanted to develop a parcel along the new or existing highway alignments, they would need to get permit/approval from the local government and would need to request an access permit from MnDOT for highway access.

While no direct impacts to the parks are anticipated, construction of the proposed highway improvements may result in temporary access impacts to Bear Head Lake State Park users due to construction detours, which would affect access for park users. During these periods additional signage will be provided to clarify how to access the Park. The Highway 1/169 and County Road 128 intersection is located in a portion of the study corridor that is generally common to all Build Alternatives. Alternative 2A would have the highest potential for indirect impacts to Bear Head Lake State Park due to the need to close the corridor and detour traffic.

While Alternative 2A would not likely close the entire route for the duration of construction it is expected that long closures (several months) would be necessary to rebuild the improved highway on the existing alignment in the western segment of the project area. Access to County Road 128 would likely be maintained from either the east or west, but not from both directions. The two other Build Alternatives (Alternatives 1 and 3A) may also require temporary access restrictions, but construction staging would substantially reduce interruptions to park access, compared to Alternative 2A.

Under the Build Alternatives, temporary access limitations to the Armstrong Lake boat access may occur during construction, but no physical impacts to the property and no permanent access changes are anticipated. Since the proposed project involves maintenance and safety improvements to an existing roadway, the proposed project is not expected to influence development decisions within the project area and/or region. Therefore, all of the alternatives considered for this project are compatible with local land use and zoning plans.

c. Identify measures incorporated into the proposed project to mitigate any potential incompatibility as discussed in Item 9b above.

The proposed transportation improvements are compatible with existing and planned land use in the area. No mitigation is needed or proposed.

Figure 16 – Eagles Nest Township Zoning Map

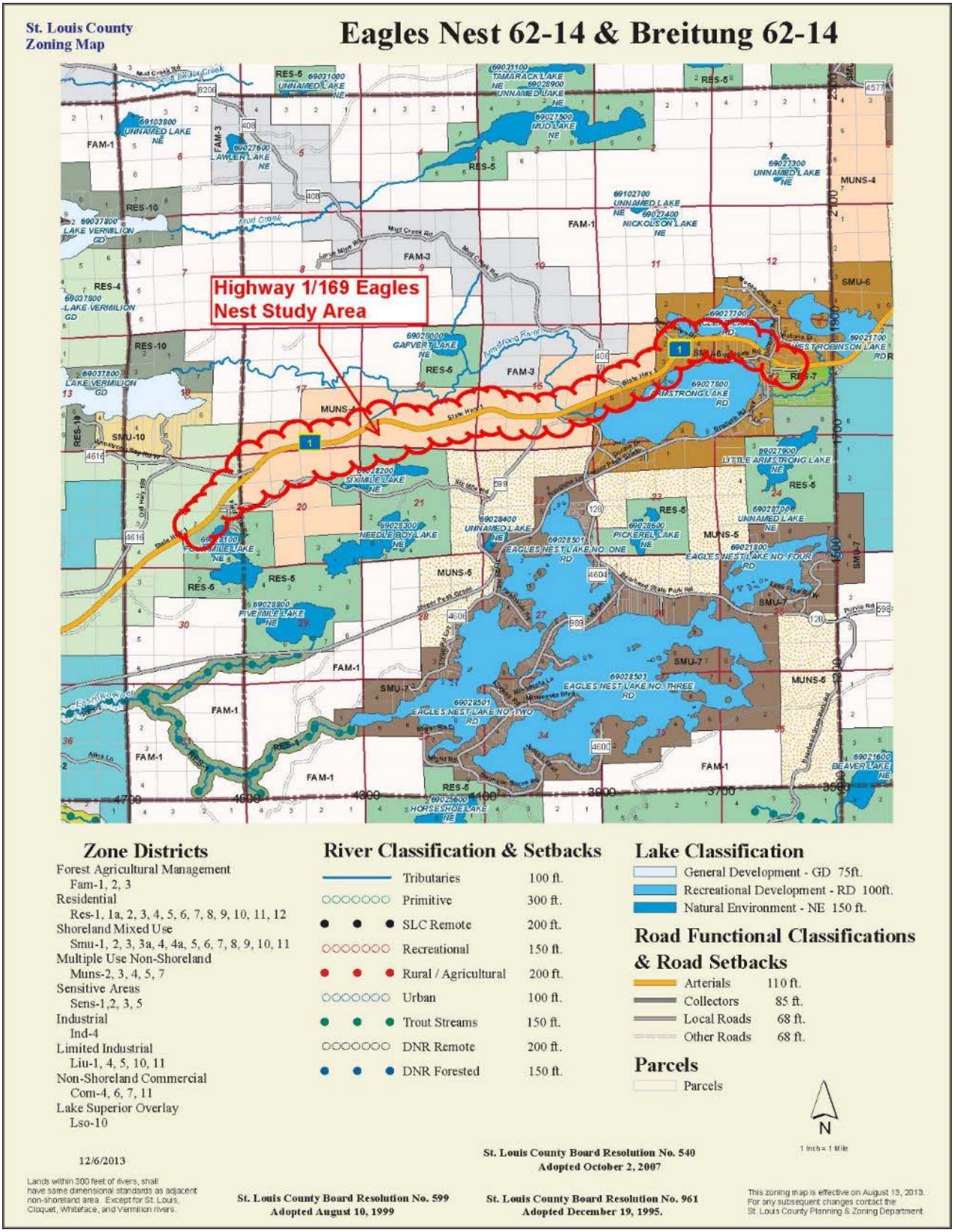
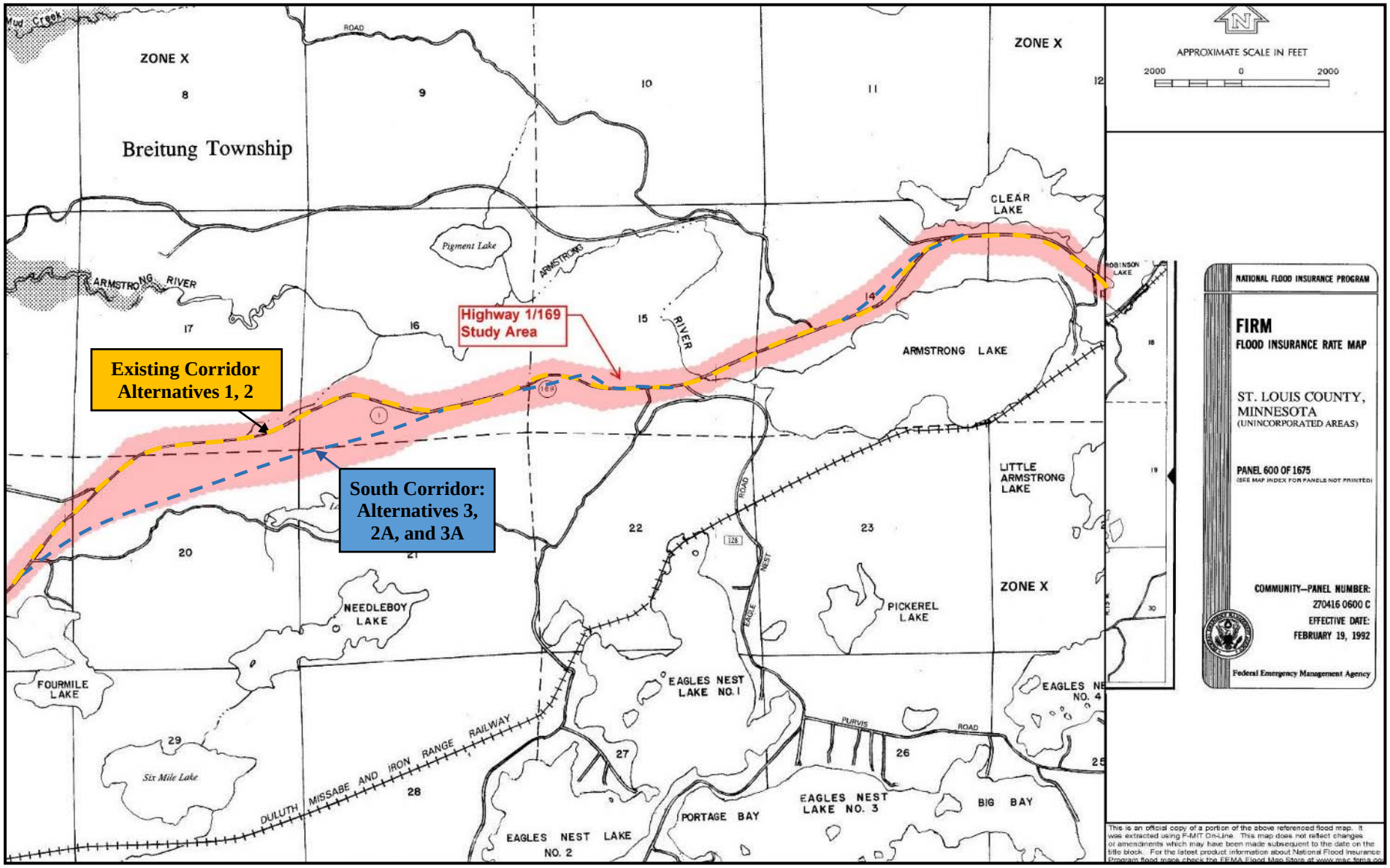


Figure 17 – Flood Insurance Rate Map



10. Geology, Soils and Topography/Land Forms

a. Geology - Describe the geology underlying the project area and identify and map any susceptible geologic features such as sinkholes, shallow limestone formations, unconfined/shallow aquifers, or karst conditions. Discuss any limitations of these features for the project and any effects the project could have on these features. Identify any project designs or mitigation measures to address effects to geologic features.

Sinkholes, shallow limestone formations, karst features or similar susceptible geologic features have not been identified in the project area.

However, the project is situated within bedrock formations that have been identified to contain sulfide-bearing minerals. In June 2009, during the early planning and design phase of the highway project development process, concerns were raised by area property owners at public meetings and in extensive correspondence with MnDOT staff regarding the potential presence of sulfides in the bedrock within the project area, since the alternatives being considered would require extensive rock excavation. The stakeholders noted that sulfides in the bedrock could potentially weather (i.e., undergo a chemical transformation), resulting in release of acidity that could affect area water resources. Acid rock drainage (ARD) refers to the acidic water that is created when sulfide minerals are exposed to air and water and, through a natural chemical reaction, produce sulfuric acid. ARD has the potential to introduce acidity and dissolved metals into water, which can be harmful to fish and aquatic life.

To better understand the potential for ARD creation in the project area and how the potential for ARD could be minimized/mitigated, MnDOT conducted background research, field data collection and collaborative discussions with regulators Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Natural Resources (MnDNR) and technical experts (Golder Associates, Inc.). A technical memorandum summarizing this work was prepared (see the *Sulfide/Acid Rock Drainage Technical Memorandum* in Appendix C). The discussion that follows is a summary of the key findings described in the technical memorandum, including: Overview/Background; Research on Current Best Practices; Investigations; Consultation; Potential Project Impacts; and Recommendations.

<u>Overview/Background</u>

The potential for acidity production from sulfide-bearing rock is dependent on a number of factors, including:

- Amount of oxygen present: Sulfide minerals oxidize more quickly where there is more oxygen available. As a result, ARD formation rates are higher where the sulfides are exposed to air than where they are buried under soil or water.[10]
- Amount of water available: Cycles of wetting and drying accelerate ARD formation by dissolving and removing oxidation products, leaving a fresh mineral surface for oxidation. In addition, greater volumes of ARD are often produced in wetter areas where there is more water available for reaction.

[10] Source: http://www.miningfacts.org/Environment/What-is-acid-rock-drainage/

- Temperature: Pyrite oxidation occurs most quickly at a temperature around 30°C. [10]
- Rock permeability: Dense, impermeable rock is more resistant to weathering since water and oxygen don't easily penetrate the rock.
- Microorganisms present: Some microorganisms are able to accelerate ARD production.[1]
- Type of minerals present: Not all sulfide minerals are oxidized at the same rate, and neutralization by other minerals present may occur, which would slow the production of ARD.[10]
- Inherent buffering capacity of the rock: If the ore/rock is exposed by construction or other activities, it would be less likely to produce ARD if it contains a high proportion of "acid-buffering" minerals such as lime, calcite, carbonate or bicarbonate, which are able to neutralize acidic waters.
- Surface area of sulfide minerals exposed: Increasing the surface area of sulfide minerals exposed to air and water increases sulfide oxidation and ARD formation.[10]

Understanding these rock weathering factors is helpful in assessing the potential risk for ARD and in developing minimization and mitigation strategies for the proposed project, as discussed in the sections that follow. These same basic rock weathering factors also affect the potential risk for release of heavy metals that may also be present in bedrock in this area, which has also been raised as a potential concern by a project stakeholder. The best management practices and mitigation strategies identified to minimize weathering of rock, and the risk of ARD, in the Recommendations section below would also be effective in avoiding/minimizing release of these other elements.

Research on Current Best Practices

In July 2009, MnDOT initiated a consultation process in which resource agencies (primarily Minnesota Department of Natural Resources [MnDNR] and Minnesota Pollution Control Agency [MPCA]) and other professionals (MnDOT staff and consultant team) began to discuss sulfides as a potential concern within the project area. Project information was distributed, including proposed highway alignments and technical reports, and periodic coordination meetings (in-person and phone conferences) have been conducted to evaluate the findings of the geologic investigations (both visual field observations and laboratory testing results), assess the potential for impacts, and advise on how to mitigate potential adverse effects. The issues raised by MnDNR and MPCA through these coordination meetings led MnDOT to research how this potential issue is addressed in other states. State Highway Departments of Transportation (DOTs) in Pennsylvania and Tennessee have encountered sulfide-bearing rock in areas of proposed roadway improvements and as a result, have developed identification, management, and monitoring protocols to address the issue (Virginia and North Carolina also acknowledge the presence of acid producing rock (APR) in their states but, similar to Minnesota, do not have established guidelines for mitigation since APR is rarely encountered on transportation projects). Information was provided by the MnDNR regarding how Pennsylvania and Tennessee DOTs handle potential ARD from

sulfides in bedrock. MnDOT staff has also contacted several representatives at these DOTs to further discuss the topic and their protocols for assessing and managing ARD risks.

Based on the Pennsylvania and Tennessee DOT's experience and protocols, MnDOT used a similar approach for initial assessment of risk, and for defining a process for further characterizing the rock and defining mitigation measures during project final design. In addition, MnDNR Division of Lands and Minerals and MPCA staff involved in mine permitting and review have expertise in sulfide-rock-related issues specific to Minnesota conditions; so these agencies were requested to review MnDOT's findings and provide comments/suggestions as information was compiled and conclusions/recommendations were developed. The following sections describe investigations to date and the planned process for addressing the issue of ARD during project design and construction, including:

- Investigation: Review existing geologic information for the project area and conduct initial field review and sampling to characterize the bedrock within the study area.
- Consultation: Consult with expert advisors at MnDNR, MPCA and mining consultant (Golder Associates, Inc.). Review results of investigations and project plans, to identify potential risks and minimization/mitigation strategies.
- Recommendations: Based on the investigation and consultation findings, summarize the potential risks for ARD and the process for managing the risks on the Eagles Nest project.

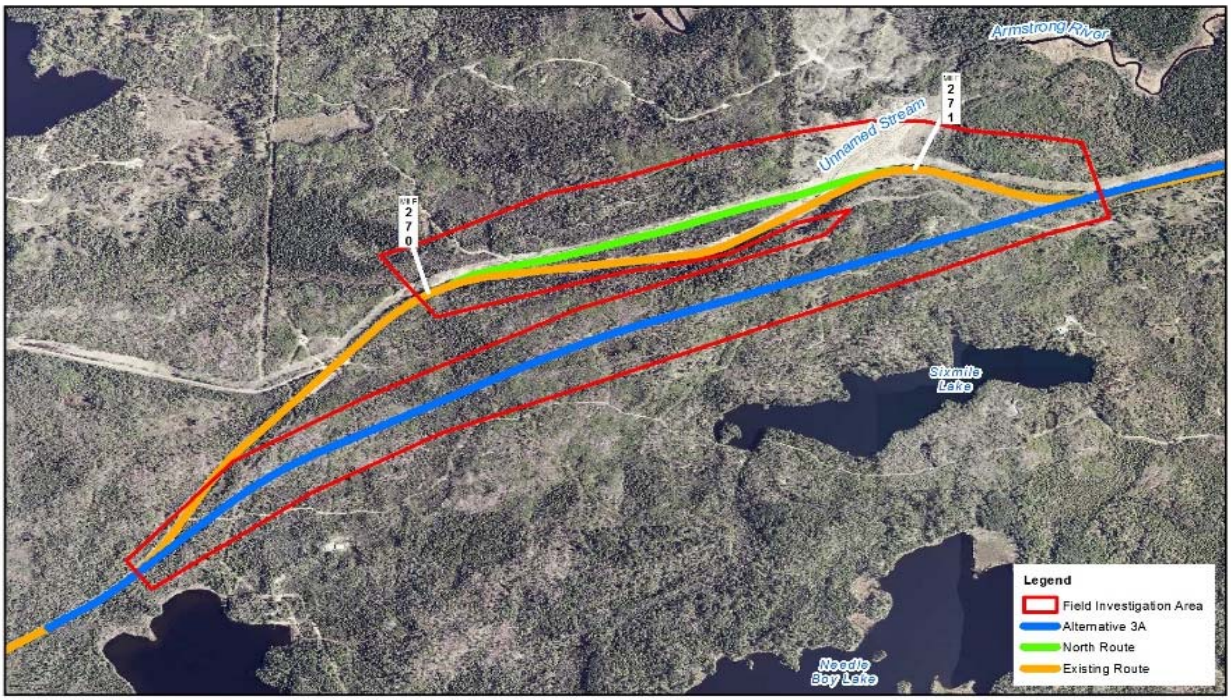
Investigation: Geologic Conditions

The investigation of geologic conditions in the project area, to understand the bedrock characteristics and potential risk for ARD, included three main components:

1. Review of existing mapping of bedrock geology (formations and fault zones), to understand the overall geology of the area.
2. Conduct field surveys at bedrock outcrops within the project area and collect samples. Geologists from the University of Minnesota – Duluth: Natural Resources Research Institute (NRRI), who have conducted numerous other geologic investigations in the project vicinity, conducted the field surveys and sampling.
3. Perform geochemical laboratory testing (sulfur analysis) to verify visual volume sulfide estimates made during field investigations by analyzing mass-percent of total sulfur at a commercial laboratory.

The details of these investigations are provided in the Technical Memorandum (Appendix C). Key findings of the investigations include:

- The initial field investigations were conducted along the re-alignment corridors at the west end of the project, near Sixmile Lake, along the South Corridor, which includes Alternatives 2A and 3A (as well as Alternative 3 dismissed during project screening) , and on the North Corridor (also dismissed during early project screening). See Section III Alternatives for a description of the alternatives development process. The field surveys found that, where present, sulfide in the South Corridor is found mostly in the Soudan Iron Formation Member as secondary pyrite. However, sulfide is generally confined to portions of single bedrock outcrops and commonly restricted to very small areas with sulfide contents ranging from 0.5-5 percent pyrite by visual volume. These small occurrences are referred to as 'anomalous sulfide zones' which occur as isolated 'islands' in a 'sea' of pyrite-barren outcrops. It was also determined that the presence and percentage of sulfide contents (up to 15 percent by volume in some very small locales) increase near fault zones which are found mostly in fill areas on construction profiles along the realignment section of Alternatives 2A and 3A.

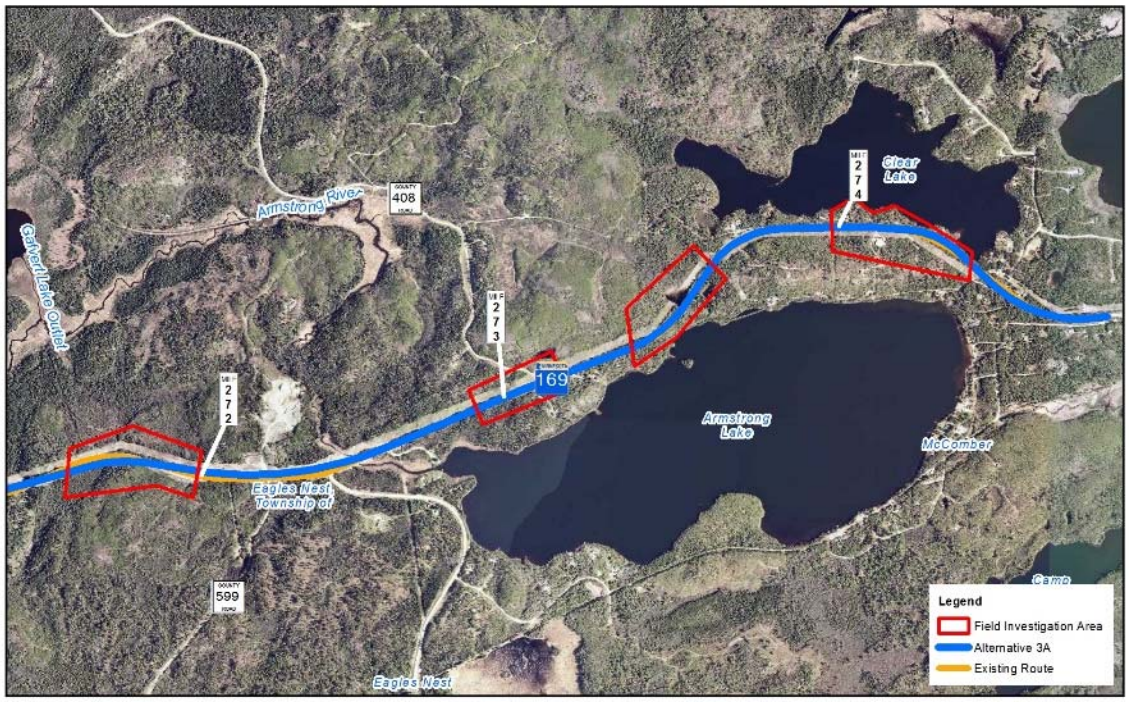


Initial Field Investigation Area

- The second field investigation was conducted on the eastern portion of the project corridor (east of Sixmile Lake area), where all of the alternatives being considered are in the same general area, i.e., no substantive re-alignments. Existing geologic information was also reviewed prior to the field investigation and suggested that: 1) bedrock units will be similar to those found during the Sixmile Lake investigation, 2) majority of bedrock excavation will be in iron formation, and 3) only four short sub-areas would likely be affected by bedrock excavation from the proposed highway improvements. Additionally, a review of prior studies and drilling data revealed that the Armstrong Lake/McComber Mine

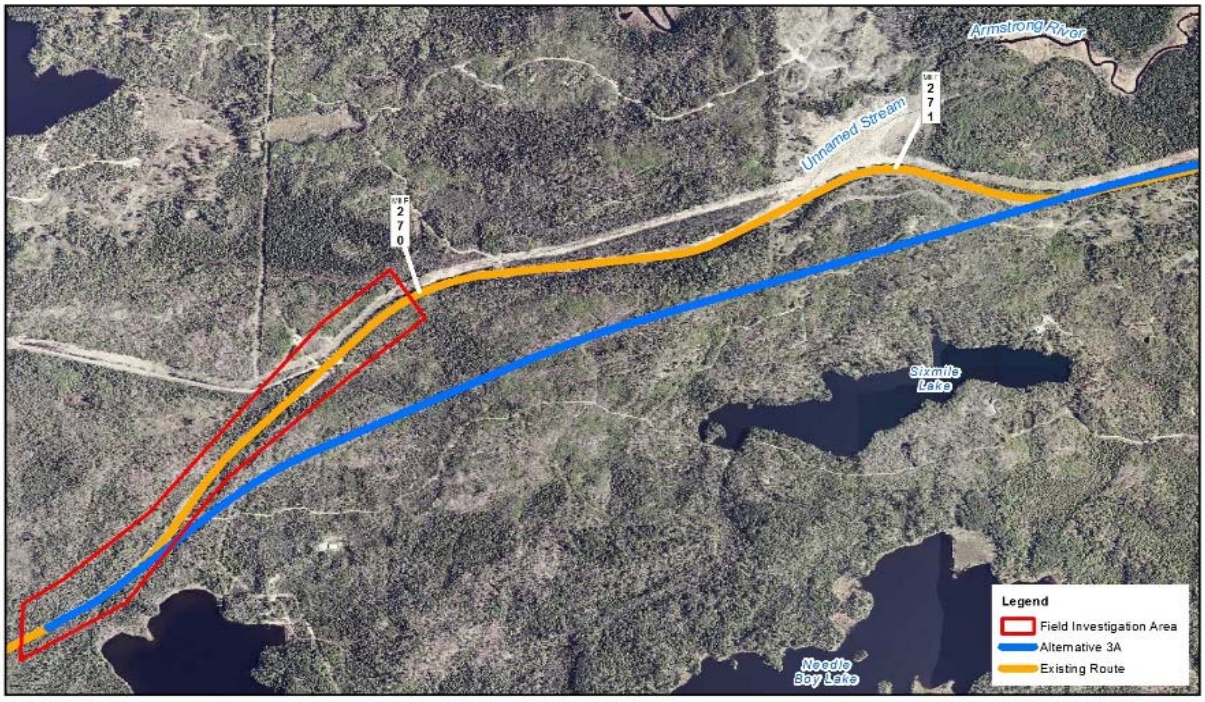
area at the eastern end of the project area would likely contain higher sulfide concentrations than those observed in the Sixmile Lake area (at the western end of the project area). Consequently, in addition to the field investigation MnDOT performed bedrock core drilling at three sites adjacent to the McComber Mine to gain preliminary insight into potentially high sulfur concentrations where proposed bedrock excavation was planned.

The investigations revealed that rare to insignificant amounts of pyrite/sulfide by visual volume are present in proposed excavation areas found east of the Sixmile Lake investigation area and west of the Armstrong Lake/McComber Mine area. However, field observations coupled with past and recent drilling information suggests that bedrock excavation performed adjacent to the McComber Mine will likely expose high amounts of primary pyrite (>0.5 percent pyrite by volume found in almost all bedrock exposures; 10 to 15 percent by volume observed in an 8-foot stretch of MnDOT drill core). Though less information was available to assess the stretch of alignment found east of the McComber Mine, it was surmised that pyrite contents could also be substantial. Thus, additional borings were recommended between the McComber Mine area and the eastern project boundary to better define amount and mode of pyrite mineralization prior to bedrock excavations. These borings will be done during project final design, as part of the additional characterization work described in the Recommendations section below.



Second Field Investigation Area

- A third geologic field investigation was performed by NRRI to assess the potential for exposing sulfide bearing rock during bedrock excavation within the alternatives that are within/directly adjacent to the existing Highway 1/169 roadway at the western portion of the project area (i.e., Alternative 1, as well as Alternative 2 that was dismissed during Level 3 screening, as described in Section III – Alternatives), in the vicinity of Sixmile Lake. Field techniques were employed which were similar to those utilized during the prior field investigations. Similar bedrock units were anticipated in the study area given the close proximity to the previous Sixmile Lake area investigation. The final report is pending, but preliminary results of the investigation suggest that: 1) iron formation is the predominant bedrock type found in the investigation area and, 2) visual volume estimates of pyrite/sulfide appear to be slightly higher than those observed in iron formation in the previous Sixmile Lake investigation area along the realignment route. The elevated sulfide presence is likely due to a combination of primary sulfide commonly found near the top of the iron formation member and secondary sulfide found in the vicinity of fault zones. Though outcrop samples were obtained from this stretch for geochemical testing, it is likely that some form of drilling would have been recommended to better characterize the sulfide presence, if Alternative 1 had been selected as the Preferred Alternative.



Third Field Investigation Area

Consultation

As noted previously, due to the complex nature of sulfides in bedrock and associated potential ARD and MnDOT's moderate level of experience with this issue, an ARD expert was consulted for the Highway 1/169 Project. Dr. Rens Verburg(Ph.D., P.Geo., L.G.), a Principal Geochemist with Golder Associates Inc., was added to the review team to assist in the evaluation of project materials (field investigations, current and future sampling and laboratory tests, potential project impacts, and proposed mitigation strategies) and to help facilitate discussions with resource agencies (e.g., MnDNR, MPCA), if needed. Golder Associates and Dr. Verburg are nationally recognized for their work on sulfides and ARD. Golder Associates assisted Tennessee DOT in preparing their guidelines and protocol for investigating, testing, monitoring, and mitigating acid producing rock on highway projects.

To date, Dr. Verburg has reviewed the NRRI reports, field logs, laboratory test results, proposed construction plans, and estimates of bedrock excavations. He has also advised MnDOT on potential mitigation measures (discussed in the Recommendations section below), including reasonable methods for calculating the quantity of buffering agent (limestone) potentially needed to neutralize ARD based on the sulfide percentages from the laboratory test results and the amount of excavated material.

In addition, as noted previously, MnDNR Division of Lands and Minerals and MPCA staff involved in mine permitting and review that have expertise in sulfide-rock-related issues specific to Minnesota conditions were requested to meet with MnDOT staff and/or review MnDOT's findings and to provide comments/suggestions as information was compiled and conclusions/recommendations were developed. The Recommendations that follow resulted from the consultation with MPCA and MnDNR staff.

Potential Project Impacts

Constructing any of the project Build Alternatives would require substantial grading (cut/fill sections) in order to meet highway design safety standards. The estimated bedrock excavation for project alternatives, based on preliminary design layouts, ranges from approximately 69,000 (Alternative 1) to 248,000 (Alternative 2A) to 163,000 (Alternative 3A – Preferred Alternative) cubic yards.

As previously stated, sulfide (pyrite) is present within bedrock in the project area, particularly the Soudan Iron Formation Member. However, visual estimates made during comprehensive field observations and corroborative geochemical laboratory testing both suggest that bedrock in the project area generally contains very low to no sulfur. The capacity to mobilize/oxidize sulfide in the excavated material (and rock slopes) along the roadway corridor is heavily dependent on surface area of bedrock that is exposed to weathering. Compared to the high surface areas produced by mining activities (which involve extensive crushing rock into more fine-grained material with high surface area), the bedrock (and rock slopes) exposed by the roadway construction process would have relatively low surface areas, since the rock fill produced by blasting will primarily be large-diameter (+3-inch to +6-inch size) material. In addition, the iron formation rock has very low permeability, which means that water and air would not easily penetrate the bedrock. Except for pyrite found

along the relatively few fracture/joint faces (the 'anomalous sulfide zones' described in the Investigation section above), there would be minimal internal weathering at exposed bedrock faces and within crushed particles.

Recommendations

In November of 2013, MnDOT project staff reviewed the field investigation results and estimated project impacts related to bedrock excavation and rock fill placement with MPCA and MnDNR staff. NRRI's recommendations for additional drilling (described in the Investigation section above), the practices used by PA and TN DOT's, and the recommendations of MnDOT's consultant expert Dr. Verburg were also reviewed with agency staff. Based on consideration of all of this information, agency staff and MnDOT agreed on a process for avoiding/minimizing/mitigating the potential production of ARD in the project. The process that will be followed – which is similar to the process used in other states – includes the following steps:

Perform additional drilling investigations for the Preferred Alternative: Following completion of the environmental review process (i.e., confirmation of the Preferred Alternative), MnDOT will review previous recommendations for additional drilling (described in the Investigation section above) and the project plans with Dr. Verburg and staff from MPCA and MnDNR, to develop a proposed plan (including locations, protocols, etc.) for additional drilling, to better characterize the bedrock characteristics in the Preferred Alternative corridor.

Develop plans and practices to avoid/ minimize ARD: Based on the results of the drilling investigation, MnDOT will work with Dr. Verburg and staff from MPCA and MnDNR, to develop a best management practices (BMP) plan for excavating, handling, and use of APR rock, and, if determined to be appropriate, use of limestone or other neutralizing materials to minimize ARD. As discussed in the Sulfide/Acid Rock Drainage Technical Memorandum in Appendix C, examples of practices that are currently being used in other states that may be utilized for this project include:

- Bedrock excavation that employs pre-split blasting methods for bedrock faces to ensure lowest surface area exposure. Discussions with MnDNR personnel indicate that bedrock faces are of less concern than crushed fill (from a surface area standpoint) and, thus, corrective/preventative measures at bedrock faces may not be necessary.
- Crushing rock to +3-inch or +6-inch size thereby creating low available surface areas for potential oxidation within the fill. Crushing to these sizes also produces very few particulates/fine-grained material.
- Encapsulating fill materials applied above the seasonal high water table under the impervious road bed, thereby minimizing direct air and/or water exposure. Limestone rock can also be mixed into bedrock fill material to serve as a buffering/neutralization agent for any potential acid production. Limestone calculations would be made by the third party expert and based on mass percent of sulfur from field samples. The constructive practice for limestone addition has not been determined, though several options are being considered. Any additional sample testing will refine the current limestone calculations.

- Placing rock fill materials below the seasonal high water to keep them submerged, thereby preventing oxidation of sulfur.

Identify if pre- or post-construction monitoring is needed: Discussions with MPCA and MnDNR staff will also include consideration of whether monitoring of excavated bedrock materials and/or surface water chemistry in water bodies in the project areas are needed to characterize the materials encountered during construction and/or whether post-construction water chemistry changes occur. If discussions with agency staff results in a recommendation for monitoring, MnDOT would be responsible for performing and reporting monitoring results.

Public Updates

Because of the level of interest/comment from some project stakeholders regarding the potential for water quality impacts related to rock excavation/ARD, MnDOT will continue to make information available to the public during final design and permitting. For example, as test results become available and as BMP decisions are made as a result of consultation with MnDNR and MPCA staff, the project website will be updated to provide the information to the public.

Conclusions

The project is situated within bedrock formations that have been identified to contain sulfide-bearing minerals that could potentially weather (i.e., undergo a chemical transformation) when rock is excavated for construction of the proposed project, potentially resulting in release of acidity (i.e., acid rock drainage [ARD]) that could affect area water resources. To better understand the potential for ARD creation in the project area and how the potential for ARD could be minimized/mitigated, MnDOT conducted background research, field data collection and collaborative discussions with regulators (MPCA and MnDNR) and technical experts. A technical memorandum summarizing this work was prepared (see the Sulfide/Acid Rock Drainage Technical Memorandum in Appendix C).

This research and collaborative discussions with regulatory agencies resulted in agreement that the risk for ARD generation from the project could be managed by following an agreed-upon process for further investigating and characterizing rock within the preferred alternative alignment, and for defining plans and practices to avoid/minimize and mitigate the potential for ARD (described in detail in the Technical Memorandum) so that there would be no significant impacts to water quality/surface water resources from the proposed project. MnDOT is committed to following this process, including additional collaboration with/concurrence from regulatory agencies and technical experts, which is similar to processes used by other state departments of transportation for managing ARD where sulfide-containing rock occurs. Since the potential risk for ARD generation from rock excavation can be avoided, minimized and mitigated, the differences in rock excavation quantities among project alternatives was not considered to be a key deciding factor in the preferred alternative identification process.

b. Soils and topography - Describe the soils on the site, giving NRCS (SCS) classifications and descriptions, including limitations of soils. Describe topography, any special site conditions relating to erosion potential, soil stability or other soils limitations, such as steep slopes, highly permeable soils. Provide estimated volume and acreage of soil excavation and/or grading. Discuss impacts from project activities (distinguish between construction and operational activities) related to soils and topography. Identify measures during and after project construction to address soil limitations including stabilization, soil corrections or other measures. Erosion/ sedimentation control related to stormwater runoff should be addressed in response to Item 11.b.ii.

Soils

Soils information was gathered for the project area using the Natural Resources Conservation Service (NRCS) Web Soil Survey for St. Louis County. Soils within the project study area are listed in Table 8. Generally, the soil types in the project area follow topographic position, with a number of different types of hydric soils prevalent in lower, flat areas, and glacial till and bedrock outcrops common in the upland areas. The range of soil classifications and conditions are similar among all of the project alternatives, so soil types are not a differentiating factor in assessing the alternatives. Several sub-surface borings have also been gathered in connection with the bedrock investigations discussed above in EAW Item 10.a. Based on the soil survey information and the soil borings, only the areas of peat and muck have been identified as potentially needing soil correction and/or other special construction measures.

Table 8– Soil Types

Highway 1/169 Eagles Nest Lake Study Area Soils	
Map Unit Symbol	**Map Unit Name**
	Low/Flat Area Soils
1020A	Bowstring/Fluvaquents, loamy, frequently flooded, 0-2% slopes
1021A	Rifle soils, 0-1% slopes
1022A	Greenwood soils, 0-1% slopes
F13A	Babbitt, bouldery-Aquepts, rubbly complex, 0-3% slopes
F17A	Aquepts, rubbly, 0-2% slopes
F34A	Cathro muck, depressional, 0-1% slopes
F34A	Cathro muck, depressional, 0-1% slopes
F129A	Tacoosh mucky peat, 0-1% slopes
F166A	Aquepts, rubbly-Tacoosh-Rifle complex, 0-2% slopes
F187A	Dora mucky peat, 0-1% slopes
W	Open Water (lakes & streams)

Highway 1/169 Eagles Nest Lake Study Area Soils	
Map Unit Symbol	**Map Unit Name**
	Upland Soils
F3D	Eveleth-Eaglesnest-Conic boulder complex, 6-18% slopes
F4E	Eveleth-Conic, bouldery-bedrock outcrop complex, 18-30% slopes
F5B	Babbitt, bouldery-Wahlsten, bouldery-Aquepts complex, 0-8% slopes
F21F	Quetico, stony-bedrock outcrop complex, 35-60% slopes
F23D	Rollins-Biwabik complex, 8-18% slopes
F26E	Shagawa-Beargrease boulder complex, 8-30% slopes
F27C	Beargrease, stony loam, 2-15% slopes
F30G	Conic, bouldery-Insula, bedrock outcrop complex, 20-70% slopes
F35D	Eveleth, bouldery-Conic, bouldery-Aquepts complex, 0-18% slopes
F35E	Eveleth, bouldery-Conic, bouldery-Aquepts complex, 0-30% slopes
F36D	Conic, bouldery-Insula, bedrock outcrop complex, 8-25% slopes
GP	Gravel pit complex

Topography

Topography in the area is characterized as rolling with moderate elevation changes between lowlands and steeper ridges. One of Minnesota's largest lakes, Lake Vermilion (40,557 acres), is located just northwest of the study area. Also, present in the project vicinity are several lakes (Armstrong Lake, Clear Lake, Sixmile Lake) and wetlands. In the western portion of the project area, Highway 169 runs along the base of a steep ridge to the south and an expansive wetland complex to the north.

During winter months (late November through early March), the steep ridge accompanied by the sun tracking lower across the sky creates a situation where the existing roadway alignment receives limited exposure to sunlight shining directly onto the roadway surface, which greatly diminishes the ability to remove icy conditions from the pavement.

Alternative 1 would shift the road slightly to the north of the existing alignment, providing greater opportunities for sunlight to reach the roadway, compared to existing conditions. Alternatives 2A and 3A would realign the western section of roadway to a location on the top of the steep ridge, more substantially improving the roadway's exposure to sunlight conditions.

At the completion of construction, newly constructed slopes within the project area will be less steep than existing slopes. However, due to excavation of bedrock in all alignment corridors being considered, it is anticipated that vertical bedrock faces would exist in several locations.

Numerous subsurface borings have been collected along the highway corridor to better understand the geological/soil conditions in the project area. Areas of shallow bedrock and muck soils exist within the alignment corridors for the Build Alternatives. The amount of fill and excavation estimated for the alternatives is presented in Table 9. Some of the cut material is expected to be relocated and/or reused throughout the project area. Section V.A.10.a. describes considerations related to use of bedrock excavated from the project area, and steps that will be taken to minimize potential water quality impacts. Since fill volumes are greater than cut volumes, additional fill material will need to be brought in for project construction. Clean fill material will be used from local approved permitted borrow sources.

To minimize soil erosion/sedimentation related to stormwater runoff, the contractor will be required to install and maintain erosion control measures, such as silt fence and ditch blocks during construction.

Table 9– Excavation (Cut/Fill) Estimate By Alternative*

Alternative	Estimate Excavation Amounts (cubic yards)		
	Cut	Fill	Total
Alternative 1	475,000 CY	695,000 CY	1,170,000 CY
Alternative 2A	365,000 CY	540,000 CY	905,000 CY
Alternative 3A (Preferred Alternative)	365,000 CY	1,300,000 CY	1,665,000 CY

*These quantities are high level estimates based on preliminary construction limits and are subject to change.

11. Water Resources

a. Describe surface water and groundwater features on or near the site in a.i. and a.ii. below.

i. Surface water - lakes, streams, wetlands, intermittent channels, and county/judicial ditches. Include any special designations such as public waters, trout stream/lake, wildlife lakes, migratory waterfowl feeding/resting lake, and outstanding resource value water. Include water quality impairments or special designations listed on the current MPCA 303d Impaired Waters List that are within 1 mi of the project. Include MnDNR Public Waters Inventory numbers, if any.

Several surface water features are located in close proximity to the project area including Armstrong Lake (MnDNR Public Water #278P), Armstrong River, Clear Lake (277P), Fourmile Lake (281P), Sixmile Lake (282W), and many wetland basins of varying types and sizes. These water bodies are shown in Figure 4 and Preferred Alternative Figures 11-15. No other special designations apply to the water bodies located within the project area.

Armstrong River flows from Armstrong Lake located immediately south of the highway corridor to Lake Vermilion (378P), which is located northwest of the study area. This is the only stream/river impacted by the proposed improvements. The creek passes under Highway 1/169 (via a large culvert). This culvert may be able to remain in place and be extended approximately 65 feet on the upstream end to accommodate the proposed roadway changes; or it may need to be replaced with a 130 foot culvert in its current location, depending on the final roadway grades in this area. All Build

Alternatives considered would cross Armstrong River with essentially the same impacts, including those at the culvert. During the final design phase a detailed hydraulic analysis will be conducted to ensure proper sizing and placement of the conveyance structure. Clear Lake is located near the eastern end of the project area and lies immediately north of the existing highway corridor. Several year-round and seasonal developments line the south Clear Lake shoreline and gain access off Highway 1/169 in the project area. Other water resources include wetlands of many classifications and characteristics. Wetlands within the construction limits of the three Build Alternatives have been delineated and characteristics of each basin are documented in EAW Item 11.b.iv Wetlands.

According to the MPCA's 2014 List of Impaired Waters, Armstrong Lake is impaired for Mercury. There is no regulatory requirements or special standards for mercury within the NPDES construction permit.

ii. Groundwater – aquifers, springs, seeps. Include: 1) depth to groundwater; 2) if project is within a MDH wellhead protection area; 3) identification of any onsite and/or nearby wells, including unique numbers and well logs if available. If there are no wells known on site or nearby, explain the methodology used to determine this.

Based on field investigations, including soil borings, the depth to groundwater in the study area varies from 1- to 2-feet below the ground surface in low-lying areas to over 20-feet in uplands and along steeper slopes.

The project area is not located within any wellhead protection areas.

Wells

A review of the Minnesota Department of Health (MDH) County Well Index (CWI) was conducted and revealed no well records in the project area. However, several seasonal and year-round residential developments are located in the study area, especially along the south shore of Clear Lake, and are presumed to have private water wells. No wells are known within the existing or proposed right-of-way limits. If any unused or unsealed water wells are discovered in the project area during construction, they will be addressed in accordance with Minnesota Rules, Chapter 4725.

b. Describe effects from project activities on water resources and measures to minimize or mitigate the effects in Item b.i. through Item b.iv. below.

i. Wastewater - For each of the following, describe the sources, quantities and composition of all sanitary, municipal/domestic and industrial wastewater produced or treated at the site.

1) If the wastewater discharge is to a publicly owned treatment facility, identify any pretreatment measures and the ability of the facility to handle the added water and waste loadings, including any effects on, or required expansion of, municipal wastewater infrastructure.

Not Applicable

2) **If the wastewater discharge is to a subsurface sewage treatment systems (SSTS), describe the system used, the design flow, and suitability of site conditions for such a system.**

Not Applicable

3) **If the wastewater discharge is to surface water, identify the wastewater treatment methods and identify discharge points and proposed effluent limitations to mitigate impacts. Discuss any effects to surface or groundwater from wastewater discharges.**

Not Applicable

ii. **Stormwater - Describe the quantity and quality of stormwater runoff at the site prior to and post construction. Include the routes and receiving water bodies for runoff from the site (major downstream water bodies as well as the immediate receiving waters). Discuss any environmental effects from stormwater discharges. Describe stormwater pollution prevention plans including temporary and permanent runoff controls and potential BMP site locations to manage or treat stormwater runoff. Identify specific erosion control, sedimentation control or stabilization measures to address soil limitations during and after project construction.**

Quantity of Runoff

The volume of runoff is expected to increase as a result of the increase in impervious area. Alternative 1 is estimated to create an additional 7 acres of impervious surface, while Alternatives 2A and 3A are estimated to add 14 acres of additional impervious area.

The alignment corridors were analyzed to determine the maximum water quality treatment volume available based on the anticipated water quality volume needing to be treated as a result of each alternative. Based on the high level assessment, the potential to detain and infiltrate runoff from the corridors in the adjacent roadside ditches exceeds the required treatment levels that will be needed as part of the NPDES Permit requirements. A more detailed storm water runoff analysis and treatment plan will be designed for the Preferred Alternative following the preliminary design phase. The plan will be designed to fully comply with NPDES permit requirements.

Quality of Runoff

Traffic-related pollutants consist of copper, lead, zinc, and phosphorus. A study conducted by the USEPA entitled, Results of the Nationwide Urban Runoff Program, December 1983, have identified the above pollutants as the predominant constituents in roadway runoff. Other common pollutants are total suspended solids (TSS) and chloride. TSS and chloride are introduced into roadway runoff primarily from winter deicing practices. The amounts vary depending upon the application rates and the number of ice/snowfall events in a given year. An effective means of reducing the level of pollutants discharged into the receiving

stream/water body is to provide grass side slopes and ditches and detention / retention areas.

EAW Item 10.a. above discusses potential water quality concerns related to potential for acid rock drainage (ARD), identified by project stakeholders. The discussion includes assessment of potential risk for impacts, coordination with regulatory agencies (MnDNR and MPCA) and consultant experts, and describes recommendations for measures to minimize/mitigate risks, to avoid potential water quality impacts related to ARD during and after construction.

Baseline Water Quality Monitoring Data

Baseline water quality monitoring was conducted between 2011-2014 for the purpose of establishing pre-construction conditions that will be used in the development of BMP for treating runoff and to determine if adverse water quality impacts result during or following construction of the proposed improvements. Appendix D contains data from the monitoring samples collected to date.

Highway 1/169 Roadway Design

The roadway design will include storm water treatment BMPs that will be designed and built to comply with the NPDES Construction Storm water permit requirements.

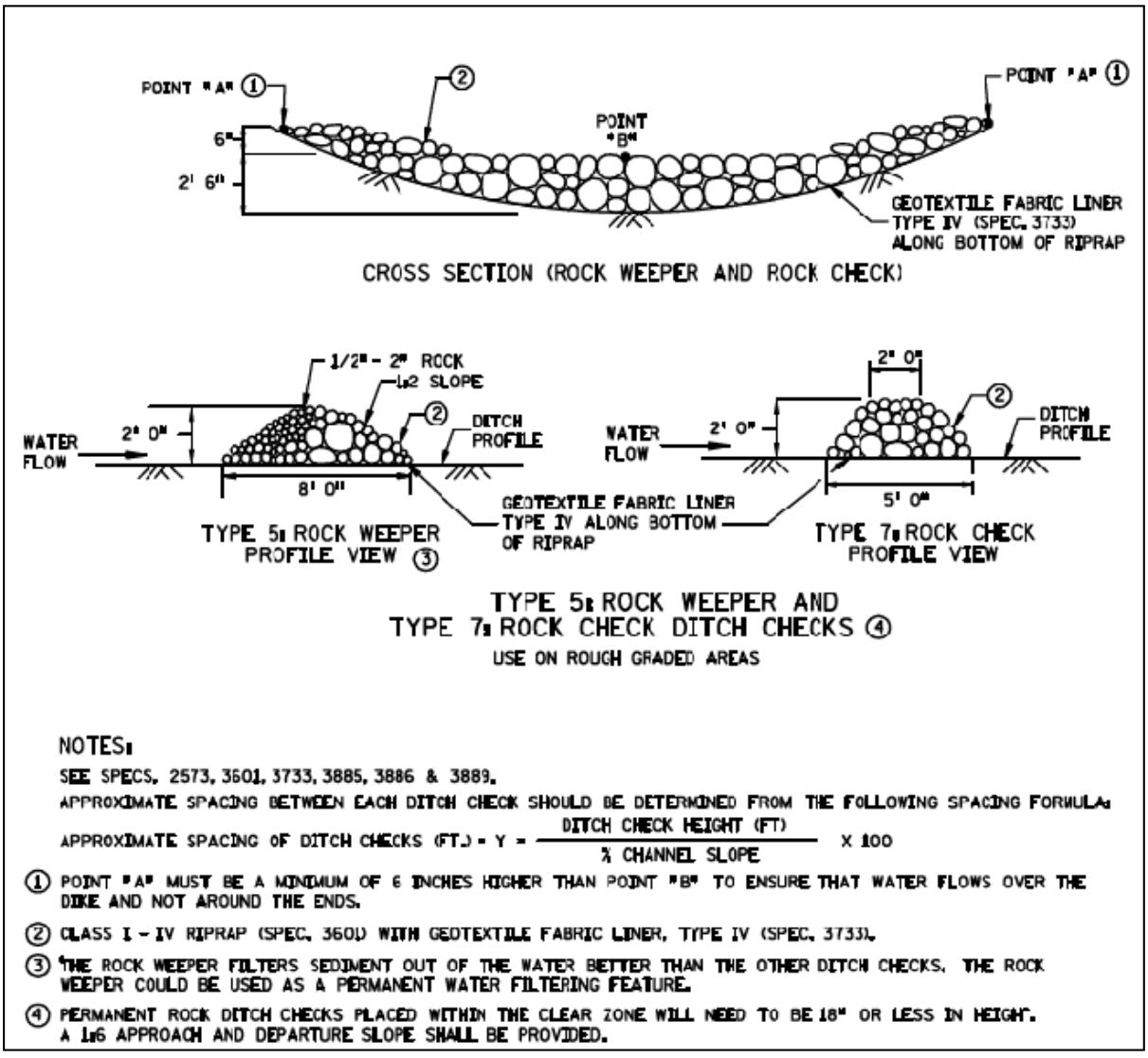
As a result of the increase in impervious surface area, the project is required to treat storm water runoff prior to discharge offsite in accordance with the NPDES Permit. The downstream receiving water bodies include several wetland basins, Armstrong River, Armstrong Lake, and Clear Lake, which are located within and/or immediately adjacent to the project area. The project proposes to utilize vegetated side slopes, grassed roadside ditches, and sediment filtration to treat storm water runoff. The proximity to underlying bedrock, numerous wetlands, and the topographical constraints throughout the corridor restrict the use of wet sedimentation basins or infiltration basins to treat storm water runoff. The Storm Water Pollution Prevention Plan (SWPPP) that will be prepared as part of the NPDES permit will detail the measures to be taken to minimize potentially adverse impacts on receiving waterbodies. Storm water runoff from the project will not impact waters classified as scenic or impaired, that would require higher levels of treatment (Armstrong Lake is identified as impaired for mercury). Therefore, the level of treatment required is 1-inch of runoff over the new impervious surface area.

The project will likely utilize grass roadway side slopes/ditches and permanent rock ditch checks to filter runoff prior to discharge offsite. A detail of a typical MnDOT rock ditch check is shown below in Figure 18. The permanent rock ditch checks would be spaced based on the ditch profile of the final design.

Surface Water Flow

No substantial changes that would alter the existing surface water flow from the highway to receiving water bodies would occur under any build alternative. Figure 19 illustrates the conceptual drainage plan for the preferred alternative, Alternative 3A including the existing/natural direction of surface water flow (blue arrows) and the direction of proposed roadway drainage flow from the project (purple arrows). Surface water flow throughout the project area is primarily towards Armstrong River. The most extensive topographic changes/grading would occur at the western portion of the project in the Sixmile Lake area where the roadway is realigned to the south. Figure 19 shows that the topographic high-point (ridge-line) in this area is located south of the proposed Alternative 3A alignment, and as a result water flow from the realigned highway would continue to flow north toward Armstrong River. In the eastern portion of the project area there is relatively little alteration to the existing grades and landscape. As a result, the existing drainage patterns remain mostly unchanged.

Figure 18 – Rock Ditch Check Typical Section



Other Water Quality Best Management Practices

Temporary erosion and sediment control measures will be implemented throughout the construction activities to protect drainage areas. A National Pollutant Discharge Elimination System (NPDES) Construction Storm Water Permit (NPDES general permit MN# R100001) will be required for the project.

The NPDES permit has both temporary directives used primarily during construction, as well as permanent requirements, which the project must meet. Below is a summary of the requirements and sediment control methods that may be used for this project.

- Horizontal slope grading, construction phasing, and other techniques designed to reduce erosion and sedimentation.
  - Implementation of temporary controls to protect exposed soil areas, such as mulch cover, cover crop seeding, hydromulching, erosion control blanket, silt fence, bio-rolls and stabilization of steep slopes.
  - Prior to any connection of a pipe or outfall structure to a water of the state, installation of inlet protection and temporary energy dissipation using riprap to control the outfall water will be implemented.
  - Perimeter barriers for sediment control BMPs will be in place on down gradient perimeters where runoff will discharge off site before construction disturbance begins.
  - Minimization of vehicle soil tracking onto paved surfaces will occur by limiting construction equipment use on paved roads and using rock construction entrances throughout the project.
  - Permanent cover will be provided post construction using topsoil, seed and mulch, erosion control blanket, sod or hydroseeding.

A SWPPP is required as part of the National Pollutant Discharge Elimination System (NPDES) Permit. The SWPPP will provide methods, schedules and details for the BMPs to be used for this project to prevent impacts to the quality of the receiving waters. The SWPPP will be incorporated into and made part of the construction documents. Erosion control measures will be in place and maintained throughout the entire construction period with implementation timing as stated in the SWPPP. Removal of erosion measures will not occur until all disturbed areas have been stabilized.

iii. Water appropriation - Describe if the project proposes to appropriate surface or groundwater (including dewatering). Describe the source, quantity, duration, use and purpose of the water use and if a MnDNR water appropriation permit is required. Describe any well abandonment. If connecting to an existing municipal water supply, identify the wells to be used as a water source and any effects on, or required expansion of, municipal water infrastructure. Discuss environmental effects from water appropriation, including an assessment of the water resources available for appropriation. Identify

any measures to avoid, minimize, or mitigate environmental effects from the water appropriation.

The project improvements associated with the Preferred Alternative will not require any creation, connection, or change to a public water supply. No known private wells will be affected by the project. No permanent public wells will be installed for any of the proposed project improvements; therefore, there would be no permanent appropriation of water.

Dewatering during excavation will likely be necessary during construction of the proposed improvements due to shallow groundwater level found throughout the project area. If it is determined dewatering is required and dewatering exceeds 10,000 gallons/day or 1 million gallons/year, a water appropriation permit application will be completed and submitted to the MnDNR for approval prior to any dewatering activities taking place.

iv. Surface Waters

a) Wetlands - Describe any anticipated physical effects or alterations to wetland features such as draining, filling, permanent inundation, dredging and vegetative removal. Discuss direct and indirect environmental effects from physical modification of wetlands, including the anticipated effects that any proposed wetland alterations may have to the host watershed. Identify measures to avoid (e.g., available alternatives that were considered), minimize, or mitigate environmental effects to wetlands. Discuss whether any required compensatory wetland mitigation for unavoidable wetland impacts will occur in the same minor or major watershed, and identify those probable locations.

The discussion that follows describes the wetland-related regulations that are applicable to this project, and provides a discussion of relevant analyses, decision-making, and findings, including:

- Wetland regulations and agency jurisdictions
- Delineation, assessment and classification of wetlands in the project area
- Development of alternatives and assessment of impacts
- Alternatives screening and decision-making
- Preferred Alternative: impacts and sequencing

<u>Wetland regulations and agency jurisdictions</u>

Wetland regulations in effect for the project area are as follows.

- Section 404 of the federal Clean Water Act as administered by the USACE
- Section 401 of the Clean Water Act water quality certification as administered by the MPCA
- The Minnesota Wetland Conservation Act (WCA) administered by the Board of Water and Soil Resources through a designated Local Government Unit (LGU).In accordance with WCA requirements, MnDOT will act as its own LGU for activities within MnDOT right-of-way.

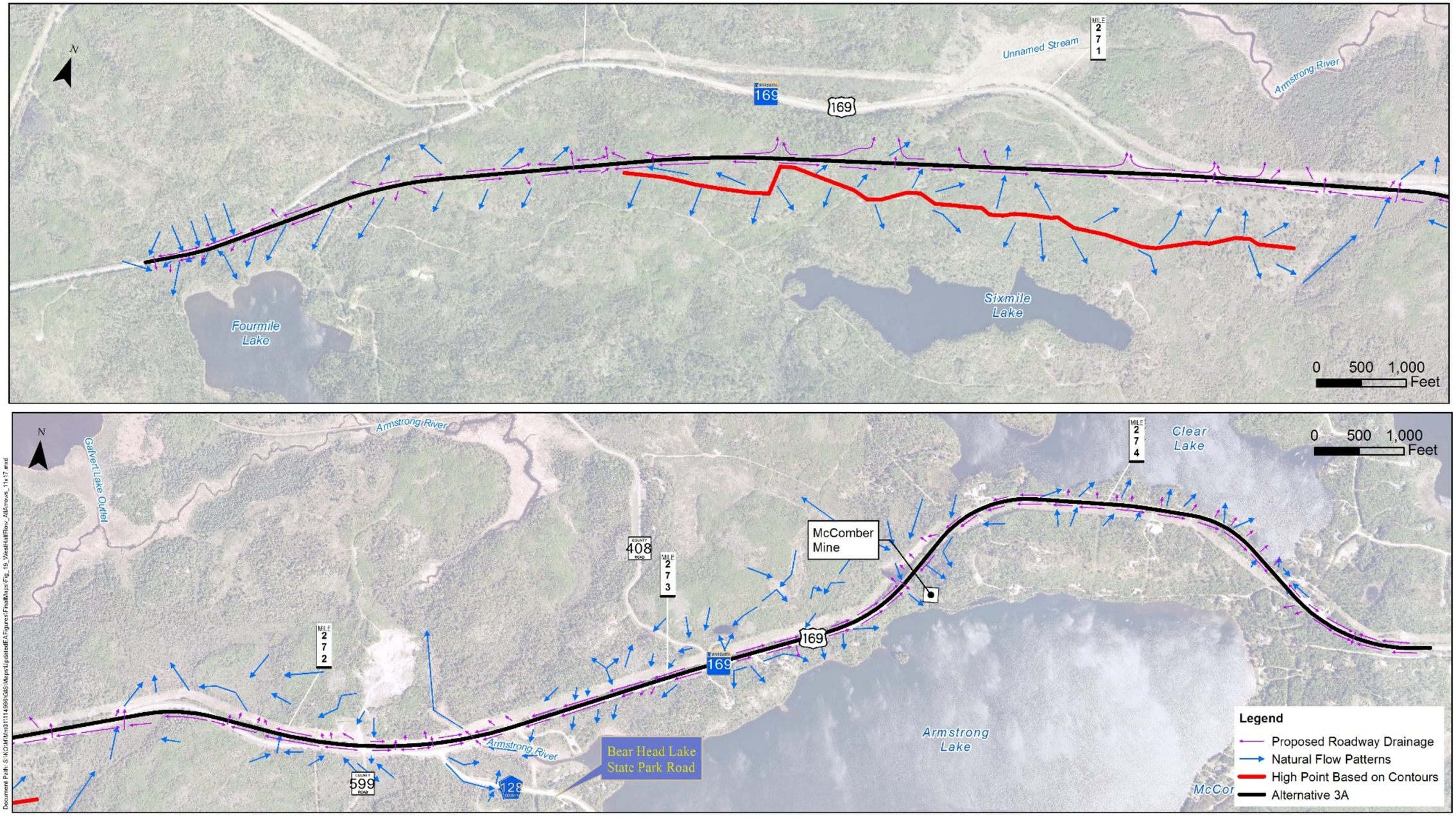
- Public Waters Work Permit for wetlands that are designated as Minnesota Department of Natural Resources (MnDNR) Public Waters.
- Executive Order 11990 – Protection of Wetlands.

Wetland Jurisdiction

Based on current rules it is anticipated that the following agencies would have jurisdiction over project area wetlands:

- The Unites States Army Corps of Engineers (USACE) regulates all waters of the U.S. including wetlands. Section 404 of the Clean Water Act requires approval by the USACE for discharge of dredged or fill material into waters of the United States. Regulated wetlands must meet the criteria of the 1987 Manual and the subsequent regional supplements. Although the USACE does not regulate isolated wetlands, the joint federal/state permit application will be prepared under the assumption that all areas mapped as wetlands are jurisdictional, depending on their characteristics of flow and connectivity. This project is anticipated to require an Individual Section 404 permit from the USACE. An informal NEPA/Section 404 Merger process was also initiated by MnDOT, FHWA, USACE, and USEPA for this project. See Section VI.A.6 for a description of the Merger process.
- The Minnesota Pollution Control Agency (MPCA) provides review of the project with regards to compliance with Section 401 of the Clean Water Act, as part of the Section 404 permit process.
- The Minnesota Wetland Conservation Act (WCA) also regulates wetlands, and is administered by MnDOT when impacts occur within its existing and/or proposed right-of-way. The WCA regulates all wetlands, regardless of isolation. The WCA does not have jurisdiction over areas constructed in non-wetland and created for a purpose other than being a wetland, even though such areas may exhibit wetland characteristics (e.g. roadside ditches and stormwater ponds). This process recognizes created areas as incidental, which could include many of the roadside drainage ditches.
- The MnDNR regulates Public Waters, and is a participant if projects occur within 1,000-feet of a Public Water. The proposed project includes improvements in the area of Clear Lake and Armstrong Lake, which are both Public Waters. No direct impacts are anticipated. However, a Public Water Work Permit may be required for improvements associated with the crossing of Armstrong River (see Section b) Other Surface Waters, below). The WCA does not administer jurisdiction over Public Waters, although the MnDNR can waive jurisdiction to WCA.

Figure 19 – Surface Water Flow



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Wetland Delineation, Assessment, and Classification

Multiple wetland delineations were conducted throughout the project area due to the development of several alternatives during the project development process. Wetlands 1 – 36 were delineated on May 31 and June 1-3, 2011; Wetlands 37 – 46 were delineated August 30, 2012; and Wetland 47 was delineated October 5, 2012. A complete description of the wetland delineation methodology and results can be found in the respective project Wetland Delineation Reports, available by contacting the MnDOT Project Manager. At the time of permitting, a re-evaluation and/or delineation of wetlands potentially impacted by the Preferred Alternative may be required due to the amount of time that will have lapsed since the original delineations were completed.

Data was gathered and reviewed prior to the initiation of jurisdictional wetland delineations to identify the potential wetland habitats in the area. Data sources included the following:

- National Wetlands Inventory (NWI)
- St. Louis County Soil Survey
- Recent and Historic Aerial Photographs
- MnDNR Protected Waters Inventory (PWI)
- U.S. Geological Service Quadrangle Maps

The project area was examined for areas meeting the technical wetland criteria in accordance with the U.S. Army Corps of Engineers Wetland Delineation Manual (USACE 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: North-Central and Northeast Region (USACE 2012). The Manual and Regional Supplement require that parameters of soils, vegetation, and hydrology be present in order for an area to be classified as wetland. These parameters were observed and recorded for both wetland and adjacent upland areas on Wetland Determination Data Forms which are attached in the Appendices of the Wetland Delineation Reports. The delineated wetland boundaries were marked and surveyed.

Each delineated wetland was typed and classified in accordance with the U.S. Fish and Wildlife Service (USFWS) publications, *Circular 39 Wetlands of the United States, Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et. al., USFWS/OBS 79/31) and *Eggers, S.D. and Reed, D.M. 1997, Wetland Plants and Plant Communities of Minnesota and Wisconsin, U.S. Army Corps of Engineers*.

Additional data gathered on each delineated wetland included the identification of any inlet and outlet features and hydrological connectivity indicators. Topographic setting, when possible, was also determined in accordance with the settings described in the WCA. Important wetland functions and values were also recorded when observed. Since the adjacent land is relatively undeveloped, the overall quality of all of the wetlands within the project area is high. Land uses adjacent to and surrounding each delineated wetland were also described. Each delineated wetland was assigned a unique identification number.

The field delineations have been reviewed/accepted by the Technical Evaluation Panel (TEP) that consists of specialists from the USACE, MnDNR, Board of Water

and Soil Resources (BWSR), and Soil and Water Conservation District (SWCD. The wetland delineation report was also provided to the USEPA.

Development of alternatives and assessment of impacts

Section III of this EA describes the project alternatives development and decision-making process in detail. This process is summarized below, focusing on steps relevant to the first 2 considerations in wetland impacts 'sequencing', i.e., impact avoidance and impact minimization. The third step – impact compensation/mitigation is discussed in the section describing the Preferred Alternative below.

In early 2011, MnDOT initiated the evaluation of safety and mobility improvements in the Eagles Nest Lake Area of Highway 1/169. Due to the presence of numerous lakes, wetlands, bedrock outcroppings, and other natural resources, the early stages of project development considered three alignment corridors (North Corridor, Existing Corridor, South Corridor) and numerous design options – which were developed to avoid and minimize wetland impacts to the extent practicable -- within each corridor. An initial screening process dismissed a North Corridor primarily due to the fact that this route resulted in the highest level of wetland impacts. Alternatives and design options within the remaining two corridors (Existing and South) were refined and revised several times to minimize potential social, economic, and environmental (SEE) impacts – including minimizing wetland impacts to the extent practicable – resulting in alignment Alternatives 1, 2, 3, 2A and 3A described in Section III Alternatives. A summary of the wetland impacts for each of the five Build Alternatives originally considered is presented in Table 10 by wetland type and Table 11 (on the following pages) by basin. [All five build alternatives (not just the three alternatives described in the rest of this EA) are included in this comparison, in order to fully document the potential wetland impacts of all alternatives considered.] The impact quantities listed in the tables are based on preliminary construction limits and considered wetland "fill" impacts.

Table 10– Wetland Types And Impacts

Wetland Type	Alternative 1	Alternative 2	Alternative 3	Alternative 2A	Alternative 3A (Preferred Alternative)
1	0	0	0	0	0
2	8.6	4.47	8.06	4.01	7.01
3	0.18	0.14	0.87	0.18	0.22
4	0	0	0	0	0
5	0.01	0	0	0	0.1
6	0.62	0.49	0.19	0.02	0.02
7	3.84	1.49	8.15	2.31	3.66
Total Acreage	13.25	6.59	17.27	6.52	10.92

Note: Impacts less than 435 square-feet were rounded to 0.01 acres of impact.

Table 11 – Wetland Characteristics And Impacts

Wetland ID	Circular 39 (Cowardin) Plant Comm. Type[1]	NWI Code	Dominant Vegetation	Setting and Inlet/Outlet	MNDNR PWI	Delineated Basin Size[2]	Wetland Impacts				
							Alt. 1	Alt. 2	Alt. 3	Alt. 2A	Alt. 3A
1	Type 2/3/7 (PEMB/PEMC/PFO1B) Sedge Meadow / Shallow Marsh / Hardwood Swamp	PFO/SSB PSS/EM5B	Sedges, grasses, balsam fir	Depression, no apparent inlet or outlet	N/A	4.66+	0.23	0.19	3.48	0.19	0.23
2	Type 3/7 (PEMC/PFO1B) Shallow Marsh / Hardwood Swamp	PSS/EM5B	Grasses, sedges, black ash	Depression, appears isolated	N/A	0.61	--	--	--	--	--
3	Type 3/6 (PEMC/PSS1B) Shallow Marsh / Shrub-Carr	PEM5B	Grasses, sedges, steeplebush, black ash	Depression, appears isolated	N/A	1.40	--	--	--	--	--
4	Type 7 (PFO1B) Hardwood Swamp	N/A	Black ash, red maple, balsam fir	Depression, appears isolated	N/A	0.11	--	--	--	--	--
5	Type 6/7 (PSS1B/PFO1B) Alder Thicket / Hardwood Swamp	PSS1/EM5C	Alders, black ash, balsam fir	Armstrong Lake fringe	Armstrong Lake (69-278P)	4.54	--	--	0.38	--	--
6	Type 2/7 (PEMB/PFO1/PFO4B) Sedge Meadow / Hardwood Swamp / Coniferous Swamp	PSS1/EM5C	Sedges, cedar, tamarack, alder	Armstrong Lake fringe, flow through wetland	Armstrong Lake (69-278P) and Armstrong River	6.54+	0.004 (188 sf)	--	0.36	--	0.004 (188 sf)
7	Type 2 (PEMB) Sedge Meadow	PSS1/EM5C	Sedges	Flow through wetland	Armstrong River flows through	6.22+	2.28	0.58	1.09	0.58	2.28
8	Type 7 (PFO1B) Hardwood Swamp	PFO/SSB	Sedges, black ash, alder	Depression, culvert connection to Wetland 9	N/A	0.83	--	0.05	0.04	0.05	--
9	Type 7 (PFO1B) Hardwood Swamp	PFO/SSB	Sedges, black ash, alder	Depression, culvert connection to Wetlands 8 and 10	N/A	1.42	--	0.04	0.44	0.04	--
10	Type 2/7 (PEMB/PFO1B) Fresh (wet) Meadow / Hardwood Swamp	PFO/SSB	Grasses, sedges, black ash	Depression, culvert connection from Wetland 9, flows to Armstrong River	N/A	6.31+	1.35	0.70	3.69	0.70	1.35
11	Type 2 (PEMB) Fresh (wet) Meadow	PSS/EM5B	Grasses, sedges	Depression, culvert connection from Wetland 12, flows to Armstrong River	N/A	2.01+	0.08	0.54	0.04	0.54	0.08
12	Type 7 (PFO1C) Hardwood Swamp	PFO4/SS3Bg	Black ash, cedar, alder	Depression, culvert connection to Wetland 11	N/A	4.44+	1.11	0.02	2.54	0.02	1.11
13	Type 2 (PEMB) Fresh (wet) Meadow	PSS	Grasses, sedges, black ash	Depression, flows to Armstrong River	N/A	2.74+	2.00	0.61	1.41	.061	2.00
14	Type 7 (PFO1B) Hardwood Swamp	PFO4/6B	Black ash, alder, balsam fir	Depression, appears isolated	N/A	0.84+	--	--	0.09	0.09	0.09
15	Type 7 (PFO1B) Hardwood Swamp	N/A	Black ash, alder, balsam fir	Depression, appears isolated	N/A	0.67+	--	--	0.05	0.05	0.05
16	Type 3 (PEMC) Shallow Marsh	N/A	Sedges, mostly open water	Depression, appears isolated	N/A	0.04	--	--	0.04	0.04	0.04

Table 7 continued

Wetland ID	Circular 39 (Cowardin) Plant Comm. Type[1]	NWI Code	Dominant Vegetation	Setting and Inlet/Outlet	MNDNR PWI	Delineated Basin Size[2]	Wetland Impacts				
							Alt. 1	Alt. 2	Alt. 3	Alt. 2A	Alt. 3A
17	Type 2/6 (PEMB/PSS1B) Sedge Meadow / Open Bog	N/A	Grasses, sedges, cranberry	Depression, appears isolated	N/A	0.50+	--	--	0.05	0.05	0.05
18	Type 6 (PSS1B) Alder Thicket	N/A	Alder, grasses, sedges	Depression, appears isolated	N/A	0.08	--	--	--	--	--
19	Type 3 (PEMC) Shallow Marsh	N/A	Sedges, mostly open water	Depression, appears isolated	N/A	0.02	--	--	--	--	--
20	Type 6 (PEMC) Shrub-Carr	N/A	Willows, sedges	Depression, appears isolated	N/A	0.04	--	--	--	--	--
21	Type 2/6 (PEMBPSS1B) Fresh (wet) Meadow / Alder Thicket	N/A	Grasses, alder	Depression, culvert connection to Wetland 22	N/A	0.58+	--	--	0.19	0.19	0.19
22	Type 7 (PFO1B) Hardwood Swamp	N/A	Black ash, red maple, aspen	Intermittent forested drainage, culvert connection from Wetland 21	N/A	0.71+	--	--	0.13	0.13	0.13
23	Type 6/7 (PSS1B/PFO4B) Alder Thicket / Coniferous Swamp	N/A	Alder, black spruce, balsam fir	Depression, appears isolated	N/A	0.45+	--	--	0.12	0.12	0.12
24	Type 7 (PFO4B) Coniferous Swamp	N/A	Black spruce, balsam fir, some alder	Depression, appears isolated	N/A	0.27	--	--	0.27	0.27	0.27
25	Type 7 (PFO4B) Coniferous Swamp	PFO4/6B	Cedar, alder, black spruce	Depression, intermittent overland drainage flows in from Wetland 22	N/A	0.60+	--	--	0.32	0.32	0.32
26	Type 2/7 (PEMB/PFO1B) Sedge Meadow / Hardwood Swamp	N/A	Grasses, sedges, black ash, aspen	Wet ditch, culvert connects to Wetland 27	N/A	0.73+	--	0.18	0.30	0.30	0.30
27	Type 2 (PEMB) Sedge Meadow	N/A	Sedges, grasses	Depression, culvert connects from Wetland 26.	N/A	0.94+	0.64	0.20	0.68	0.68	0.68
28	Type 2 (PEMB) Sedge Meadow	N/A	Sedges, grasses	Depression, appears isolated	N/A	0.06+	0.01	--	0.03	--	0.01
29	Type 2 (PEMB) Sedge Meadow	N/A	Sedges, grasses	Wet ditch, culvert connection to Wetland 30	N/A	0.64+	--	0.11	0.57	0.57	0.57
30	Type 6 (PSS1B) Alder Thicket	N/A	Alder, sedges, grasses	Wet ditch, culvert connection from Wetland 29, flows into tributary to Armstrong River	N/A	0.27	0.27	0.12	--	--	--
31	Type 7 (PFO1B) Hardwood Swamp	N/A	Black ash, sedges, some alder	Four Mile Lake fringe, culvert connection from Wetland 32	Four Mile Lake (69-281P)	0.37+	--	--	0.08	0.08	0.08
32	Type 7 (PFO1B) Hardwood Swamp	N/A	Black ash, sedges, alder	Depression, culvert connection to Wetland 31	N/A	0.64+	--	--	0.01	0.01	0.01
33	Type 2 (PEMB) Fresh (wet) Meadow	PFO/SS1B	Grasses, sedges	Wet ditch, culvert connection to Wetland 35	N/A	1.12+	0.30	0.21	0.27	0.27	0.27

Table 7 continued

Table 7 continued

Wetland ID	Circular 39 (Cowardin) Plant Comm. Type[1]	NWI Code	Dominant Vegetation	Setting and Inlet/Outlet	MNDNR PWI	Delineated Basin Size[2]	Wetland Impacts				
							Alt. 1	Alt. 2	Alt. 3	Alt. 2A	Alt. 3A
34	Type 2 (PEMB) / Fresh (wet) Meadow	PFO/SS1B	Grasses, sedges	Wet ditch, culvert connection to Wetland 35	N/A	1.15+	0.70	0.15	0.09	0.09	0.09
35	Type 2/7 (PEMB/PFO4B) / Fresh (wet) Meadow / Coniferous Swamp	N/A	Grasses, sedges, balsam fir	Wet ditch, culvert connection from Wetlands 33 and 34	N/A	0.50	0.19	0.07	0.50	0.50	0.50
36	Type 5 (L2UB) / Shallow Open Water	L1UBH	Open water	Clear Lake littoral zone	Clear Lake (69-277P)	5.00+	0.004 (154 sf)	--	--	--	0.004 (154 sf)
37	Type 2/7 (PEMB/PFO1B) / Fresh (wet) Meadow / Hardwood Swamp	N/A	Grasses, black ash	Depression, connection to wetlands off site	N/A	0.44	0.44	0.36	--	--	--
38	Type 6 (PSS1B) / Alder Thicket	N/A	Alder, aspen, sedges	Depression, possible overland connection to Wetland 37	N/A	0.35	0.35	0.35	--	--	--
39	Type 6 (PSS1B) / Alder Thicket	N/A	Alder, aspen, sedges	Depression, appears isolated	N/A	0.67	--	0.02	--	--	--
40	Type 2 (PEMB) / Sedge Meadow	PFO4/6Bg	Sedges, grasses	Large flow through wetland, no apparent inlet or outlet	N/A	1.87	0.53	0.37	--	--	--
41	Type 2 (PEMB) / Fresh (wet) Meadow	N/A	Grasses	Wet ditch, overland connection to Wetland 43	N/A	0.11	0.11	0.10	--	--	--
42	Type 2 (PEMB) / Sedge Meadow	PFO6/4B / PEM5B	Sedges, grasses	Large flow through wetland, no apparent inlet or outlet	Fringe of Unnamed Public Watercourse	16.54	1.87	0.70	--	--	--
43	Type 2 (PEMB) / Fresh (wet) Meadow	N/A	Grasses	Wet ditch, overland connection to Wetlands 41 and 44	N/A	0.49	0.44	0.39	--	--	--
44	Type 2 (PEMB) / Fresh (wet) Meadow	N/A	Grasses	Wet ditch, overland connection to Wetlands 43 and 45	N/A	0.11	0.07	0.09	--	--	--
45	Type 2 (PEMB) / Fresh (wet) Meadow	N/A	Grasses	Wet ditch, overland connection to Wetlands 44 and 46	N/A	0.37	0.01	0.25	--	--	--
46	Type 2 (PEMB) / Fresh (wet) Meadow	N/A	Grasses	Wet ditch, overland connection to Wetlands 45	N/A	0.16	0.16	0.16	--	--	--
47	Type 7 (PFO1B) / Hardwood Swamp	N/A	Black ash, dogwoods, grasses and sedges	Depression, possible connection to Armstrong Lake	Possible connection to Armstrong Lake (69-278P)	0.17+	0.09	0.03	--	0.03	0.09
						Total (acres)	**13.25**	**6.59**	**17.27**	**6.52**	**10.92**

[1] Plant communities are those described in Eggers and Reed, 1997.

[2] Wetland size describes wetlands delineated within the project corridor. Actual wetland size may be larger than shown if the wetland continues outside the project corridor.

+ Indicates total wetland size extends beyond delineated boundary.

Table 12– LEDPA Rationale

Alternative	Practicable?	Less adverse effect on aquatic environment? Wetlands and other surface waters (3) (4)	Less adverse effect on aquatic environment? Water quality (5) Potential for acid rock drainage (ARD) from sulfide-containing minerals in bedrock within the project area was identified as a potential environmental impact. Therefore, the alternatives are compared with respect to quantity of bedrock excavation below. See footnote (5) below re: minimization and mitigation.	Significant environmental consequences? [Section 7 (ES Act) considerations]	Conclusion
No-Build	No – does not meet project purpose.	Avoidance alternative – 0 acres of wetland impact.	None – no impacts.	None – no impacts.	Not practicable. Not the LEDPA.
1 -- Minimal Off-Set/ Construct Under Traffic	Yes, but provides less transportation purpose benefits than other alternatives (12,500-feet of passing opportunities vs. 22,700-feet for Alt. 3A).(1)	13.3 acres of wetland fill impact – 2nd highest amount of aquatic environment impact (3).	69,000 CY of bedrock excavation (5) With BMPs and mitigation, no substantive difference among Build Alternatives in potential for water quality impacts.	No unique or rare ecosystems have been identified in any of the project alternative corridors. All of the Build Alternatives result in forest habitat impacts. [Alt 1 = 48 ac, Alt 2 = 41 ac, Alt 2A = 73 ac, Alt 3 = 84 ac, and Alt 3A = 75 ac]. So, all of these alternatives would likely be considered to potentially affect forests that could be used as summer roosting areas by the long-eared bat (proposed for listing under the Endangered Species Act). While coordination with the Service is continuing, it is not anticipated that the project impacts would reach the level of jeopardizing the continued existence of the long-eared bat, regardless of which alternative is selected. The project is located within a geographic region identified as critical habitat for the Canada lynx. However, coordination with USFWS in 2011 resulted in the USFWS concurring with the determination that based on the potential project impacts, the project may affect, but is not likely to adversely affect the lynx or its critical habitat. Discussion with USFWS regarding potential measures to minimize impacts to the Canada lynx will continue, concurrent with the on-going discussions regarding the long-eared bat. Based on this assessment, there is no substantive difference among the Build Alternatives with respect to this Section 404(b)(1) criteria. None of the alternatives are anticipated to have significant environmental consequences.	Not the least adverse effect on aquatic environments. Also, low project purpose benefits. Not the LEDPA.
2 -- Reconstruct on Existing and Detour Traffic	No – Results in substantial logistical problems due to the long detour route and duration; resulting in unacceptable social and economic impacts. (2) Also, this alternative provides the least transportation purpose benefits (only 10,800-feet of passing opportunities). (1)	Least impact on aquatic environments (3) – 6.6 acres of wetland fill impact.	127,000 CY of bedrock excavation (5) With BMPs and mitigation, no substantive difference among Build Alternatives in potential for water quality impacts.		Not practicable due to logistical problems. Also, least transportation purpose benefits. Not the LEDPA.
2A -- Reconstruct with Less Detour	No – Results in substantial logistical problems due to the long detour route and duration; resulting in unacceptable social and economic impacts. (2)	Least impact on aquatic environments (3) – 6.6 acres of wetland fill impacts.	248,000 CY of bedrock excavation (5) With BMPs and mitigation, no substantive difference among Build Alternatives in potential for water quality impacts.		Not practicable due to logistical problems. Not the LEDPA.
3 -- Construct on New Alignment	Yes – provides the most substantial transportation purpose benefits (25,900-feet of passing opportunities). (1)	17.3 acres of wetland fill impacts– greatest amount of aquatic environment impacts (3)	266,000 CY of bedrock excavation (5) With BMPs and mitigation, no substantive difference among Build Alternatives in potential for water quality impacts.		Not the least adverse effect on aquatic environment. Not the LEDPA.
3A – Reconstruct Under Traffic with Partial Realignment	Yes – provides the 2nd most substantial transportation purpose benefits (22,700-feet of passing opportunities). (1)	11.0 acres of wetland fill impacts – 2nd lowest amount of aquatic environment impacts (3)	163,000 CY of bedrock excavation (5) With BMPs and mitigation, no substantive difference among Build Alternatives in potential for water quality impacts.		**This alternative is the LEDPA – the practicable alternative with the least adverse impacts to aquatic environments.**

(1) Details on alternatives' ability to meet transportation purposes are included in the Alternatives Memorandum and Section III of this EA.

(2) Details on the required detour route/distance and social and economic impacts from the Alt 2 and 2A detours are included in the Alternatives Memorandum and Section III of this EA.

(3) Re: non-wetland surface water impacts: As described in EA Section V, Item 11.b (Other Surface Waters), all of the Build alternatives considered for this project would affect the Armstrong River crossing at the east end of the project. All of the alternatives would cross the river at the same location (where there is currently a culvert for the river crossing), and all would result in essentially the same impacts and mitigation. No substantial changes to the river channel are proposed, and project design will include measures to minimize erosion and hydraulic impacts and to ensure fish passage. Therefore, there is no difference among the Build alternatives with respect to physical impacts to non-wetland surface waters.

(4) Wetland environment impacts are based on fill impacts within estimated construction limits. There would not be any vegetation clearing outside of the construction limits, so no 'Type conversion' of wetlands would occur (i.e., no changes in wetland Type due to vegetation changes).

(5) All of the Build alternatives would require rock excavation, with potential for sulfide weathering/ARD surface water quality risk; but this risk can be minimized/ mitigated by following the process agreed to with MnDNR and PCA (e.g., additional rock characterization; defining handling and utilization best management practices; providing buffering; etc.), as described in Section V.A.10.a. of this EA. Through the use of these practices, and there would not be any substantive difference among Build alternatives with respect to potential for water quality impacts, and there is not a potential for substantial water quality impacts from any of the Build alternatives.

Alternatives Screening and Decision-Making

Section III. Alternatives provides a complete description of the alternatives considered including a comparative assessment of transportation benefits and potential social, economic and environmental impacts, based on MnDOT's analyses and input received during MnDOT's consultation with FHWA, federal and state regulatory agencies (USEPA, USACE, MnDNR and MPCA), and other project stakeholders (Highway 169 Task Force, Bois Forte Band of Chippewa, and the public). Section III also provides the rationale for selection of the Preferred Alternative, based on NEPA process considerations. With respect to wetlands regulations, selection of a Preferred Alternative also needs to be consistent with the requirements of Section 404(b)(1) of the Clean Water Act and with the findings required under Executive Order 11990. The following sections describe the project alternatives development and decision-making process with respect to these two federal requirements.

Section 404(b)(1) of the Clean Water Act – Least Environmentally Damaging Practicable Alternative (LEDPA)

Federal regulations at 40 CFR 230.10(a) provide the guidance for USACE regarding alternatives considerations for Section 404 permitting, including:

"…no discharge of dredged or fill material shall be permitted if there is a *practicable alternative* to the proposed discharge which would have less adverse *impact on the aquatic ecosystem*, so long as the alternative does not have other *significant adverse environmental consequences*." [*italics added*]
"…(2) An alternative is *practicable* if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes." [*italics added*]

Table 12 summarizes the assessment of the five project Build Alternatives originally under consideration, based on the three Section 404 considerations: practicability; less adverse impact on aquatic ecosystems; and potential for other significant adverse environmental consequences. This assessment found that the Preferred Alternative – Alternative 3A – is consistent with the LEDPA requirements.

Section 404 (b)(1) of the Clean Water Act -- No Significant Degradation

Another requirement of the Section 404(b)(1) guidelines prohibits any discharge which will cause or contribute to the significant degradation of the waters of the United States. As described in EAW Items 10.a (Geology) and 11.b.ii (Surface Water – Stormwater), potential sources of surface water quality impacts are identified, and measures to avoid, minimize and/or mitigate those impacts have been developed that would be included in the design and implementation of the Preferred Alternative. Therefore, the construction of the Preferred Alternative includes measures that ensure that project impacts would not cause or contribute to the significant degradation of waters of the United States and no significant impact to human health or welfare would occur from the proposed impacts to waters of the United States.

No significant impact to aquatic ecosystem diversity, productivity and stability, or aquatic ecosystem-dependent wildlife populations would occur from the proposed impacts. In addition, there would be no significant impact to recreational,

aesthetic, and economic values of waters of the United States based on the proposed impacts. Additional coordination with state and federal regulatory/permitting agencies (MnDNR, MPCA, and USACE) will occur during the design and permitting phases of the project to ensure that no significant degradation will occur from the construction of the Preferred Alternative.

Executive Order 11990 – Protection of Wetlands

Executive Order 11990 includes the requirement that federal agencies "to the extent permitted by law, shall avoid undertaking or providing assistance for new construction located in wetlands unless the … agency finds (1) that there is *no practicable alternative* to such construction, and (2) that the proposed action includes *all practicable measures to minimize harm* to wetlands which may result from such use. In making this finding the head of the agency *may take into account economic, environmental and other pertinent factors*." [*italics added*].

The US Department of Transportation issued DOT Order 5660.1A in response to Executive Order 11990. The DOT Order includes the following: "5. Policy. …new construction located in wetlands shall be avoided unless there is no practicable alternative to the construction and the proposed action includes all practicable measures to minimize harm to wetlands which may result from such construction. In making a finding of no practicable alternative, economic, environmental and other factors may be taken into account." "7. Procedures. ….h. For any major action which entails construction located in wetlands, a specific finding should be made by the affected operating administration that (1) there is no practicable alternative to construction in the wetland and (2) that all practicable measures to minimize harm have been included."

Based on these Orders, the Project Wetland Finding under EO 11990 follows:

- Finding (1) – there is no practicable alternative to construction in wetlands: Discussion: The No-Build Alternative is the only alternative that would avoid construction in wetlands, and that alternative is not practicable, since it would not meet the project purpose and need.

- Finding (2) – the proposed action includes all practicable measures to minimize harm: Discussion: The summary table for the LEDPA decision-making compares the Build Alternatives with respect to extent of wetland impacts and practicability. Alternatives 2 and 2A would have the least harm to wetlands (6.6 acres of impacts), however, these alternatives are not practicable, since they result in substantial logistical problems due to the extensive detour, with resulting unacceptable social and economic impacts. Alternative 3A (the Preferred Alternative) would have the next lowest amount of wetland impacts (11.0 acres). This alternative was a modification of Alternative 3, which had the most extensive wetland impacts of all of the alternatives considered. During development of the alignment for this alternative, efforts were made to minimize wetland impacts to the extent practicable (see the discussion in the 'Preferred Alternative Impacts and Sequencing' section below). Therefore, Alternative 3A (the Preferred Alternative) includes measures (design revisions) to minimize harm, and is the practicable alternative with the least harm to wetlands. Additional measures to further reduce wetlands will be considered

during project final design and, if practicable, could be used to further minimize wetland impacts.

Conclusion: Based upon the above findings, it is determined that there is no practicable alternative to the proposed construction in the identified wetlands, and the proposed action includes all practicable measures to minimize harm to wetlands.

Preferred Alternative Impacts and Sequencing (avoidance, minimization, mitigation)

Preferred Alternative Impacts

Based on the preliminary design and field delineations it was determined that the Preferred Alternative (Alternative 3A) would potentially impact twenty-seven (27) wetland basins resulting in approximately 10.92 acres of impact. Table 13 summarizes the Preferred Alternative wetland impacts by basin and Table 14 lists the impacts by Circular 39 wetland type. Table 15 lists impact by Eggers and Reed wetland type. The impact quantities listed in the Preferred Alternative wetland tables are based on preliminary construction limits and considered wetland "fill" impacts. As described in EAW Item 13. below, vegetation clearing for project construction would not extend beyond the construction limits, so wetland 'Type conversions' would not occur, beyond the impacts identified in Table 11 (for fill impacts).

Table 13– Preferred Alternative Summary of Wetland Characteristics

Wetland ID	Cowardin Classification[1]	Circular 39 Classification[2]	Wetland Community	Basin Size (acres)	Area of Impact (acres)	Percent of Basin Impacted
1	PEMB	Type 2	Sedge Meadow	15	0.05	1.5%
	PEMC	Type 3	Shallow Marsh		0.19	
6	PEMB	Type 2	Sedge Meadow	390	0.002	<1%
	PFO1	Type 7	Hardwood Swamp		0.002	
7	PEMB	Type 2	Sedge Meadow	15	2.28	15.2%
10	PEMB	Type 2	Fresh (wet) Meadow	428	0.96	<1%
	PFO1B	Type 7	Hardwood Swamp		0.39	
11	PEMB	Type 2	Fresh (wet) Meadow	428	0.08	<1%
12	PFO1C	Type 7	Hardwood Swamp	9	1.11	12.3%
13	PEMB	Type 2	Fresh (wet) Meadow	428	2.0	<1%
14	PFO1B	Type 7	Hardwood Swamp	1.6	0.09	5.6%
15	PFO1B	Type 7	Hardwood Swamp	1.5	0.05	3.3%
16	PEMC	Type 3	Shallow Marsh	0.04	0.04	100%
17	PEMB	Type 2	Sedge Meadow	0.9	0.05	5.6%
21	PEMB	Type 2	Fresh (wet) Meadow	3.1	0.17	6.1%
	PBSS1B	Type 6	Alder Thicket		0.02	
22	PFO1B	Type 7	Hardwood Swamp	5.5	0.13	2.4%
23	PFO4B	Type 7	Coniferous Swamp	0.5	0.12	24%
24	PFO4B	Type 7	Coniferous Swamp	0.27	0.27	100%
25	PFO4B	Type 7	Coniferous Swamp	5.5	0.32	5.8%
26	PEMB	Type 2	Sedge Meadow	0.73	0.22	41.1%
	PFO1B	Type 7	Hardwood Swamp		0.08	

Table 13 continued

Wetland ID	Cowardin Classification[1]	Circular 39 Classification[2]	Wetland Community	Basin Size (acres)	Area of Impact (acres)	Percent of Basin Impacted
27	PEMB	Type 2	Sedge Meadow	0.94	0.68	72.3%
28	PEMB	Type 2	Sedge Meadow	0.06	0.01	16.7%
29	PEMB	Type 2	Sedge Meadow	0.64	0.57	89%
31	PFO1B	Type 7	Hardwood Swamp	0.4	0.08	20%
32	PFO1B	Type 7	Hardwood Swamp	1.8	0.01	<1%
33	PEMB	Type 2	Fresh (wet) Meadow	1.12	0.27	24.1%
34	PEMB	Type 2	Fresh (wet) Meadow	1.7	0.09	5.3%
35	PEMB	Type 2	Fresh (wet) Meadow	0.5	0.03	100%
	PFO4B	Type 7	Coniferous Swamp		0.47	
36	L2UB	Type 5	Open Water	135	0.004	<1%
47	PFO1B	Type 7	Hardwood Swamp	0.17	0.09	53%
			Preferred Alternative Total		**10.92 acres**	**N/A**

[1] *Classification of Wetlands and Deepwater Habitats of the United States.* (Cowardin *et al.*, December 1979).
[2] *Wetlands of the United States, Circular 39.* (Shaw and Fredine, United States Fish and Wildlife Service, 1956).

Table 14– Preferred Alternative Impacts By Wetland Type (Circular 39)

	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7	Total
Preferred Alternative	0	7.46	0.22	0	0.01	0.02	3.21	10.92

Table Note: Impacts less than 435 square-feet were rounded to 0.01 acres of impact.

Table 15– Preferred Alternative Impacts By Wetland Community Type (Eggers and Reed)

	Sedge Meadow	Shallow Marsh	Hardwood Swamp	Fresh Meadow	Alder Thicket	Coniferous Swamp	Open Water	Total
Preferred Alternative	3.86	0.23	2.03	3.6	0.02	1.18	0.004	10.92

As many of the wetlands observed within the project corridor were similar, wetlands are described by type below.

- Type 2 (PEMB) Sedge Meadow

  Portions of Wetlands 1, 6, 17, and 26 and all of Wetlands 7, 27, 28, 29, 40, and 42 are classified as Type 2 (PEMB) sedge meadows. Many of the sedge meadow areas are small or linear basins in the highway or high voltage transmission line (HVTL) rights of way. The dominant vegetation is tussock sedge (*Carex stricta* – OBL). Reed canary grass (*Phalaris arundinacea* – FACW) is co-dominant in Wetlands 27 and 28. Typical soils in the sedge meadows are sapric peat over shallow bedrock, meeting the hydric soil indicator A1: Histosol. At the time of the field delineation, soils were saturated to the ground surface.

  The adjacent upland areas within the project corridor for sedge meadows were primarily road right-of-way. In the herbaceous stratum, orange hawkweed (*Hieracium aurantiacum – UPL*) and Kentucky bluegrass (*Poa pratensis* – FAC) are dominant on the roadsides. White pine (*Pinus strobus* – FACU) and red maple (*Acer rubrum* – FAC) are typical dominant species in tree stratum.

Typical soils in the upland are brown (7.5YR 4/6) silty or loamy sand or 10YR 2/2 sandy loam over rock and cobble. No indicators of wetland hydrology were observed in the uplands.

- Type 2 (PEMB) Fresh (Wet) Meadow

  Portions of Wetlands 10, 21, 35, and 37 and all of Wetlands 11, 13, 33, 34, 41, 43, 44, 45, and 46 are classified as Type 2 (PEMB) fresh (wet) meadows. Wetlands 33, 34, 41, 43, 44, 45, and 46 are wet ditches. Many of the fresh (wet) meadow areas are in the HVTL right-of-way. The dominant vegetation in these wetlands is reed canary grass. Typical soils in these wetlands consist of shallow sapric peat over bedrock, or a layer of muck over a gleyed (Gley 1 4/5G or Gley 1 5/N) matrix. These soil profiles meet hydric soil indicator A1: Histosol or F2: Loamy Gleyed Matrix. At the time of the field delineation, soils were saturated to the surface and some wetlands had up to 4-inches of surface water.

  Surrounding forested upland areas are dominated by quaking aspen (*Populus tremuloides* – FAC), balsam fir (*Abies balsamea* – FACW), balsam poplar (*Populus balsamifera* – FACW), and/or paper birch (*Betula papyrifera* – FACU) in the tree layer. Large-leaf aster (*Eurybia macrophylla* – UPL) and bracken fern (*Pteridium aquilinum* – FACU) are common in the herbaceous stratum. Soils are dark (7.5YR 3/1, 10YR 2/1) loam or sandy loam w/ no redox features over rock and cobble. No indicators of wetland hydrology were observed in the upland sample points.

- Type 3 (PEMC) Shallow Marsh

  Portions of Wetlands 1, 2, and 3, and all of Wetland 16 are classified as Type 3 (PEMC) shallow marshes. Dominant vegetation is reed canary grass, tussock sedge, and Canada bluejoint (*Calamagrostis canadensis* – OBL). Typical soil profiles in the wetlands consist of histosols. In some places, there were only shallow layers (about 4-inches) of peat over bedrock. At the time of the site visit, the shallow marshes were inundated with 2- to 6-inches of standing water.

  Surrounding upland is located on hillslopes; in some places sample points are on the road slope from US 169. Dominant trees in the upland are paper birch and white pine. The dominant shrub species is beaked hazel (*Corylus cornuta subsp. cornuta* – UPL). In the herbaceous stratum, orange hawkweed is dominant on roadsides and large-leaf aster is dominant in forested areas. Typical soils in the upland are brown (7.5YR 4/4, 7.5YR 4/6) silty sand or 10YR 5/2 silty sand with no redox features. No indicators of wetland hydrology were observed in the uplands.

- Type 5 (L2UB) Shallow Open Water

  Wetland 36 is classified as Type 5 (L2UB) shallow open water. This wetland is located in the Clear Lake littoral zone. Clear Lake is public water basin #69-277P and is listed on the MnDNR Public Waters Inventory. The shoreline of Clear Lake was not field delineated, as road design and establishment of construction limits will ensure avoidance of Clear Lake and its ordinary high water level.

- Type 6 (PSS1B) Shrub-Carr

  Portions of Wetland 3 and all of Wetland 20 are classified as Type 6 (PSS1B) shrub-carrs. Wetland 20 is a small basin dominated by pussy willow (*Carex discolor* – FACW). The shrub-carr portion of Wetland 3 is dominated by young black ash (*Fraxinus nigra* – FACW), speckled alder (*Alnus incana subsp. rugosa* – OBL), and steeplebush (*Spirea tomentosa* – FACW). Soils in both wetlands consist of a shallow layer of sapric peat over bedrock. At the time of the delineation, both wetlands were inundated with 2-to 6-inches of surface water.

  Surrounding upland is forested, with balsam fir, paper birch, and bigtooth aspen (*Populus grandidentata* – FACU) dominant in the tree stratum, beaked hazel dominant in the shrub stratum, and large-leaf aster dominant in the herbaceous stratum. Typical soils in the upland are brown silty sand with no redox features. No indicators of wetland hydrology were present in the uplands.

- Type 6 (PSS1B) Alder Thicket

  Portions of Wetlands 5, 17, 21, and 23 and all of Wetlands 18, 30, 38, and 39 are classified as Type 6 (PSS1B) alder thickets. Dominant vegetation in the wetlands is speckled alder in the shrub layer with tussock sedge and reed canary grass common in the herbaceous layer. Soils in the alder thickets are thin layers of sapric peat over bedrock. These wetlands were saturated to the surface in most areas.

  Upland sample points are similar to those taken in the shrub-carr wetlands, with balsam fir, paper birch, beaked hazel, and large-leaf aster as the dominant vegetation. Soils were brown silty sand or 10YR 4/4 silt loam. No indicators of wetland hydrology were observed.

- Type 7 (PFO1B) Hardwood Swamp

  Portions of wetlands 1, 2, 6, 10, 37, and 47 and all of wetlands 4, 8, 9, 12, 14, 15, 22, 31, and 32 are classified as Type 7 (PFO1B) hardwood swamps. The dominant plant species in the hardwood swamps are black ash in the tree stratum, young balsam fir and speckled alder in the shrub stratum, and tussock sedge, marsh marigold (*Caltha palustris* – OBL), and dewberry (*Rubus hispidus* – FACW) in the herbaceous stratum. Soils in most of the hardwood swamp wetlands are thin layers of sapric peat over bedrock. Another typical soil profile is 10YR 5/2 sandy loam with 7.5YR 4/6 iron concentrations under a layer of dark muck, meeting the hydric soil indicator A11: Depleted Below Dark Surface. Soils in the hardwood swamps were saturated to the surface, and in some areas were inundated with shallow (two-inches) surface water.

  Uplands surrounding the hardwood swamp wetlands include forested areas and highway right-of-way. Vegetation on the road slopes is dominated by Kentucky bluegrass and orange hawkweed. In the forested areas, white pine, balsam fir, quaking aspen, and paper birch are dominant in the tree stratum. Young balsam fir and beaked hazel are dominant in the shrub layer. Typical soil profiles included 10YR 4/4 silt and loamy clay, 10YR 5/2 silty sand with no redox features, and thin layers of dark loam over bedrock. No indicators of wetland hydrology were observed in the uplands.

Sequencing

Wetland impact sequencing includes three steps: impact avoidance, impact minimization, and impact compensation/mitigation.

Avoidance and Minimization

Avoidance and minimization measures have been considered throughout the conceptual and preliminary design phases for the alternatives considered. Since wetlands are located directly adjacent to the existing highway and throughout much of the study area, none of the Build Alternatives considered would succeed in complete avoidance of wetland impacts.

The preliminary design of the Preferred Alternative was developed to avoid as many wetlands as possible while still meeting highway design and safety standards. Reasons for the Preferred Alternative not avoiding impacts to a specific wetland included 1 or more of the following:

- Need to provide safe roadway geometrics
- Shifting the alignment would create impacts to other wetlands and/or to other social, environmental, or natural resources

Another step in the sequencing process and requirement of the Section 404(b) (1) guidelines is to implement minimization measures prior to the issuance of a permit. Measures that have been implemented in the Highway 1/169 Preferred Alternative include the use of the existing roadway corridor where possible and alignment shifts in order to reduce potential wetland impacts. As described in Section III (Alternatives) above, early project screening eliminated the North Route corridor, which had the most wetland impacts (34 acres). Section III also discusses how wetland minimization was considered as alternative alignments were developed during project screening. The western segment of the Preferred Alternative has been shifted south of the existing corridor in part to limit wetland impacts, while at the same time improving the transportation benefits through enhance roadway geometrics and greater passing zones. Further design refinements during the more detailed design process may further reduce impacts. These detailed wetland impact minimization measures would be completed with the final design plans for the project and will be described in the wetland permit application in accordance with USACE, WCA, and for the transportation project elements, MnDOT guidance and requirements for sequencing.

Compensation/Mitigation

MnDOT's wetland replacement proposal is to use COE approved wetland bank credits from the geographically closest wetland bank site. As of November 2014, there are wetland credits available at the U of M Fens site in St. Louis County. This bank site is located in the same major watershed (WS #3) and Bank Service Area (BSA 1) as the proposed wetland impacts.

A Wetland Mitigation Plan will be prepared and submitted with the wetland permit application for the preferred alternative. The Plan will include detailed design plans and data, the administrative procedures, and will address the need for wetland replacement. The Mitigation Plan will be submitted with the wetland permit application at MnDOT for WCA approval, USACE for Section 404 permit approval, and MnDNR for Public Waters Work Permit approval.

c. Other surface waters- Describe any anticipated physical effects or alterations to surface water features (lakes, streams, ponds, intermittent channels, county/judicial ditches) such as draining, filling, permanent inundation, dredging, diking, stream diversion, impoundment, aquatic plant removal and riparian alteration. Discuss direct and indirect environmental effects from physical modification of water features. Identify measures to avoid, minimize, or mitigate environmental effects to surface water features, including in-water Best Management Practices that are proposed to avoid or minimize turbidity/sedimentation while physically altering the water features. Discuss how the project will change the number or type of watercraft on any water body, including current and projected watercraft usage.

Armstrong River currently passes under Highway 1/169 via a large culvert structure. All three Build Alternatives considered would cross the river at the same location with approximately the same impacts, including the need to extend or replace the existing culvert. This culvert may be able to remain in place and be extended approximately 65 feet on the upstream end to accommodate the proposed roadway changes; or it may need to be replaced with a 130 foot culvert in its current location, depending on the final roadway grades in this area. During the final design phase a detailed hydraulic analysis will be conducted to ensure proper sizing and placement of the conveyance structure. No substantial changes to the channel are proposed. Additional stabilization (rip-rap) will likely be needed along the banks of the river near the culvert in order to minimize potential erosion. The culvert dimensions (width, length, height) will be designed to accommodate the reconstructed highway section. Stream monitoring data will be used along with hydraulic modelling to complete the design. Coordination with the MnDNR will occur during the final design process to ensure fish passage is perpetuated along Armstrong River and that appropriate construction BMP's are utilized and compliance with the Public Waters Work Permit requirements is achieved. Early coordination with MnDNR staff did not identify a need for providing wildlife crossings in the project area. During project final design and permitting, MnDOT will work with MnDNR staff to determine if there is a need to provide special fish passage accommodation.

Existing drainage ditches along the highway will be modified to accommodate the reconstructed highway section. A rural roadway section with grassed ditches is proposed throughout the study area. The ditches are intended to collect and convey surface water runoff from the roadway to treatment/infiltration areas. Drainage culverts will be periodically placed under the highway to allow water in the ditch to pass under the highway as it drains towards infiltration areas and receiving waterbodies.

The project would not change the number or type of watercraft use on any of the surrounding lakes or any other water resources.

12. Contamination/Hazardous Materials/Wastes

a. Pre-project site conditions - Describe existing contamination or potential environmental hazards on or in close proximity to the project site such as soil or ground water contamination, abandoned dumps, closed landfills, existing or abandoned storage tanks, and hazardous liquid or gas pipelines. Discuss any potential environmental effects from pre-project site conditions that would be caused or exacerbated by project construction and operation. Identify measures to avoid, minimize or mitigate adverse effects from existing contamination or potential environmental hazards. Include development of a Contingency Plan or Response Action Plan.

If hazardous materials are encountered during construction, MnDOT will properly handle and treat the material in accordance with all applicable state and federal regulations. MnDOT will work with the Minnesota Pollution Control Agency (MPCA) Voluntary Investigation and Cleanup (VIC) Unit and/or the Voluntary Petroleum Investigation and Cleanup (VPIC) Unit, if appropriate, to obtain assurances that contaminated site cleanup work, and/or contaminated site acquisition, will not associate MnDOT with long-term environmental liability for the contamination.

The presence of potentially-contaminated properties (defined as properties where soil and/or groundwater contain pollutants, contaminants, or hazardous wastes) is a concern in the development of highway projects. Liabilities are associated with ownership of such properties, cleanup costs, and various safety concerns, especially where encountered by personnel with unsuspected wastes or contaminated soil or groundwater is possible. Contaminated materials encountered during roadway construction projects must be properly handled and treated in accordance with state and federal regulations. Improper handling of contaminated materials can worsen their impact on the environment. Contaminated materials also cause adverse impacts on roadway projects by increasing construction costs and causing construction delays, which also can increase general project costs.

A Phase I Environmental Site Assessment (ESA) has been completed for the Highway 1/169 Eagles Nest Lake Area Project. The ESA included a review of historical records and an environmental database search, which identifies sites with possible soil and/or groundwater contamination. A complete copy of the Phase I ESA is available from MnDOT District 1 by contacting the project manager listed under EAW Item 2. Sites of potential concern identified by a Phase I ESA can be categorized into 4 risk areas: high, medium, low potential for environmental risk. Table 16 provides definitions for properties considered to have a high, medium or low potential for contamination. The Phase I ESA identified fifteen properties with a low potential for environmental risk and no properties with high or medium risk. Much of the area within the project limits was identified as undeveloped tree covered land or developed land with no known environmental impacts. A detailed evaluation of each of these low potential risk sites is provided in the Phase I ESA.

Table 16 – Potential For Contamination Definitions

Contamination Risk Potential	Risk Definition and Rationale
High Risk	Sites where there are 1 or more of the following: • Active and inactive Voluntary Investigation and Cleanup (VIC) Program and Minnesota Environmental Response and Liability Act (MERLA) sites. • Active and inactive dumpsites. • Active Leaking Underground Storage Tank (LUST) sites. • Industrial sites, vehicle fueling and/or repair sites, and dry cleaners with poor housekeeping practices. • Parcels adjoining and down gradient of release sites (release within 250')
Medium Risk	Sites where there are 1 or more of the following: • Sites known to have, or have had, soil or groundwater contamination, but current information indicates contamination is being remediated, does not require remediation, or that continued monitoring is required. • Site where a contaminant release has been investigated, remediated and/or closed by the MPCA. • Sites that contain underground or above ground tanks with no history of leaks or spills • Sites that have handled or store regulated substances but have no documented spill, release, or regulatory violations. • Sites that are occupied by industrial uses (e.g. filling stations, vehicle repair services, dry cleaners, etc.) with acceptable housekeeping practices. • Parcels adjoining and down-gradient of potential release sites (potential release within 100')
Low Risk	Sites where there are 1 or more of the following: • Sites where hazardous materials or petroleum products may have been stored or used; however, based on the file and field review, there is no known contamination associated with the property.

Table 17 lists sites identified in the Phase I ESA as having low environmental risk and are within 500-feet of the Highway 1/169 Eagles Nest project area. The table provides a general description of these fifteen sites and the reasons for each site's risk potential and/or environmental concern. All of the sites were rated as Low risk.

Table 17 – Sites with Potential Risk For Contamination

Site #	Parcel Name/Location	Risk Ranking	Environmental Concerns	Alternative(s) Potentially Affected
1	Undeveloped tree-covered land and Old TH 169 route	Low	Undeveloped land and old highway right-of-way. Potential past use and storage of hazardous substances/petroleum products.	1, 2, 2A, 3, 3A
2	Cellular Tower, undeveloped tree-covered land	Low	Undeveloped land. Current presence of cellular tower. Potential use and storage of hazardous substances/petroleum products.	1, 2
3	Undeveloped tree-covered land	Low	Undeveloped land. Potential use and storage of hazardous substances/petroleum products.	1,2
4	Undeveloped tree-covered land	Low	Undeveloped land. Potential use and storage of hazardous substances/petroleum products.	1,2, 2A, 3, 3A
5	Undeveloped tree-covered land	Low	Undeveloped land. Potential use and storage of hazardous substances/petroleum products.	1,2, 2A, 3, 3A

Table 17 continued

Site #	Parcel Name / Location	Risk Ranking	Environmental Concerns	Alternative(s) Potentially Affected
6	Undeveloped tree-covered land	Low	Undeveloped land. Potential use and storage of hazardous substances/petroleum products.	1,2, 2A, 3, 3A
7	Undeveloped tree-covered land and roads	Low	Undeveloped land. Potential use and storage of hazardous substances/petroleum products.	1,2, 2A, 3, 3A
8	Gravel pit and undeveloped tree-covered land	Low	Gravel pit (appears to be located outside construction limits). No evidence of dumping. Potential use or storage of hazardous substances/petroleum products.	1,2, 2A, 3, 3A
9	Undeveloped tree-covered land and roads	Low	Undeveloped land. Potential use and storage of hazardous substances/petroleum products.	1,2, 2A, 3, 3A
10	Developed property	Low	Unknown use (outside construction limits). Potential use and storage of hazardous substances/petroleum products.	1,2, 2A, 3, 3A
11	Residential dwellings and accessory buildings	Low	Residential uses. Potential use and storage of hazardous substances/ petroleum products.	1,2, 2A, 3, 3A
12	Armstrong Lake Public Water Access	Low	Public boat launch. Potential use and storage of hazardous substances/ petroleum products.	1,2, 2A, 3, 3A
13	Several residential dwellings, undeveloped tree-covered land, and Armstrong Lake	Low	Residential uses. Undeveloped land and Armstrong Lake. Potential use and storage of hazardous substances/petroleum products.	1,2, 2A, 3, 3A
14	Several residential dwellings, undeveloped tree-covered land, and Clear Lake	Low	Past and current residential use. Undeveloped land and Clear Lake. Potential use and storage of hazardous substances/petroleum products.	1,2, 2A, 3, 3A
15	Developed property	Low	Accessory/storage garage (outside project limits)	1,2, 2A, 3, 3A

MnDOT also investigated historical construction records to determine if there was a possibility that taconite tailings from mine pits located south and east of the project area were used in the construction of the road base and/or embankments for this segment of Highway 1/169. Construction records for this segment of TH 169 indicated that the original roadway was constructed in the 1920s and that reconstruction occurred in the 1950s, prior to the time that taconite production started on the Iron Range. Based on this roadway construction history and the haul distance to taconite mine pits, it has been determined that no such material is likely present in the study area.

Further evaluation of properties identified within the construction limits of the project may be completed during the final design for the identified Preferred Alternative and prior to any right-of-way acquisition, if it is deemed necessary. The results of this investigation would be used to determine whether the impacted property can be designed around or whether the construction activities on these properties can be minimized. If necessary, response action plan or special provisions would be developed for properly handling any materials during construction. Any soil and groundwater

handling activities would be coordinated with appropriate local, state, and federal regulatory agencies.

b. Project related generation/storage of solid wastes - Describe solid wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from solid waste handling, storage and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of solid waste including source reduction and recycling.

All solid wastes generated by construction of the proposed transportation improvements will be disposed of properly in a permitted, licensed solid waste facility or a similarly regulated facility elsewhere. Project demolition of concrete, asphalt, and other potentially recyclable construction materials will be directed to the appropriate storage, crushing or renovation facility for recycling or reuse.

Materials anticipated to be present on-site during construction are those normally associated with the operation or maintenance of construction equipment including petroleum products such as gasoline and other engine fluids.

No other toxic or hazardous materials are anticipated during construction and none will be present following construction. No above- or below-ground storage tanks are planned for permanent use in conjunction with the highway project. Temporary storage tanks for petroleum products may be located in the project area for refueling construction equipment during roadway construction activities. Appropriate measures will be taken during construction to avoid spills that could contaminate groundwater and/or surface water in the project area. In the event that a leak or spill occurs during construction, appropriate action to remedy the situation will be taken immediately in accordance with MPCA guidelines and regulations.

If a spill of hazardous/toxic substances should occur within the roadway right-of-way during or after construction of the proposed project, it is the responsibility of MnDOT and their contractor(s) to notify the Department of Public Safety, Division of Emergency Services, to arrange for corrective measures to be taken pursuant to 6 MCAR 4.9005E. Any contaminated spills or leaks that occur during construction are the responsibility of the contractor and would be responded to according to MPCA containment and remedial action procedures.

c. Project related use/storage of hazardous materials - Describe chemicals/hazardous materials used/stored during construction and/or operation of the project including method of storage. Indicate the number, location and size of any above or below ground tanks to store petroleum or other materials. Discuss potential environmental effects from accidental spill or release of hazardous materials. Identify measures to avoid, minimize or mitigate adverse effects from the use/storage of chemicals/hazardous materials including source reduction and recycling. Include development of a spill prevention plan.

See response 12.b. above.

d. Project related generation/storage of hazardous wastes - Describe hazardous wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from hazardous waste handling, storage, and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of hazardous waste including source reduction and recycling.

See response 12.b. above.

13. Fish, wildlife, plant communities, and sensitive ecological resources (rare features)

a. Describe fish and wildlife resources as well as habitats and vegetation on or in near the site.

Wildlife habitats and plant communities within the project area are similar to those found in the surrounding area and region. The following descriptions of habitat types are derived from the MnDNR Ecological Land Classification System (ELCS) in the *Field Guide to the Native Plant Communities of Minnesota: the Laurentian Mixed Forest Province* (MnDNR, 2003) for natural habitats and the land uses defined in EAW Item 9 for anthropogenic based habitats when they are encountered. Habitats within the project area were identified in the field at the same time that the wetlands were delineated.

The terrestrial habitats identified in upland areas include forests and grassland/shrub habitats. The majority of the natural uplands within the site are comprised of northern mesic mixed forest (FDn43). The FDn43 habitat has a mixed species tree canopy with white pines and hardwood trees, a subcanopy of younger trees and shrubs, and an herbaceous ground layer. The FDn43 habitat is common in the surrounding areas and in the region. It is second growth forest with relatively mature trees. In addition to natural, undisturbed uplands, disturbed and re-vegetated road right-of-way (brush/grass) is maintained on both sides of the existing roadway. The types of wetlands that were delineated within the project corridor correspond to the following ECS codes:

- Type 2 (PEMB) Sedge Meadow corresponds to Sedge Meadow (WMn82b).
- Type 2 (PEMB) Fresh (wet) Meadow roughly corresponds to Northern Wet Meadow/Carr (WMn82), but most are dominated by non-native species.
- Type 3 (PEMC) Shallow Marsh corresponds to either Northern Wet Meadow/Carr (WMn82) or Northern Mixed Cattail Marsh (MRn83).
- Type 5 (L2UB) Shallow Open Water corresponds to Inland Lake Clay/Mud Shore (LKi54).
- Type 6 (PSS1B) Shrub-Carr corresponds to Northern Wet Meadow/Carr Willow-Dogwood Shrub Swamp (WMn82a).
- Type 6 (PSS1B) Alder Thicket corresponds to Northern Alder Swamp (FPn73).
- Type 7 (PFO1B) Hardwood Swamp corresponds to Northern Wet Ash Swamp (WFn55) or Northern Very Wet Ash Swamp (WFn64).
- Type 7 (PFO4B) Coniferous Swamp corresponds to Northern Rich Spruce Swamp (FPn62) or Northern Wet Cedar Forest (WFn53).

These upland and wetland habitats in the study area are common to the region and abundant in the area surrounding the Highway 1/169 Eagles Nest Lake study area. No rare or unique habitats were identified. No breeding concentrations of migratory birds (e.g., nesting swallow colonies and waterbird rookeries) were observed within or adjacent to the site. Forest and wetland songbird species common to the region were observed throughout the site. Suitable loon nesting habitats are present along the shorelines of Clear Lake and Armstrong Lake near the eastern portion of the project area, but those lakes are outside of the project limits.

The project area crosses Armstrong River and its adjacent wetland habitat that is contiguous with the deepwater habitats found in Armstrong Lake and Armstrong Bay on the east side of Lake Vermillion. The channel provides in-lake and upstream spawning habitats for fish (e.g. walleye, largemouth and smallmouth bass, northern pike) and invertebrates, foraging habitats for fish and aquatic organisms, and foraging and breeding habitats for some terrestrial fauna. Armstrong Lake is a MnDNR fishery and is stocked biannually with walleye. There are no designated trout streams within the project vicinity.

No designated fish or wildlife habitats, state or federal wildlife management areas, refuges, or preserves, or hunting preserves were identified in the project area.

b. Describe rare features such as state-listed (endangered, threatened or special concern) species, native plant communities, Minnesota County Biological Survey Sites of Biodiversity Significance, and other sensitive ecological resources on or within close proximity to the site. Provide the license agreement number (LA-_) and/or correspondence number (*ERDB #20140014*) from which the data were obtained and attach the Natural Heritage letter from the MnDNR. Indicate if any additional habitat or species survey work has been conducted within the site and describe the results.

State-Listed Species in the Project Area: The MnDOT Early Notification Memo process was initiated at the beginning of the project development process (2007). The memo was submitted to the Minnesota Department of Natural Resources (MnDNR) along with information regarding the proposed project improvements. Available information regarding reported occurrences of rare, threatened, and endangered (RT&E) species or critical habitats was reviewed through the MnDNR National Heritage Program. The database search covered an area within one mile of the alignment. Based on this review, the MNDNR replied there are two records of rare features in the search area, but based on the nature and location of the proposed project, MnDNR stated that the project would not impact any known occurrences of rare features. A copy of the MnDNR correspondence is contained in Appendix E. Follow-up discussions with the MnDNR have occurred to determine if an updated evaluation of the study area was needed, but it was determined that the original findings and determination are still valid.

Federally-Listed Species/Designated Critical Habitat in the Action Area
Section 7 of Endangered Species Act of 1973, as amended (ESA), requires each Federal agency to review any action that it funds, authorizes or carries out to determine whether it may affect threatened, endangered, proposed species or listed

critical habitat. Federal agencies (or their designated representatives) must consult with the U.S. Fish and Wildlife Service (Service) if any such effects may occur as a result of their actions. Consultation with the Service is not necessary if the proposed action will not directly or indirectly affect listed species or critical habitat. If a federal agency finds that an action will have no effect on listed species or critical habitat, it should maintain a written record of that finding that includes the supporting rationale.

Previous Consultation

MnDOT on behalf of the Federal Highway Administration (FHWA), the lead federal agency for this project, had previously informally consulted with the U.S. Fish and Wildlife Service (Service) on this action. On May 18, 2011, MnDOT sent a letter requesting concurrence for a may affect, not likely to adversely affect determination for both the Canada lynx and the gray wolf, including an analysis of potential impacts to designated critical habitat . On October 14, 2011, the Service concurred with these determinations, concluding the informal consultation process under Section 7 of the Endangered Species Act of 1973, as Amended (ESA).

Since the time of this consultation, changes have occurred to both the proposed action as well as the species receiving/proposed to receive protection under the ESA. The discussion below focuses upon the current conditions of the project and species listing and the corresponding determinations.

Species List for the Project County

According to the official County Distribution of Minnesota's Federally-Listed Threatened, Endangered, Proposed, and Candidate Species list (revised in October 2014), maintained by the Service, the project county is within the distribution range of the following:

County	Species	Status	Habitat
St. Louis	Canada lynx *(Lynx canadensis)*	Threatened	Northern forest
	Canada lynx *(Lynx canadensis)*	Critical Habitat	Map of lynx critical habitat in Minnesota
	Northern long-eared bat *Myotis septentrionalis*	Proposed as Endangered	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer.
	Piping Plover *(Charadrius melodus)* Great Lakes Breeding Population	Endangered and Critical Habitat Designated in this county	Sandy beaches, islands
	Rufa Red knot *(Calidris canutus rufa)*	Proposed Threatened	Coastal areas along Lake Superior

c. Discuss how the identified fish, wildlife, plant communities, rare features and ecosystems may be affected by the project. Include a discussion on introduction and spread of invasive species from the project construction and operation. Separately discuss effects to known threatened and endangered species.

Alternative 3 (Preferred Alternative) will affect natural resources, including loss of an estimated 75 acres of vegetation (vs. 48 acres for Alternative 1 and 73 acres for Alternative 2A) and approximately 10.92 acres of wetland impact (vs. 13.3 acres for Alternative 1 and 6.6 acres for Alternative 2A). EAW Question 7 (Cover Types) identifies the before/after cover type conditions potential loss of forestland and wetlands. Furthermore, EAW Question 11.b.iv., (Wetlands) provides a detailed discussion anticipated wetland impacts. No unique or rare vegetation types would be affected by any of the Build Alternatives considered. Alternative 1 would have fringe impacts on vegetation and wildlife habitat within the vicinity of the existing roadway, while the western third of Alternative 2A and 3A have greater potential of impacting undisturbed areas with the realignment of the highway corridor.

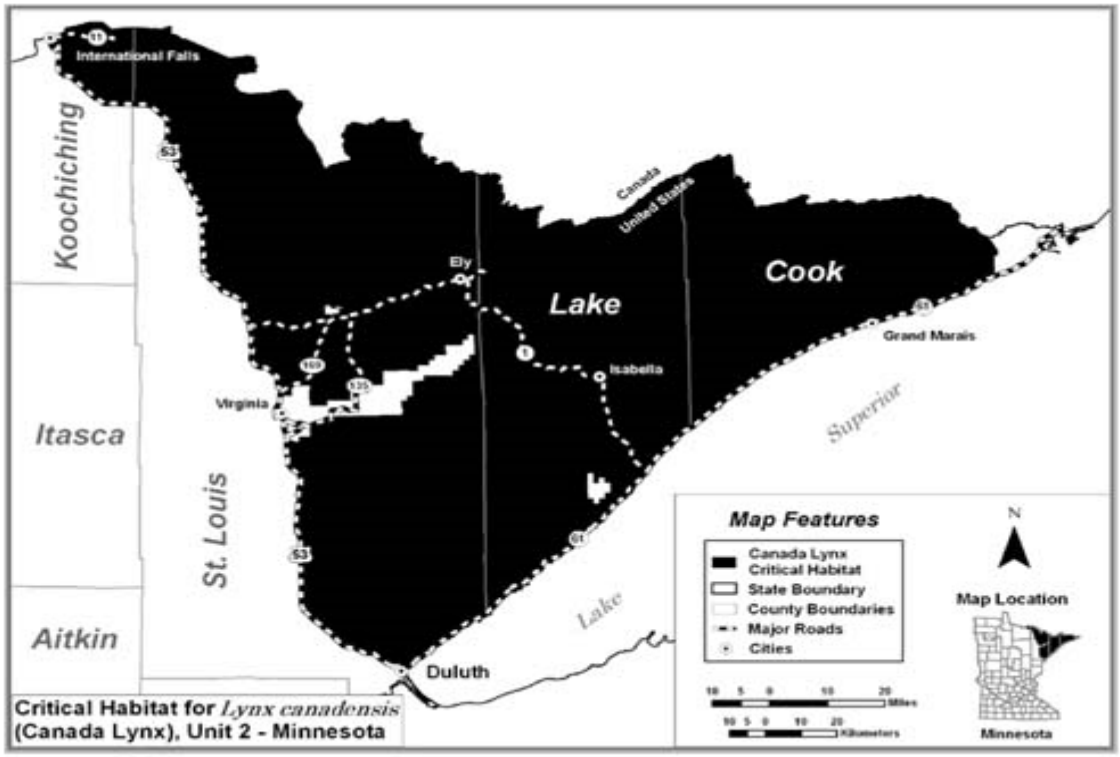
The introduction of exotic, non-native, or invasive species can change a diverse native plant community to a monotypic stand of undesirable species. Within the Highway 1/169 project area, natural resources could be affected by invasive species due to vegetation disturbance during construction. MnDOT will follow construction BMPs to control and prevent the spread of invasive species including MnDOT's Standard Specification for Construction 2572 (Protection and Restoration of Vegetation). In order to protect vegetation that lies outside of the construction limits, special attention will be paid to measures such as the use of temporary fence for tree protection and unique vegetation protection.

No impacts to Clear Lake and Armstrong Lake have been identified. All Build Alternatives would continue to cross Armstrong River in same location as the existing crossing, with essentially the same impacts – either extension of the existing culvert or replacement of the culvert. If a new structure (e.g. box culvert) is needed to convey the Armstrong River under the roadway, it would be designed in accordance with recommendations from a hydraulic analysis and fish passage recommendations (see item d. below) that will be performed during the final design phase. A MnDNR Public Waters Work Permit will be required for work within the river channel.

<u>Federally-Listed Species/Designated Critical Habitat in the Action Area</u>
Section 7 of Endangered Species Act of 1973, as amended (ESA), requires each Federal agency to review any action that it funds, authorizes or carries out to determine whether it may affect threatened, endangered, proposed species or listed critical habitat. Federal agencies (or their designated representatives) must consult with the U.S. Fish and Wildlife Service (Service) if any such effects may occur as a result of their actions. Consultation with the Service is not necessary if the proposed action will not directly or indirectly affect listed species or critical habitat. If a federal agency finds that an action will have no effect on listed species or critical habitat, it should maintain a written record of that finding that includes the supporting rationale.

Piping Plover – Determination of No Effect
There are no known of occurrences of this species within the action area. In addition, the project area does not contain habitat preferred by the species and is well outside of any designated critical habitat. Therefore, MnDOT on behalf of the FHWA has made a determination of no effect for this species.

Canada lynx and Associated Critical Habitat action – May Affect, not likely to Adversely Affect Determination
The proposed action is located within both the species distribution range as well as an area designated as critical habitat.



In comparing the existing roadway with the preferred alternative, the new roadway dimensions will be relatively similar with the exception of the turn lane sections which would require added roadway width. The proposed action would not result in a higher posted speed limit or result in added vehicular capacity.

Modification of Critical Habitat
Critical habitat for the lynx is defined as boreal forest landscapes supporting a mosaic of differing successional forest stages and containing the following Primary Constituent Elements:

The proposed TH 1/169 reconstruction project will require alignment shifts and corridor widening, resulting in additional land disturbances. The following factors related to Canada lynx critical habitat were considered in making a determination of the potential for adverse effects to the lynx:

1. Presence of snowshoe hares (*Lepus americanus*) and their preferred habitat conditions, which include dense understories of young trees, shrubs or overhanging boughs that protrude above the snow, and mature multistoried stands with conifer bough touching the snow surface.

   Habitat for snowshoe hares is present throughout the project area. The project will result in relocation of the roadway in several areas and as indicated in the table above, will result in the removal of several acres of vegetation. In reviewing vegetation impacts in relation to the known species requirements with the Service, it has been determined that the removal of these relatively small linear takings of the boreal forest stands in comparison to the surrounding landscape, would not negatively affect the lynx given the extensive range used by this species. For the same reason, the proposed action would not result in the permanent loss or conversion of the boreal forest on a scale proportionate to the large landscape used by lynx.

2. Winter snow conditions that are generally deep and fluffy for extended period of time.

   The construction of this project will not result in changes in snow depth or compaction.

3. Sites for denning that have abundant coarse woody debris, such as downed trees and root wads

   Sites for denning that have abundant coarse woody debris, such as downed trees and root wads. This project will involve the relocation of the roadway in several areas, which could result in localized area of disturbance. Therefore, the net long-term disturbance to denning habitat will be minimal.

4. Matrix habitat (e.g., hardwood forest, dry forest, non-forest or other habitat types that do not support snowshoe hares) that occurs between patches of boreal forest in close juxtaposition (at the scale of the lynx home range) such that the lynx are likely to travel through such habitat while accessing patches of boreal forest within a home range.

   The project lies within contiguous boreal forest. The action will not interfere with travel by Canada lynx or result in the creation of corridor gaps impeding the ability of Canada lynx to travel from one location to another.

MnDOT on behalf of the FHWA has determined that the proposed action may affect, but is not likely to adversely affect Canada lynx or result in adverse modification of designated critical habitat. A letter dated December 11, 2014 (see Appendix E) summarizes this determination and requests concurrence from the Service.

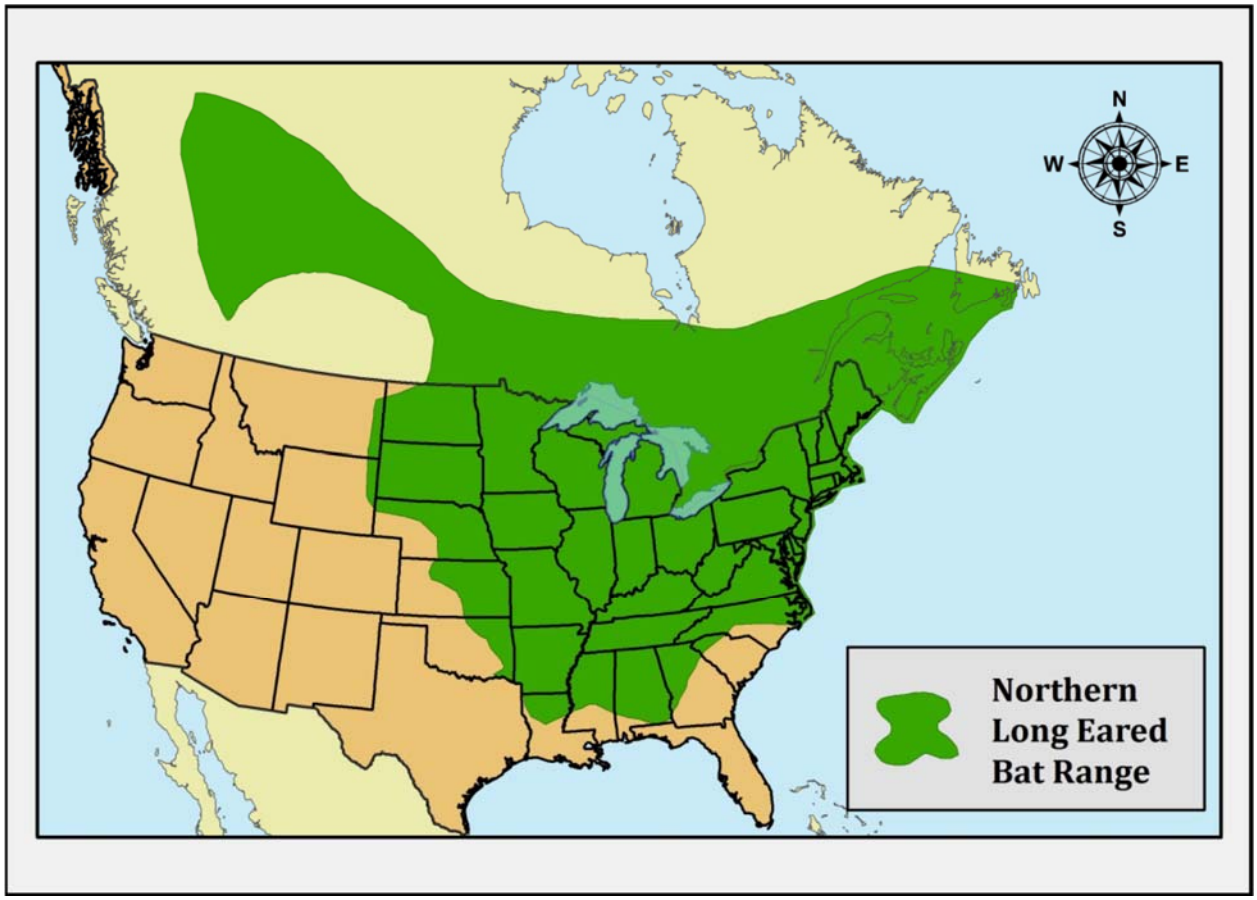
Species Proposed for Federal Listing in the Action Area

Section 7(a)(4) requires Federal agencies to confer with the Service on any agency action that is likely to jeopardize the continued existence of any species proposed for listing or result in the adverse modification of critical habitat proposed to be designated. A conference may involve informal discussions between the Service, the action agency, and the applicant. Following informal conference, the Service issues a

conference report containing recommendations for reducing adverse effects. These recommendations are discretionary, because an agency is not prohibited from jeopardizing the continued existence of a proposed species or from adversely modifying proposed critical habitat. However, as soon as a listing action is finalized, the prohibition against jeopardy or adverse modification applies, regardless of the stage of the action.

Rufa red knot – Determination of No Jeopardy
There are no known of occurrences of this species within the action area. In addition, the project area does not contain habitat preferred by the species. Currently there is no critical habitat proposed for this species. **Therefore, MnDOT, on behalf of the FWHA, has made a determination of no jeopardy for this species.**

Northern long-eared bat - Determination of No Jeopardy
On October 2, 2013, the U.S. Fish and Wildlife Service proposed the northern long-eared bat (*Myotis septentrionalis*; NLEB) for listing as endangered under the ESA (Federal Register October 2, 2013). Currently, the Service is reopening the public comment period on a proposal to list the northern long-eared bat as endangered under the ESA. Comments will be accepted through Dec. 18, 2014. The Service is reopening the comment period to alert the public to additional information provided by state conservation agencies within the range of the species. The Service will consider this information, and all information received previously, while determining whether the northern long-eared bat warrants listing under the Endangered Species Act. Reopening of the comment period will allow the public to provide comments on the proposed rule



in light of that additional information. A final decision on the proposal is due on April 2, 2015.

The Service has generated a list of activities that could potentially affect the NLEB and that should be considered during the determination/conferencing process. Highlighted are those activities that will be undertaken as part of project implementation.

Impacts to NLEB and/or Winter Hibernacula Habitat

- Wearing clothing or footwear or bringing equipment that was used in a WNS-affected state or region into a cave or mine in an unaffected state or region may exacerbate the spread of WNS.
- Impacts to hibernacula openings may restrict bat flight and movement and/or may modify air flow or microclimate, reducing suitability of the hibernaculum for bats or decreasing survivorship. A few degrees change may make a cave unsuitable for some hibernating bats.
- Entering a hibernaculum during the winter. Cave-dwelling bats, such as NLEB, are vulnerable to human disturbance while hibernating. Bats use up their energy stores when aroused and may not survive the winter or may result in termination of pregnancy.
- Blasting or drilling within ½ mile of caves or mines where NLEB hibernate during the winter may disturb hibernating bats.
- Impacting water resources that flow into NLEB hibernacula during the winter, which may affect the cave climate.
- Clearing trees within 5 miles of caves or mines where NLEB hibernate, reducing staging/swarming habitat.
- Human ignited fires (e.g., prescribed burning) near caves or mines where NLEB hibernate and where the smoke may enter the cave, disturbing the bats (during winter).

Impacts to NLEB and/or Summer Habitat

- The permanent or temporary removal of forested habitat from a variety of actions may adversely affect the NLEB by reducing the amount of habitat available for roosting, foraging, or travel. Additionally, bats may also be directly disturbed or killed if such projects are conducted while they are present.
- Burning, although potentially necessary to maintain habitat, could disturb or kill bats by smoke inhalation or scorching.
- Although many types of timber management, when properly designed, will not impact (or may improve) NLEB habitat, some types of timber management (e.g. clear-cutting) can reduce the viability of NLEB populations if key areas of a home range are removed.
- Removal of occupied suitable man-made roosting structures.
- Lethal bat removal from occupied homes/structures.
- Use of pesticides and herbicides in a way that exposes NLEBs (e.g., aerial application at night) or significantly reduces their prey.
- Loss of clean water sources (e.g., fill, degradation of water quality), which could reduce NLEB drinking sources, foraging habitat and/or prey.

The action area is located within approximately three miles of one of the largest known hibernacula for the northern long-eared bat in the State of Minnesota, near the town

of Sudan. Due to the close proximity, the proposed project is well within the known distribution distances for the bat's summer roosting/foraging activities.

As indicated in the Northern Long-Eared Bat Interim Conference and Planning Guidance – issued January 6, 2014 by the Service, the northern long-eared bats uses a variety of tree species during its summer roosting and foraging activities. As a result, any action that requires the removal of trees during this summer period, which is approximately, April 1- October 1, could potentially result in some form a take, either direct or indirect or potentially both. As highlighted in the table below, all of the alternatives analyzed would require a considerable amount of tree removal. Unfortunately, due various project constraints, winter tree removal is not an option at this time. As a result, MnDOT has been working closely with the Service to ensure that the appropriate determination is made given the species current status and also that the appropriate process is followed should the species become officially listed prior to project completion.

Cover Type	Alternative					
	Alternative 1 Minimal Off-Set/Construct Under Traffic		Alternative 2A Reconstruct on Existing With Detour		Alternative 3A (Preferred Alternative) Reconstruct Under Traffic Plus Partial New Alignment	
	Before	After	Before	After	Before	After
Wetlands	13[a] ac.	0 ac.	7[a] ac.	0 ac.	11[a] ac.	0 ac.
Deep water/streams	0 ac.	0 ac.	0 ac.	0 ac.	0 ac.	0 ac.
Wooded/forest	48 ac.	0 ac.	73 ac.	0 ac.	75 ac.	0 ac.
Brush/Grassland/ Road Ditch	53 ac.	107 ac.	82 ac.	148 ac.	83 ac.	155 ac.
Cropland	0 ac.	0 ac.	0 ac.	0 ac.	0 ac.	0 ac.
Lawn/landscaping	0 ac.	0 ac.	0 ac.	0 ac.	0 ac.	0 ac.
Impervious Surface	22 ac.	29 ac.	25 ac.	39 ac.	25 ac.	39 ac.
Other	0 ac.	0 ac.	0 ac.	0 ac.	0 ac.	0 ac.
TOTALS	**136** ac.	**136** ac.	**187** ac.	**187** ac.	**194** ac.	**194** ac.

Conferencing for NLEB and the Jeopardy Analysis: The following text has been taken directly from the Northern Long-Eared Bat Interim Conference and Planning Guidance – Issued January 6, 2014

"A proposed species is any species where a proposed listing rule under section 4 of the ESA has been published in the Federal Register. For species that have been proposed for listing, the FWS has determined that there is enough information to warrant listing them as either threatened or endangered. The NLEB was proposed for federal listing under the ESA on October 2, 2013 and the final listing decision is expected within one year from this date.

While there is no prohibition for "taking" proposed species, there are certain statutory requirements under the ESA for proposed species. Section 7(a)(4) of the ESA states, "Each Federal agency shall confer with the Secretary on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed or result in the destruction or adverse modification of critical habitat proposed to be designated for such species." Conference is a process of early interagency cooperation

involving informal and/or formal discussions between the action agency and the FWS pursuant to section 7(a)(4) of the ESA regarding the likely impact of an action on proposed species or proposed critical habitat.

While consultation under Section 7 of the ESA is required when a proposed action "may affect" a listed species, a conference is required only if the proposed action is likely to jeopardize the continued existence of a proposed species or destroy or adversely modify proposed critical habitat. The Conference process is discretionary for all other effect determinations besides jeopardy/adverse modification. However, it is in the best interest of the species, and our federal partners to consider the value of voluntary conservation measures in a conference opinion or conference report for projects that are not likely to cause jeopardy, but are likely to adversely affect the NLEB."

In reviewing the project impacts with the Service, it was determined that all of the build alternatives considered for the project have some potential for impacting forest vegetation that could be utilized by the northern long-eared bat (see table above), so there is no build alternative that would avoid potential impacts. As shown in Table 1 (Section III. Alternatives) the preferred alternative, Alternative 3A, reduced forest impacts compared to Alternative 3. Based on the current species information and due to the linear nature of the vegetation removal, MnDOT, on behalf of FHWA, has determined that these impacts are of a magnitude that would not result in jeopardizing the continued existence of this species. Currently there is no critical habitat proposed for this species. A letter dated December 11, 2014 (see Appendix E) summarizes the no jeopardy determination and requests concurrence from the Service.

In accordance with Section 7(a)(4) of the ESA referenced above, MnDOT will continue working with the Service through a voluntary informal conferencing process for the Northern long-eared bat. This process would provide a mechanism to both bridge the gap should the species listing status change from proposed to either threatened or endangered prior to project completion as well as a way of expediting the formal consultation process should the Service make the determination that formal consultation is the appropriate path at the time of the status change.

d. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to fish, wildlife, plant communities, and sensitive ecological resources.

Any activities that will disturb fish habitats in Armstrong River will be conducted outside of the fish spawning season, the design of the Armstrong River crossing will allow fish passage to continue to wetland complexes located north and south of the highway, and coordination with staff from the MnDNR will occur throughout the detail design and permitting processes.

Coordination with the MnDNR will occur during the final design process to ensure fish passage is perpetuated along Armstrong Creek. Also, if areas of the existing highway corridor are abandoned due to realignment, restoration of these areas to native vegetation, including on-site wetland restoration, will be considered.

Where reasonable and feasible, design modifications (minor alignment shifts, steeper side slopes, use of guardrail, etc.) have been incorporated into the preliminary design of the three Build Alternatives. Minimization of vegetation clearing will include confining clearing to the areas directly affected by project construction, instead of clearing an additional 10-feet beyond the construction limits, as is the more routine practice.

During construction, BMPs will be implemented to control erosion and sediment discharge to water bodies. As outlined in EAW Item 11.b.iv (Wetlands), impacts to wetlands will be mitigated through the creation of new wetlands or purchase of wetland credits from a certified wetland bank site. Disturbed areas would be re-vegetated with native plants and land in the right-of-way would be managed to have diverse grassy vegetation with trees and shrubs outside the required roadway clear zone. Section c. above describes measures to control invasive species. A detailed re-vegetation plan will be developed during final design.

14. Historic properties

Describe any historic structures, archeological sites, and/or traditional cultural properties on or in close proximity to the site. Include: 1) historic designations, 2) known artifact areas, and 3) architectural features. Attach letter received from the State Historic Preservation Office (SHPO). Discuss any anticipated effects to historic properties during construction and operation. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to historic properties.

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, requires projects that involve a federal action take into account the effects of the undertaking on historic properties. Federal undertakings refer to any federal involvement including funding, permitting, licensing, or approval. The Advisory Council on Historic Preservation (ACHP) issues regulations that implement Section 106 of the NHPA. By definition, historic properties are properties eligible for or listed on the National Register of Historic Places (NRHP). Section 106 sets up the review process whereby a federal agency consults with the State Historic Preservation Officer (SHPO), Native American tribes, other interested parties, and the public to identify, evaluate, assess effects, and mitigate adverse impact on any historic properties affected by the undertaking. As per the terms of the *Programmatic Agreement Among the Federal Highway Administration; the Minnesota State Historic Preservation Office; the Advisory Council on Historic Preservation; the Department of the Army, Corps of Engineers, St. Paul District; and the Minnesota Department of Transportation Regarding the Implementation of the Federal-Aid Highway Program in Minnesota* (2005), the Corps recognizes the FHWA as the lead federal agency and has no further Section 106 obligations on the undertaking. Also, as per the PA, when MnDOT CRU makes a finding of No Historic Properties Affected, the Section 106 process is complete and no consultation with the SHPO is required.

Section 106 regulations apply to the Highway 1/169 Eagles Nest Lake Area Improvement Project because the project will utilize FHWA funding and will require a federal permit from the USACE for proposed wetland impacts. Consultation with Native American tribes who have expressed an interest reviewing projects in this area of the state was undertaken. The MnDOT CRU reviewed the proposed project area with respect to federal Section 106 requirements on behalf of FHWA and made a finding of No Historic Properties Affected by the Build Alternatives as currently proposed. The MnDOT CRU findings letters can be found in Appendix F.

15. Visual

Describe any scenic views or vistas on or near the project site. Describe any project related visual effects such as vapor plumes or glare from intense lights. Discuss the potential visual effects from the project. Identify any measures to avoid, minimize, or mitigate visual effects.

The general setting of the project area is rural with a heavily wooded landscape with bedrock outcroppings, and widely scattered rural residential developments. The eastern portion of the project area has experienced slightly denser development along the south shore of Clear Lake.

The type of traveler or neighbor will determine the level of visual impact that occurs as a result of highway improvements. Travelers are people who use the highway. Most travelers in this segment of the Highway 1/169 corridor are commuters who regularly use the road to get home, to work, or market. Other travelers include haulers who use the highway to move goods and tourists who use the road as a route to recreational destinations. Different types of travelers focus their attention on different types of visual resources. Commuters and haulers are interested in maintaining visual landmarks that guide them to their destination, while tourists are occasional visitors to the area and are more concerned with views of scenic beauty. Neighbors are people who use property adjacent to the existing or proposed highway. Neighbors found in the Highway 1/169 Eagles Nest Lake Area Project are generally residential (year-round and seasonal) neighbors that live near the roadway. Neighbors are typically concerned with maintaining the status quo of surrounding visual resources.

The primary visual change for roadway users with all Build Alternatives would be changes in the existing visual scene resulting from wider shoulders and clear zones. The only portion of the project area with residents close to the existing highway is the eastern end and in this segment all the Build Alternatives stay on or very close to the existing alignment. As a result, very little change in the visual setting is anticipated with any of the Build Alternatives for area residents.

Efforts will be made in the final design phase of the Preferred Alternative to minimize impacts to visual resources. Efforts may include minimizing the changes to the vertical landscape, minimizing the amount of area to be cleared within the proposed right-of-way, by creating irregular edges in the tree line, and by revegetating disturbed areas. A detailed revegetation plan will be established that will include seeding with native seed mixes and possibly tree plantings in the project area.

16. Air

a. **Stationary source emissions - Describe the type, sources, quantities and compositions of any emissions from stationary sources such as boilers or exhaust stacks. Include any hazardous air pollutants, criteria pollutants, and any greenhouse gases. Discuss effects to air quality including any sensitive receptors, human health or applicable regulatory criteria. Include a discussion of any methods used assess the project's effect on air quality and the results of that assessment. Identify pollution control equipment and other measures that will be taken to avoid, minimize, or mitigate adverse effects from stationary source emissions.**

The proposed improvements to Highway 1/169 will not have stationary source air emissions concerns.

b. Vehicle emissions - Describe the effect of the project's traffic generation on air emissions. Discuss the project's vehicle-related emissions effect on air quality. Identify measures (e.g. traffic operational improvements, diesel idling minimization plan) that will be taken to minimize or mitigate vehicle-related emissions.

Introduction to Transportation Air Quality

Motorized vehicles affect air quality by emitting airborne pollutants. Changes in traffic volumes, travel patterns, and roadway locations affect air quality as the number of vehicles and the congestion levels in a given area change. The adverse impacts this project could have on air quality have been analyzed by addressing criteria air pollutants, a group of common air pollutants that are regulated by the U.S. Environmental Protection Agency (USEPA) on the basis of specific criteria that reflect the effects of pollution on public health and the environment. The criteria air pollutants identified by the EPA are ozone, particulate matter, carbon monoxide, nitrogen dioxide, lead, and sulfur dioxide. Potential impacts resulting from these pollutants are assessed by comparing the project's projected concentrations to National Ambient Air Quality Standards (NAAQS).

In addition to the criteria air pollutants, the USEPA also regulates a category of pollutants known as air toxics, which are generated by emissions from mobile sources. The Federal Highway Administration (FHWA) provides guidance for the assessment of Mobile Source Air Toxic (MSAT) effects for transportation projects in the National Environmental Policy Act (NEPA) process. The scope and methods of the MSAT analysis performed for this project, as described below, were developed in collaboration with the Minnesota Department of Transportation (MnDOT), the Minnesota Pollution Control Agency (MPCA), and the Federal Highway Administration (FHWA).

NAAQS Criteria Pollutants

Ozone

Ground-level ozone is a primary constituent of smog and is a pollution problem in many areas of the United States. Exposures to ozone can cause people to be more susceptible to respiratory infection, resulting in lung inflammation, and aggravating respiratory diseases, such as asthma. Ozone is not emitted directly from vehicles but is formed when volatile organic compounds (VOCs) and nitrogen oxides (NO_x) react in the presence of sunlight. Transportation sources emit NO_x and VOCs and can, therefore, affect ozone concentrations. However, due to the phenomenon of atmospheric formation of ozone from chemical precursors, concentrations are not expected to be elevated near a particular road.

The MPCA, in cooperation with various other agencies, industries, and groups, has encouraged voluntary control measures for ozone concentrations and has begun developing a regional ozone modeling effort. Ozone concentrations in the lower atmosphere are influenced by a complex relationship of precursor concentrations,

meteorological conditions, and regional influences on background concentrations. The MPCA states in the document, Air Quality in Minnesota: 2013 Report to the Legislature (January 2013, page 8), that: *All areas of Minnesota currently meet the federal ambient 8-hour standard for ozone but Minnesota is at risk for being out of compliance. In 2008, USEPA tightened the federal eight-hour ambient air standard for ozone to 75 parts per billion (ppb). USEPA plans to propose a revised ozone standard on December 1, 2014 and finalize November 1, 2015. Preliminary documents indicate that USEPA believes the scientific evidence on the health impacts of ozone shows that the current ambient standard is insufficient to protect public health. USEPA's Clean Air Scientific Advisory Committee has recommended that a new ambient standard be set in the range of 60-70 ppb to ensure public health protection with an adequate margin of safety. In 2010, USEPA proposed a revised ozone standard in the range of 60-70 ppb but withdrew the proposal in fall 2011. Many areas of Minnesota would not meet the revised standard if the USEPA sets the standard at the lowest end of the advisory committee's recommended range.*

In addition to currently meeting the federal ambient 8-hour standard for ozone concentrations, the State of Minnesota is classified by the USEPA as an "ozone attainment area," which means that Minnesota has been identified as a geographic area that meets the national health-based standards for ozone levels. Because of these factors, a quantitative ozone analysis was not conducted for this project.

Particulate Matter

Particulate matter is the term for particles and liquid droplets suspended in air. Particles come in a wide variety of sizes and have been historically been measured by the diameter of the particle in micrometers. $PM_{2.5,}$ or finer particulate matter, refers to particles that are 2.5 micrometers or less in diameter. PM_{10} refers to particulate matter that is 10 micrometers or less in diameter.

Motor vehicles (i.e., cars, trucks, and buses) emit direct PM from their tailpipes, as well as from normal brake and tire wear. Vehicle dust from paved and unpaved roads may be re-entrained, or re-suspended, in the atmosphere. In addition, $PM_{2.5}$ can be formed in the atmosphere from gases such as sulfur dioxide, nitrogen oxides, and volatile organic compounds. $PM_{2.5}$ can penetrate the human respiratory system's natural defenses and damage the respiratory tract when inhaled. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including:

- Premature death in people with heart or lung disease;
- Nonfatal heart attacks;
- Irregular heartbeat;
- Aggravated asthma;
- Decreased lung function; and,
- Increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing.

  (Source: http://www.epa.gov/air/particlepollution/health.html)

On December 14, 2012, the USEPA issued a final rule revising the annual health NAAQS for fine particles ($PM_{2.5}$). The USEPA website states:

With regard to primary (health-based) standards for fine particles (generally referring to particles less than or equal to 2.5 micrometers (mm) in diameter, PM2.5), the USEPA is strengthening the annual $PM_{2.5}$ standard by lowering the level to 12.0 micrograms per cubic meter (µg/m3). The existing annual standard, 15.0 µg/m3, was set in 1997. The USEPA is revising the annual $PM_{2.5}$ standard to 12.0 µg/m3 so as to provide increased protection against health effects associated with long- and short-term exposures (including premature mortality, increased hospital admissions and emergency department visits, and development of chronic respiratory disease), and to retain the 24-hour $PM_{2.5}$ standard at a level of 35 µg/m3 (the USEPA issued the 24-hour standard in 2006). The USEPA is revising the Air Quality Index (AQI) for $PM_{2.5}$ to be consistent with the revised primary $PM_{2.5}$ standards. (Source: http://www.epa.gov/pm/actions.html).

The agency also retained the existing standards for coarse particle pollution (PM_{10}). The NAAQS 24-hour standard for PM_{10} is 150 µg/m3, which is not to be exceeded more than once per year, on average, over 3 years.

The Clean Air Act conformity requirements include the assessment of localized air quality impacts of federally-funded or federally-approved transportation projects that are located within PM nonattainment and maintenance areas and deemed to be projects of air quality concern. This project is not located in 1 of these areas nor is the proposed improvements deemed to have air quality concerns. plan/minnesota-state-implementation-plan-sip.html) NOTE: Quantitative evaluation of PM_{10} impacts is not required for this project because it is not considered a culpable source of PM_{10} or a project of air quality concern regarding PM_{10} emissions. In addition, the project is located in an area that has been designated as an unclassifiable/attainment area for $PM_{2.5}$. This means that the project area has been identified as a geographic area that meets the national health-based standards for $PM_{2.5}$ levels, and therefore, is exempt from detailed analyses.

Nitrogen Dioxide (Nitrogen Oxides)

Nitrogen Oxides, or NOX, is the generic term for a group of highly reactive gases, including nitrogen dioxide (NO2), all of which contain nitrogen and oxygen in varying amounts. Nitrogen oxides are formed when fuel is burned at high temperatures, as in a combustion process. The primary sources of NOx are motor vehicles, electric utilities, and other industrial, commercial, and residential sources that burn fuels. The MPCA's *Air Quality in Minnesota: 2013 Report to the Legislature* (January 2013, page 10) indicates that:

> *On-road gasoline vehicles and diesel vehicles account for 44% of NOx emissions in Minnesota. In addition to being a precursor to ozone, NOx can worsen respiratory irritation, and increase risk of premature death from heart or lung disease.*

Minnesota currently meets federal nitrogen dioxide standards. (Source: Minnesota Pollution Control Agency. July 2012. *Annual Air Monitoring Network Plan for Minnesota, 2013*. Figure 21: Average Annual NO2 Concentrations compared to the NAAQS.) In the MPCA's report, *Annual Air Monitoring Network Plan for Minnesota, 2013* (July 2012), the following statement is made on page 32 with regard to NO2: "A monitoring site meets the annual NAAQS for NO2 if the annual average is less than or

equal to 53 ppb. Minnesota averages ranged from 5 ppb at FHR 423 to 9 ppb at FHR 420; therefore, Minnesota currently meets the annual NAAQS for NO2."

The USEPA's regulatory announcement, EPA420-F-99-051 (December 1999), describes the Tier 2 standards for tailpipe emissions, and states:

> *The* new *tailpipe standards are set at an average standard of 0.07 grams per mile for nitrogen oxides for all classes of passenger vehicles beginning in 2004. This includes all light-duty trucks, as well as the largest SUVs. Vehicles weighing less than 6000 pounds will be phased-in to this standard between 2004 and 2007.*
>
> *As newer, cleaner cars enter the national fleet, the new tailpipe standards will significantly reduce emissions of nitrogen oxides from vehicles by about 74 percent by 2030. The standards also will reduce emissions by more than 2 million tons per year by 2020 and nearly 3 million tons annually by 2030.*

Within the project area, it is unlikely that NO_2 standards will be approached or exceeded, based on the relatively low ambient concentrations of NO_2 in Minnesota and on the long-term trend toward reduction of NO_x emissions. Because of these factors, a specific analysis of NO_2 was not conducted for this project.

Sulfur Dioxide

Sulfur dioxide (SO_2) and other sulfur oxide gases (SO_x) are formed when fuel containing sulfur, such as coal, oil, and diesel fuel is burned. Sulfur dioxide is a heavy, pungent, colorless gas. Elevated levels can impair breathing, lead to other respiratory symptoms, and at very high levels, can aggravate heart disease. People with asthma are most at risk when SO_2 levels increase. Once emitted into the atmosphere, SO_2 can be further oxidized into sulfuric acid, a component of acid rain.

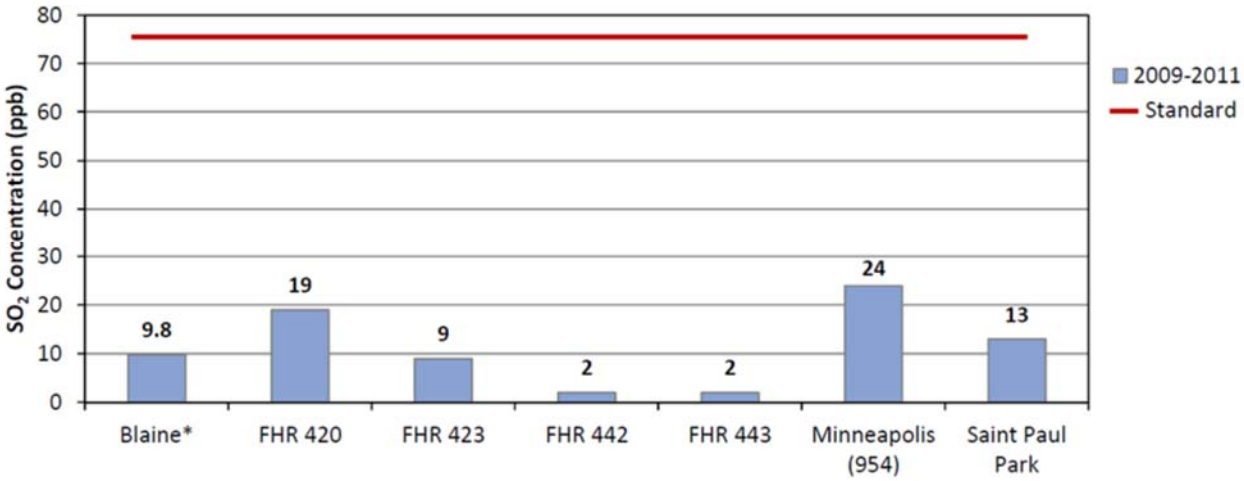
As the MPCA states in *Air Quality in Minnesota: 2013 Report to the Legislature*, monitoring in Minnesota in 2011 indicated ambient SO2 concentrations were at 32 percent of federal standards at that time. In other words, the SO2 levels were consistently below state and federal standards. (Source: *Air Quality in Minnesota: 2013 Report to the Legislature*, January 2013, page 4.) The MPCA also states in that report that about 70 percent of SO_2 released into the air comes from electric power generation (page 20). Therefore, only a fraction of the total SO_2 released into the air in Minnesota is attributable to on-road mobile sources. The MPCA has concluded that long-term trends in both ambient air concentrations and total SO2 emissions in Minnesota indicate steady improvement.

Minnesota currently meets federal SO_2 standards as shown in Figure 20. (Source: Minnesota Pollution Control Agency, July 2012: Annual Air Monitoring Network Plan for Minnesota, 2013, Figure 20: 1-hour SO_2 Concentrations Compared to the NAAQS.) In the MPCA's report, Annual Air Monitoring Network Plan for Minnesota, 2013 (July 2012), the following statement is made on page 33 with regard to SO_2:

On June 2, 2010, the USEPA finalized revisions to the primary SO_2 NAAQS. USEPA established a new 1-hour standard which is met if the 3-year average of the annual 99th percentile daily maximum 1-hour SO2 concentration is less than 75 ppb. In

addition to creating the new 1-hour standard, the USEPA revoked the existing 24-hour and annual standards. Figure 20 describes the 2009-2011 average 99th percentile 1-hour SO_2 concentration and compares them to the 1-hour standard. Minnesota averages ranged from 2 ppb at FHR 442 and FHR 443 to 24 ppb in Minneapolis (954); therefore, all Minnesota sites currently meet the1-hour NAAQS for SO_2.

Figure 20 – 1-hour SO2 Concentration Compared to the NAAQS



* The monitoring site did not meet the minimum completeness criteria for design value calculations. A site meets the completeness requirement if 75% of required sampling days are valid for each calendar quarter included in the design value calculation. SO_2 at Duluth was part of a 1-year assessment and not intended to collect 3 years of data for design value calculations.

Emissions of sulfur oxides from transportation sources are a small component of overall emissions and continue to decline due to the desulphurization of fuels. Additionally, the project area is classified by the USEPA as a "sulfur dioxide attainment area," which means that the project area has been identified as a geographic area that meets the national health-based standards for sulfur dioxide levels. Because of these factors, a quantitative analysis for sulfur dioxide was not conducted for this project.

Lead

Due to the phase out of leaded gasoline, lead is no longer a pollutant associated with vehicular emissions.

Carbon Monoxide

Carbon monoxide (CO) is the traffic-related pollutant that has been of concern in the Twin Cities Metropolitan Area (designated as a 'maintenance area' by USEPA), but not in northeast Minnesota where the Highway 1/169 project is located. Therefore, demonstration of air quality conformity is not required for this project. Federally-funded and state-funded projects are also subject to "hot spot" analysis requirements to demonstrate that no localized CO concentrations will exceed NAAQS limits.

CO Conformity

The USEPA issued final rules (1993) on transportation conformity (40 CFR 93, Subpart A) which describe the methods required to demonstrate State Implementation Plan (SIP) compliance for transportation projects. As demonstrated by the above

information, this project conforms to the requirements of the Clean Air Act Amendments and to the Conformity Rules. Therefore, no regional modeling is required.

Hot-Spot Analysis

This project is located in an area where conformity requirements do not apply. Furthermore, the scope of the project does not indicate that air quality impacts would be expected. The USEPA has approved a screening method to determine which intersections need hot-spot analysis. MnDOT has demonstrated by the results of the screening procedure that there are no high volume or signalized intersections included in the project area that require hot-spot analysis. Therefore, no carbon monoxide hot-spot analysis is necessary.

Mobile Source Air Toxics (MSAT)

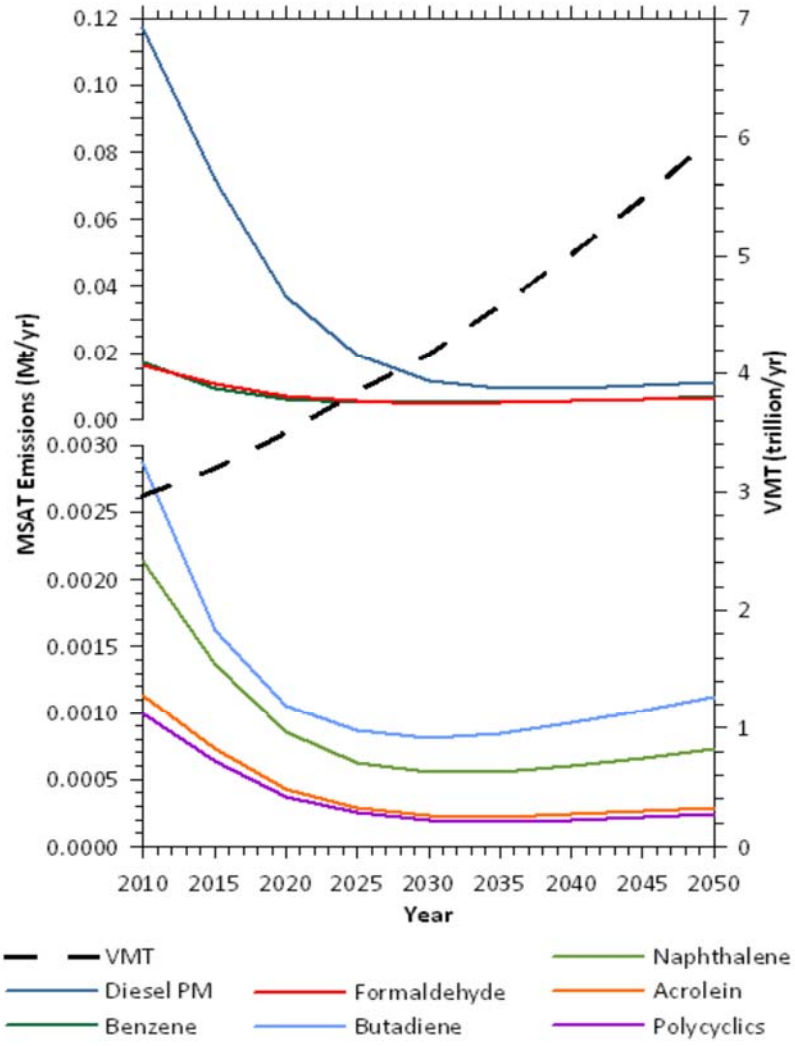
Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the USEPA regulate 188 air toxics, also known as hazardous air pollutants. The USEPA has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007), and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS) (http://www.epa.gov/iris/).

In addition, the USEPA identified 7 compounds with significant contributions from mobile sources that are among the national- and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA) (http://www.epa.gov/ttn/atw/nata1999/). These are Acrolein, Benzene, 1,3-Butidiene, Diesel Particulate Matter, plus diesel exhaust organic gases (Diesel PM), Formaldehyde, Naphthalene, and Polycyclic Organic Matter (POM). The 2007 USEPA rule mentioned above requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines.

Based on an FHWA analysis using USEPA's MOVES 2010b model, as shown in Figure 21 on the following page, even if vehicle-miles travelled (VMT) increases by 102 percent, as assumed from 2010 to 2050, a combined reduction of 83 percent in the total annual emissions for the priority MSAT is projected for the same time period. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the USEPA-projected reductions is so great (even after accounting for VMT growth), that MSAT emissions in the project area are likely to be lower in the future in nearly all cases. On a regional basis, USEPA's vehicle and fuel regulations will, over time, cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be significantly lower than they are today.

Figure 21 – National MSAT Emission Trends

1999-2050 for Vehicles Operating on Roadways Using USEPA's MOVES 2010b Model2F[11]



Incomplete or Unavailable Information for Project-Specific MSAT Health Impacts Analysis

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a project.

The USEPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The USEPA is in the continual process

[11] Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA (http://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/aqintguidmem.cfm)

of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (USEPA, http://www.epa.gov/iris/). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures, with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). Two HEI studies are summarized in *Appendix D of FHWA's Interim Guidance Update on Mobile source Air Toxic Analysis in NEPA Documents.* Among the adverse health effects linked to MSAT compounds at high exposures are; cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (http://pubs.healtheffects.org/view.php?id=282) or in the future as vehicle emissions decrease (http://pubs.healtheffects.org/view.php?id=306).

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts - each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI (http://pubs.healtheffects.org/view.php?id=282).

As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. USEPA (http://www.epa.gov/risk/basicinformation.htm#g) and HEI (http://pubs.healtheffects.org/getfile.php?u=395) have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the USEPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a 2-

step process. The first step requires USEPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory 2-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld USEPA's approach to addressing risk in its 2 step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

c. Dust and odors - Describe sources, characteristics, duration, quantities, and intensity of dust and odors generated during project construction and operation. (Fugitive dust may be discussed under item 16a). Discuss the effect of dust and odors in the vicinity of the project including nearby sensitive receptors and quality of life. Identify measures that will be taken to minimize or mitigate the effects of dust and odors.

Dust

Dust generated during construction will be minimized through standard dust control measures such as applying water to exposed soils and limiting the extent and duration of exposed soil conditions. Construction contractors will be required to control dust and other airborne particulates in accordance with MnDOT specifications. After construction is complete, dust levels are anticipated to be minimal because all soil surfaces exposed during construction would be in permanent cover (i.e., paved or revegetated areas).

Odors

No long-term odors will be generated by the proposed project. Odors may be generated by exhaust from diesel engines engaged in construction activities and fuel storage areas. All machinery will be properly equipped to control emissions.

17. Noise

Describe sources, characteristics, duration, quantities, and intensity of noise generated during project construction and operation. Discuss the effect of noise in the vicinity of the project including 1) existing noise levels/sources in the area, 2) nearby sensitive receptors, 3) conformance to state noise standards, and 4) quality of life. Identify measures that will be taken to minimize or mitigate the effects of noise.

Construction Noise

The construction activities associated with implementation of the proposed project will result in increased noise levels relative to existing conditions. These temporary impacts will primarily be associated with construction equipment and blasting of underlying bedrock. During construction, nighttime noise hours will be from 10:00PM to 6:00 AM.

The following table (Table 18) shows peak noise levels monitored at 50-feet from various types of construction equipment. This equipment is primarily associated with site grading/site preparation, which is generally the roadway construction phase associated with the highest noise levels.

Table 18 – Typical Construction Equipment Noise Levels at 50-feet

Equipment Type	Manufacturers Sampled	Total Number of Models in Sample	Peak Noise Level (dBA)	
			Range	Average
Backhoes	5	6	74-92	83
Front Loaders	5	30	75-96	85
Dozers	8	41	65-95	85
Graders	3	15	72-92	84
Scrapers	2	27	76-98	87
Pile Drivers	N/A	N/A	95-105	101

Source: United States Environmental Protection Agency and Federal Highway Administration

Elevated noise levels are, to a degree, unavoidable for this type of project. MnDOT will require that construction equipment be properly muffled and in proper working order. Contractor(s) will be required to comply with applicable local noise restrictions and ordinances to the extent that is reasonable. Advanced notice will be provided to affected property owners of any planned abnormally loud construction activities. It is anticipated that night construction may sometimes be required to minimize traffic impacts and to improve safety. However, construction will be limited to daytime hours as much as possible. This project is expected to be under construction for at least 2 construction seasons (2017-2018).

Any associated high-impact equipment noise, such as pile driving, pavement sawing, or jack hammering, will be unavoidable with construction of the proposed project. Blasting of underlying bedrock is also required for all of the Build Alternatives considered. The use of high-impact equipment or blasting will be prohibited during nighttime hours (10 PM to 6 AM).

Traffic Noise

A detailed traffic noise study was conducted using noise analysis software MINNOISE V3.1, a modified version of FHWA's STAMINA 2.0. The analysis modeled noise levels for existing conditions, 2033 No-Build Alternative, and 2033 Build Alternatives (Alternatives 1, 2A, and 3A).

Noise Description

Noise is defined as any unwanted sound. Sound travels in a wave motion and produces a sound pressure level. This sound pressure level is commonly measured in decibels. Decibels represent the logarithmic increase in sound energy relative to a reference energy level. For

highway traffic noise, an adjustment, or weighting, of the high- and low-pitched sounds is made to approximate the way that an average person hears sounds. The adjusted sound levels are stated in units of "A-weighted decibels" (dBA). A sound increase of 3 dBA is barely perceptible to the human ear, a 5 dBA increase is clearly noticeable, and a 10 dBA increase is heard twice as loud. For example, if the sound energy is doubled (e.g. the amount of traffic doubles), there is a 3 dBA increase in noise, which is just barely noticeable to most people. On the other hand, if traffic increases to where there is 10 times the sound energy level over a reference level, then there is a 10 dBA increase and it is heard twice as loud.

In Minnesota, traffic noise impacts are evaluated by measuring and/or modeling the traffic noise levels that are exceeded 10 percent and 50 percent of the time during the loudest hour of the day and/or night. These levels are identified as the L10 and L50. The L10 value is compared to FHWA noise abatement criteria.

The following chart provides a rough comparison of some common noise sources.

Sound Pressure Level (dBA)		Noise Source
140	----------	Jet Engine (at 25 meters)
130	----------	Jet Aircraft (at 100 meters)
120	----------	Rock and Roll Concert
110	----------	Pneumatic Chipper
100	----------	Jointer/Planer
90	----------	Chainsaw
80	----------	Heavy Truck Traffic
70	----------	Business Office
60	----------	Conversational Speech
50	----------	Library
40	----------	Bedroom
30	----------	Secluded Woods
20	----------	Whisper

Source: "A Guide to Noise Control in Minnesota," Minnesota Pollution Control Agency, http://www.pca.state.mn.us/programs/pubs/noise.pdf and "Highway Traffic Noise," FHWA, http://www.fhwa.dot.gov/environment/htnoise.htm

State of Minnesota Noise Regulations

Minnesota state noise standards are for a 1-hour period and apply to outdoor areas (i.e. exterior noise levels). The standards are in terms of the L10 and L50 noise descriptors. The L10 is the sound level exceeded ten percent of the time or 6 minutes out of an hour. The L50 is the sound level exceeded fifty percent of the time or thirty minutes out of an hour. State noise standards have been established for daytime and nighttime periods. The Minnesota Pollution Control Agency (MPCA) defines daytime as 7:00 a.m. to 10:00 p.m. and nighttime from 10:00 p.m. to 7:00 a.m.

Table 19 provides the Minnesota State Noise Standards for 3 Noise Area Classifications (NAC), and for daytime, nighttime, L10 and L50. The standards for NAC-1 apply to residential areas and other uses intended for overnight sleeping (hotels, motels, mobile homes, etc.). The NAC-1 standards also apply to schools, churches, medical services, and park areas. The nighttime standards differ from the daytime standards only in areas intended for overnight sleeping.

The NAC-1 daytime standards apply during nighttime hours at other NAC-1 uses not intended for overnight sleeping. The NAC-2 standards are applicable to certain NAC-1 land uses if the following criteria are met:

- The building noise attenuation is at least 30 decibels (dBA),
- The building has year-round indoor climate control,
- The building has no facilities for outdoor activities.

Table 19 – Minnesota State Noise Standards

Noise Area Classification	General Land Use Type	Sound Level (dBA)			
		Day (7:00 am-10:00 pm)		Night (10:00 pm-7:00 am)	
		L10	L50	L10	L50
1	Residential	65	60	55	50
2	Commercial	70	65	70	65
3	Industrial	80	75	80	75

Federal Noise Abatement Criteria (NAC)

In the Federal NAC, for residential and recreational uses (Federal Land Use Category B), the Federal L_{10} standard is 70 dBA for both daytime and nighttime. For commercial and industrial areas (Federal Land Use Category C), the Federal L_{10} standard is 75 dBA for both daytime and nighttime. Locations where noise levels are "approaching" (defined in Minnesota as being within 1 decibel of the criterion threshold, i.e. 69/74 dBA) or exceeding the criterion level must be evaluated for noise abatement reasonableness. The Federal NAC are shown in Table 20.

In addition to the identified noise criteria, the FHWA also defines a noise impact as a "substantial increase" in the future noise levels over the existing noise levels. MnDOT considers an increase of 5 dBA or greater a substantial noise level increase.

Table 20– Federal Noise Abatement Criteria

Activity Category	Activity Criteria (1,2) 10(h) dBA	Evaluation Location	Activity Description
A	60	Exterior	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(3)	70	Exterior	Residential
C(3)	70	Exterior	Exterior Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or non-profit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E(3)	75	Exterior	Exterior Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.

Table 20 continued

Activity Category	Activity Criteria (1,2) 10(h) dBA	Evaluation Location	Activity Description
F	-----	-----	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	-----	-----	Undeveloped lands that are not permitted

Notes: (1) L 10(h) shall be used for impact assessment.
(2) The L 10(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.
(3) Includes undeveloped lands permitted for this activity category.

The Minnesota State Noise Standards apply to the Highway 1/169 Eagles Nest Lake Area Project and because federal funds will likely be used as part of this project, the federal noise criteria also apply to the project.

Alternatives

The noise analysis included evaluation of the 3 Build Alternatives, Alternatives 1, 2A, and 3A, depicted in Figures 11-15 (for the Preferred Alternative, Alternative 3A) and figures located in Appendix H (for Alternatives 1 and 2A).

Traffic Noise Analysis Methodology and Assumptions

The proposed project is located in a rural area of St. Louis County. Traffic noise is generated by vehicles traveling on Highway 1/169, as well as along intersecting local (county and township) roadways. Other noise sources in the area may be generated by gravel mining and forestry activities found in close proximity of the study area.

Scattered residences (year-round & seasonal) are located adjacent to the project area, and receptor locations were chosen that are representative of the various groupings of residences.

Existing and future noise levels (2033) were modeled using the MnDOT noise prediction model MINNOISE V31. Noise projections were based on existing and forecasted peak hour traffic volumes, vehicle speeds, mix of vehicles, roadway grades, and the distance from the roadway center-of-lanes to the receptor (horizontal and vertical).

The following assumptions were used in modeling the noise levels:

Daytime vs. Nighttime Traffic Volumes

- Daytime hours were between 7:00 a.m. and 10:00 p.m.; nighttime hours were between 10:00 p.m. and 7:00 a.m.
- The noisiest daytime and nighttime hours were selected based on traffic and heavy truck volume. The nighttime noisiest hour, which for this study was the design AM peak hour (6:00 a.m. to 7:00 a.m.), is approximately 8.4 percent of the average daily traffic volume. The daytime noisiest hour corresponds with the PM peak hour (4:00 p.m. to 5:00 p.m.), which is approximately 7.9 percent of the average daily traffic volume.

Vehicle Speeds

- Highway 1/169 was modeled using posted limits of 55 miles per hour (MPH).

Ground Cover

- For a linear noise source, such as a highway, sound traveling through air attenuates 3 dBA for every doubling of distance. Ground cover can provide additional noise attenuation in absence of a noise barrier. The 2 default ground values for the noise model are soft ground, which represents open, grassy areas that provide additional acoustical attenuation of 1.5 dBA per doubling of distance, and hard ground, which represents surfaces such as asphalt or open water which do not provide acoustical attenuation. The study area is in a rural undeveloped environment with primarily a mixture of heavy foliage and grassy areas. Therefore, the default value for rural environments is soft ground with an alpha value of 0.5.

Noise Receptor Sites

Noise impacts have been assessed at 40 receptor sites representing residences along the project corridor. The receptor locations are shown on Figures 11-15 for the Preferred Alternative (Alternative 3A) and in Appendix H for the other alternatives considered. Noise impacts were evaluated at each of the receptor sites for each of the 3 alternatives (Alts. 1, 2A, and 3A). All receptor sites are classified within the definition of State of Minnesota NAC-1 and Federal Land Use Category B.

Noise Analysis Results

Five scenarios have been analyzed using the MINNOISEV31 noise model, for comparison of the traffic noise levels. The scenarios are: 1) Existing Conditions; 2) 2033 No-Build Alternative; 3) 2033 Alternative 1; 4) 2033 Alternative 2A; and 5) 2033 Alternative 3A (Preferred Alternative). Complete modelling results are provided in Tables 20 and 21. A summary of results for the 3 Build Alternatives is presented below.

For Alternative 1, State nighttime standards are exceeded at 20 receptor locations. These receptors are scattered along the entire corridor. There are no exceedances of the daytime standards or increases in noise levels greater than 5dBA.

For Alternative 2A, State nighttime standards are exceeded at 21 receptor locations. These receptor locations are generally on the east end of the project study area near Clear Lake. Additionally, along the new alignment section in the western segment of the corridor there are 4 receptor locations that will experience a modeled increase in noise levels exceeding 5 dBA, but not exceeding state noise standards. These receptors are on the north side of Sixmile Lake. This is adjacent to the portion of the project where the roadway is proposed to be realigned the furthest distance to the south.

For Alternative 3A (Preferred Alternative), State nighttime standards are exceeded at 20 receptor locations. These receptor locations are generally on the east end of the project study area near Clear Lake. Additionally, along the new alignment section in the western segment of the corridor there are 4 additional receptor locations that will experience a modeled increase in noise levels exceeding 5 dBA, but not exceeding state noise standards. These receptors are on the north side of Sixmile Lake. This is adjacent to the portion of the project where the roadway is proposed to be realigned the furthest distance to the south.

Noise Barrier Evaluation

Because the State Nighttime standards would be exceeded and modeled increases in noise level exceed 5 dBA at some residential receptor sites, mitigation measures have been analyzed for locations that meet 1 or both of these criteria.

In order for a noise barrier to be proposed as part of a project, it must be both feasible and reasonable. Feasibility refers to physical constraints and engineering considerations (i.e., can a noise barrier be constructed at this location). For noise barriers to be considered reasonable, it must meet the following 3 criteria:

1) It must be acoustically effective by providing a substantial reduction in noise, defined as a 5 decibel reduction or more. Additionally, 1 receiver must receive a 7 decibels or greater reduction.
2) It must meet MnDOT's cost effectiveness criteria of $43,500 per residence (based on a barrier construction cost of $20/ square-foot), and
3) It must consider the viewpoint of the benefited residences and owners.

Noise barriers were analyzed for 11 areas along the Alternative 1 corridor. Noise barriers were analyzed for 12 areas along the Alternative 2A and 3A corridors. The barrier locations are shown on Figures 11-15 for the Preferred Alternative (Alternative 3A) and in Appendix H for Alternatives 1 and 2A.

There are several steps to assessing the cost-effectiveness of noise barriers. First, the cost-effective noise barrier height is determined for each segment of the project area.

For this study, 3 heights of potential noise barriers were analyzed: 20, 15 and 10-feet. If a 20-foot noise barrier is feasible and meets the reasonableness criteria, it would be proposed for construction. If the 20-foot barrier achieves a 7 dBA reduction, but does not meet the cost criteria, a 15-foot barrier is evaluated. Likewise if a 15-foot barrier achieves a 7 dBA reduction, but does not meet the criteria, a 10-foot barrier is studied. If a 10-foot noise barrier meets the reasonableness criteria and is feasible, it would then be proposed.

Table 21 – Daytime Noise Impact Assessment

	Existing		2033 No-Build		No-Build vs. Existing		2033 Alternative 1		2033 Alternative 1 vs. Existing		2033 Alternative 2A		2033 Alternative 2A vs. Existing		2033 Alternative 3A (Preferred Alternative)		2033 Alternative 3A (Preferred Alternative) vs. Existing	
Receptor	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R-1	50.4	42.9	51.6	44.6	1.2	1.7	51.8	44.8	1.4	1.9	50.3	42.7	-0.1	-0.2	50.3	42.7	-0.1	-0.2
R-3	49.3	42.2	50.5	43.9	1.2	1.7	50.5	43.9	1.2	1.7	51.8	45.0	2.5	2.8	51.8	45.0	2.5	2.8
R-5	33.8	29.5	34.9	31.0	1.1	1.5	34.8	31.0	1.0	1.5	43.0	36.4	9.2	6.9	43.0	36.4	9.2	6.9
R-7	33.2	29.3	34.2	30.7	1.0	1.4	34.1	30.6	0.9	1.3	43.1	36.4	9.9	7.1	43.1	36.4	9.9	7.1
R-9	33.2	29.3	34.2	30.7	1.0	1.4	34.1	30.6	0.9	1.3	43.0	36.5	9.8	7.2	43.0	36.5	9.8	7.2
R11	37.2	31.8	38.3	33.4	1.1	1.6	38.2	33.2	1.0	1.4	43.2	37.0	6.0	5.2	43.2	36.9	6.0	5.1
R13	48.0	41.3	49.2	43.0	1.2	1.7	48.7	42.6	0.7	1.3	49.0	42.9	1.0	1.6	48.7	42.6	0.7	1.3
R15	50.2	43.2	51.4	44.9	1.2	1.7	51.1	44.6	0.9	1.4	51.2	44.7	1.0	1.5	51.1	44.6	0.9	1.4
R17	53.7	45.9	54.9	47.6	1.2	1.7	54.5	47.3	0.8	1.4	54.6	47.3	0.9	1.4	54.5	47.3	0.8	1.4
R19	59.2	50.0	60.5	51.8	1.3	1.8	58.7	49.8	-0.5	-0.2	59.0	50.0	-0.2	0.0	58.7	49.8	-0.5	-0.2
R21	49.4	42.6	50.6	44.3	1.2	1.7	50.9	44.5	1.5	1.9	50.8	44.4	1.4	1.8	50.9	44.5	1.5	1.9
R23	54.5	46.4	55.7	48.2	1.2	1.8	54.8	46.8	0.3	0.4	54.9	47.0	0.4	0.6	54.8	46.8	0.3	0.4
R25	47.6	41.1	48.8	42.7	1.2	1.6	48.7	42.7	1.1	1.6	48.7	42.6	1.1	1.5	48.7	42.7	1.1	1.6
R27	58.9	49.6	60.2	51.4	1.3	1.8	58.7	49.6	-0.2	0.0	58.0	49.2	-0.9	-0.4	58.7	49.6	-0.2	0.0
R29	51.9	44.8	53.1	46.5	1.2	1.7	53.1	46.5	1.2	1.7	53.2	46.5	1.3	1.7	53.1	46.5	1.2	1.7
R31	47.6	41.7	48.7	43.3	1.1	1.6	48.7	43.2	1.1	1.5	48.7	43.3	1.1	1.6	48.7	43.2	1.1	1.5
R33	56.4	46.6	57.8	48.4	1.4	1.8	54.5	44.9	-1.9	-1.7	53.8	44.4	-2.6	-2.2	54.5	44.9	-1.9	-1.7
R35	55.8	45.1	57.2	46.9	1.4	1.8	54.9	45.2	-0.9	0.1	54.8	45.1	-1.0	0.0	54.9	45.2	-0.9	0.1
R37	59.4	48.3	60.8	50.1	1.4	1.8	59.2	48.9	-0.2	0.6	59.2	49.0	-0.2	0.7	59.2	48.9	-0.2	0.6
R39	57.0	47.3	58.4	49.1	1.4	1.8	57.4	48.0	0.4	0.7	57.6	48.2	0.6	0.9	57.4	47.9	0.4	0.6
R41	56.7	46.9	58.1	48.8	1.4	1.9	57.0	47.7	0.3	0.8	57.3	48.0	0.6	1.1	57.0	47.7	0.3	0.8
R43	55.4	46.4	56.8	48.2	1.4	1.8	56.0	47.3	0.6	0.9	56.3	47.6	0.9	1.2	56.0	47.3	0.6	0.9
R45	47.8	41.8	49.0	43.4	1.2	1.6	48.8	43.0	1.0	1.2	48.9	43.1	1.1	1.3	48.8	43.0	1.0	1.2
R47	50.7	43.8	51.9	45.5	1.2	1.7	51.7	45.0	1.0	1.2	51.7	45.1	1.0	1.3	51.7	45.0	1.0	1.2
R51	58.1	49.2	59.4	51.0	1.3	1.8	59.7	51.1	1.6	1.9	59.3	50.9	1.2	1.7	59.7	51.1	1.6	1.9
R53	59.0	47.9	60.4	49.7	1.4	1.8	58.2	48.3	-0.8	0.4	59.8	48.9	0.8	1.0	58.2	48.3	-0.8	0.4
R55	59.6	49.4	61.0	51.2	1.4	1.8	60.2	50.6	0.6	1.2	60.7	50.8	1.1	1.4	60.2	50.6	0.6	1.2
R57	63.8	53.4	**65.2**	55.2	1.4	1.8	63.1	52.9	-0.7	-0.5	61.2	52.1	-2.6	-1.3	63.1	52.8	-0.7	-0.6
R59	57.8	49.0	59.1	50.7	1.3	1.7	58.3	50.0	0.5	1.0	58.8	50.4	1.0	1.4	58.3	50.0	0.5	1.0
R61	60.6	51.1	62.0	52.9	1.4	1.8	62.6	53.3	2.0	2.2	62.5	53.2	1.9	2.1	62.6	53.3	2.0	2.2
R63	57.1	48.6	58.3	50.4	1.2	1.8	57.5	48.9	0.4	0.3	59.1	50.2	2.0	1.6	57.5	48.9	0.4	0.3
R65	59.9	50.5	61.3	52.3	1.4	1.8	55.6	45.5	-4.3	-5.0	55.7	45.9	-4.2	-4.6	55.6	45.5	-4.3	-5.0
R66	56.6	48.8	57.9	49.8	1.3	1.0	58.2	49.2	1.6	0.4	57.3	48.9	0.7	0.1	58.2	49.2	1.6	0.4
R67	53.0	45.1	54.2	46.9	1.2	1.8	54.0	45.9	1.0	0.8	53.8	46.2	0.8	1.1	54.0	45.9	1.0	0.8
R68	56.8	48.2	58.1	49.9	1.3	1.7	58.5	49.4	1.7	1.2	57.5	49.0	0.7	0.8	58.5	49.4	1.7	1.2

Table 21 continued

	Existing		2033 No-Build		No-Build vs. Existing		2033 Alternative 1		2033 Alternative 1 vs. Existing		2033 Alternative 2A		2033 Alternative 2A vs. Existing		2033 Alternative 3A (Preferred Alternative)		2033 Alternative 3A (Preferred Alternative) vs. Existing	
Receptor	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R69	63.4	53.2	64.8	55.0	1.4	1.8	62.0	52.7	-1.4	-0.5	64.2	54.3	0.8	1.1	62.0	52.7	-1.4	-0.5
R70	53.7	45.6	55.0	47.4	1.3	1.8	54.2	45.9	0.5	0.3	54.1	46.0	0.4	0.4	54.2	45.9	0.5	0.3
R71	58.7	49.5	60.0	51.3	1.3	1.8	58.8	49.7	0.1	0.2	59.0	49.8	0.3	0.3	58.8	49.7	0.1	0.2
R72	57.7	48.9	59.0	50.6	1.3	1.7	58.5	50.2	0.8	1.3	58.7	50.3	1.0	1.4	58.5	50.2	0.8	1.3
R73	57.5	48.6	58.8	50.4	1.3	1.8	57.6	49.5	0.1	0.9	57.9	49.7	0.4	1.1	57.6	49.5	0.1	0.9

Bold values indicate exceedances of state standards. Shaded values indicate a substantial increase (increase of 5 dBA or more over existing noise levels)

Table 22 – Nighttime Noise Impact Assessment

	Existing		2033 No-Build		No-Build vs. Existing		2033 Alternative 1		2033 Alternative 1 vs. Existing		2033 Alternative 2A		2033 Alternative 2A vs. Existing		2033 Alternative 3A (Preferred Alternative)		2033 Alternative 3A (Preferred Alternative) vs. Existing	
Receptor	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R-1	50.7	43.3	51.8	44.9	1.1	1.6	51.9	45.1	1.2	1.8	50.5	42.9	-0.2	-0.4	50.5	42.9	-0.2	-0.4
R-3	49.5	42.6	50.6	44.2	1.1	1.6	50.6	44.2	1.1	1.6	51.9	45.3	2.4	2.7	51.9	45.3	2.4	2.7
R-5	34.0	29.9	35.0	31.2	1.0	1.3	34.9	31.2	0.9	1.3	43.1	36.6	9.1	6.7	43.1	36.6	9.1	6.7
R-7	33.4	29.6	34.3	30.9	0.9	1.3	34.1	30.8	0.7	1.2	43.2	36.7	9.8	7.1	43.2	36.6	9.8	7.0
R-9	33.4	29.6	34.3	30.9	0.9	1.3	34.2	30.7	0.8	1.1	43.2	36.7	9.8	7.1	43.1	36.7	9.7	7.1
R11	37.5	32.2	38.4	33.6	0.9	1.4	38.3	33.4	0.8	1.2	43.3	37.2	5.8	5.0	43.3	37.2	5.8	5.0
R13	48.3	41.7	49.3	43.2	1.0	1.5	48.8	42.8	0.5	1.1	49.1	43.1	0.8	1.4	48.8	42.8	0.5	1.1
R15	50.5	43.6	51.5	45.1	1.0	1.5	51.2	44.8	0.7	1.2	51.3	44.9	0.8	1.3	51.2	44.8	0.7	1.2
R17	54.0	46.3	**55.1**	47.8	1.1	1.5	54.7	47.5	0.7	1.2	54.7	47.6	0.7	1.3	54.7	47.5	0.7	1.2
R19	**59.5**	**50.4**	**60.7**	**52.0**	1.2	1.6	**58.8**	50.0	-0.7	-0.4	**59.1**	**50.3**	-0.4	-0.1	**58.8**	50.0	-0.7	-0.4
R21	49.7	43.0	50.8	44.5	1.1	1.5	51.0	44.7	1.3	1.7	51.0	44.7	1.3	1.7	51.0	44.7	1.3	1.7
R23	54.7	46.8	**55.9**	48.4	1.2	1.6	54.9	47.0	0.2	0.2	**55.1**	47.2	0.4	0.4	54.9	47.0	0.2	0.2
R25	47.9	41.4	48.9	43.0	1.0	1.6	48.9	42.9	1.0	1.5	48.8	42.8	0.9	1.4	48.9	42.9	1.0	1.5
R27	**59.2**	50.0	**60.4**	**51.6**	1.2	1.6	**58.8**	49.9	-0.4	-0.1	**58.1**	49.4	-1.1	-0.6	**58.8**	49.9	-0.4	-0.1
R29	52.1	45.2	53.2	46.7	1.1	1.5	53.2	46.7	1.1	1.5	53.3	46.8	1.2	1.6	53.2	46.7	1.1	1.5
R31	47.8	42.1	48.8	43.6	1.0	1.5	48.8	43.4	1.0	1.3	48.9	43.5	1.1	1.4	48.8	43.4	1.0	1.3
R33	**56.7**	47.0	**57.9**	48.6	1.2	1.6	54.6	45.0	-2.1	-2.0	53.9	44.6	-2.8	-2.4	54.6	45.0	-2.1	-2.0
R35	**56.0**	45.5	**57.3**	47.1	1.3	1.6	55.0	45.4	-1.0	-0.1	54.9	45.3	-1.1	-0.2	55.0	45.4	-1.0	-0.1
R37	**59.7**	48.6	**60.9**	**50.3**	1.2	1.7	**59.3**	49.1	-0.4	0.5	**59.4**	49.2	-0.3	0.6	**59.3**	49.1	-0.4	0.5
R39	**57.3**	47.7	**58.6**	49.3	1.3	1.6	**57.5**	48.2	0.2	0.5	**57.7**	48.4	0.4	0.7	**57.5**	48.2	0.2	0.5
R41	**57.0**	47.4	**58.2**	49.0	1.2	1.6	**57.1**	47.9	0.1	0.5	**57.4**	48.2	0.4	0.8	**57.1**	47.9	0.1	0.5

Table 22 continued

	Existing		2033 No-Build		No-Build vs. Existing		2033 Alternative 1		2033 Alternative 1 vs. Existing		2033 Alternative 2A		2033 Alternative 2A vs. Existing		2033 Alternative 3A (Preferred Alternative)		2033 Alternative 3A (Preferred Alternative) vs. Existing	
Receptor	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R43	**55.7**	46.8	**56.9**	48.4	1.2	1.6	**56.2**	47.6	0.5	0.8	**56.4**	47.9	0.7	1.1	**56.2**	47.6	0.5	0.8
R45	48.1	42.1	49.1	43.6	1.0	1.5	49.0	43.3	0.9	1.2	49.0	43.3	0.9	1.2	49.0	43.3	0.9	1.2
R47	51.0	44.2	52.0	45.7	1.0	1.5	51.9	45.3	0.9	1.1	51.9	45.4	0.9	1.2	51.9	45.3	0.9	1.1
R51	**58.4**	49.6	**59.6**	**51.2**	1.2	1.6	**59.9**	**51.4**	1.5	1.8	**59.5**	**51.1**	1.1	1.5	**59.9**	**51.4**	1.5	1.8
R53	**59.3**	48.3	**60.6**	49.9	1.3	1.6	**58.4**	48.5	-0.9	0.2	**59.9**	49.1	0.6	0.8	**58.4**	48.5	-0.9	0.2
R55	**59.9**	49.8	**61.2**	**51.4**	1.3	1.6	**60.4**	**50.8**	0.5	1.0	**60.8**	**51.1**	0.9	1.3	**60.4**	**50.8**	0.5	1.0
R57	**64.1**	**53.8**	**65.4**	**55.5**	1.3	1.7	**63.3**	**53.1**	-0.8	-0.7	**61.3**	**52.4**	-2.8	-1.4	**63.3**	**53.1**	-0.8	-0.7
R59	**58.1**	49.4	**59.2**	**51.0**	1.1	1.6	**58.5**	**50.3**	0.4	0.9	**59.0**	**50.7**	0.9	1.3	**58.5**	**50.3**	0.4	0.9
R61	**61.0**	**51.5**	**62.2**	**53.2**	1.2	1.7	**62.7**	**53.5**	1.7	2.0	**62.7**	**53.5**	1.7	2.0	**62.7**	**53.5**	1.7	2.0
R63	**57.3**	49.0	**58.5**	**50.7**	1.2	1.7	**57.6**	49.2	0.3	0.2	**59.3**	**50.5**	2.0	1.5	**57.6**	49.2	0.3	0.2
R65	**60.2**	**50.9**	**61.4**	**52.6**	1.2	1.7	**55.7**	45.7	-4.5	-5.2	**55.8**	46.1	-4.4	-4.8	**55.7**	45.7	-4.5	-5.2
R66	**56.8**	48.2	**58.1**	50.0	1.3	1.8	**58.3**	49.5	1.5	1.3	**57.5**	49.1	0.7	0.9	**58.3**	49.5	1.5	1.3
R67	53.2	45.3	54.4	47.1	1.2	1.8	54.1	46.2	0.9	0.9	54.0	46.4	0.8	1.1	54.1	46.2	0.9	0.9
R68	**57.0**	48.4	**58.3**	**50.2**	1.3	1.8	**58.7**	49.7	1.7	1.3	**57.7**	49.3	0.7	0.9	**58.7**	49.7	1.7	1.3
R69	**63.6**	**53.4**	**64.9**	**55.3**	1.3	1.9	**62.1**	**52.9**	-1.5	-0.5	**64.4**	**54.5**	0.8	1.1	**62.1**	**52.9**	-1.5	-0.5
R70	53.9	45.8	**55.2**	47.6	1.3	1.8	54.3	46.2	0.4	0.4	54.2	46.3	0.3	0.5	54.3	46.2	0.4	0.4
R71	**58.9**	49.7	**60.2**	**51.6**	1.3	1.9	**59.0**	50.0	0.1	0.3	**59.1**	50.0	0.2	0.3	**59.0**	50.0	0.1	0.3
R72	**57.9**	49.1	**59.2**	**50.9**	1.3	1.8	**58.7**	**50.4**	0.8	1.3	**58.9**	**50.6**	1.0	1.5	**58.7**	**50.4**	0.8	1.3
R73	**57.6**	48.9	**58.9**	**50.7**	1.3	1.8	**57.7**	49.7	0.1	0.8	**58.1**	50.0	0.5	1.1	**57.7**	49.7	0.1	0.8

Bold values indicate exceedances of state standards. Shaded values indicate a substantial increase (increase of 5 dBA or more over existing noise levels)

Alternative 1 Mitigation Assessment

Area 1B Residence on North Side of Armstrong Lake – Receptor R19

Receptor R19 represents a residence on the north side of Armstrong Lake. A 400-foot long, 20-foot high wall along the south side of Highway 1/169 was modeled to mitigate noise impacts at this location. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 23 provides the details of the barrier mitigation analysis.

Table 23– Area 1B – Residence on North Side of Armstrong Lake

	L_{10} Nighttime Peak-Hour Levels (dBA)						
		20' Wall Analysis		15' Wall Analysis		10' Wall Analysis	
Receptor[1]	No Wall	Level	Reduction[2]	15' Wall	Reduction	10' Wall	Reduction
R19 (1)	58.8	54.2	4.6				
Number of receivers achieving 5 dBA			0				
Does wall achieve a 7 dBA reduction?			No				
Length of Wall = 400-feet							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 2 Residence on North Side of Armstrong Lake – Receptor R23

Receptor R23 represents a residence on the north side of Armstrong Lake. A 500-foot long, 20-foot high wall along the south side of Highway 1/169 was modeled to mitigate noise impacts at this location. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 24 provides the details of the barrier mitigation analysis.

Table 24 – Area 2 – Residence on North Side of Armstrong Lake

	L_{10} Nighttime Peak-Hour Levels (dBA)						
		20' Wall Analysis		15' Wall Analysis		10' Wall Analysis	
Receptor[1]	No Wall	Level	Reduction[2]	15' Wall	Reduction	10' Wall	Reduction
R23 (1)	54.9	52.3	2.6				
Number of receivers achieving 5 dBA			0				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 500-feet							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 3 Residence on South Side of Clear Lake – Far West Area – Receptor R27

Receptor R27 represents a residence north of Highway 1/169 on the south side of Clear Lake. A 513-foot long, 20-foot high wall on the north side of Highway 1/169 was modeled to mitigate noise impacts at this location. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 25 provides the details of the barrier mitigation analysis.

Table 25 – Area 3 – Residence on South Side of Clear Lake – West Area

	L_{10} Nighttime Peak-Hour Levels (dBA)						
		20' Wall Analysis		15' Wall Analysis		10' Wall Analysis	
Receptor[1]	No Wall	Level	Reduction[2]	15' Wall	Reduction	10' Wall	Reduction
R27 (1)	58.8	52.5	6.3				
Number of receivers achieving 5 dBA			1				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 513-feet							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 4 Residences on South Side of Clear Lake – West Central Area – Receptors R33, R35, R37, R39, and R41.

Receptors R33, R35, R37, R39, and, R41 represent 5 residences north of Highway 1/169. A 1,221-foot long barrier along the north side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The lowest cost per residence for this noise barrier was $91,575 for the 15-foot high wall, which is above MnDOT's criterion of $43,500. A noise barrier is therefore not proposed for this location. Table 26 provides the details of the barrier mitigation analysis.

Table 26– Area 4 – Residence on South Side of Clear Lake – West Central Area

	L_{10} Nighttime Peak-Hour Levels (dBA)						
		20' Wall Analysis		15' Wall Analysis		10' Wall Analysis	
Receptor[1]	No Wall	Level	Reduction[2]	15' Wall	Reduction	10' Wall	Reduction
R33 (1)	54.6	49.2	5.4	49.6	5.0	50.5	4.1
R35 (1)	55.0	47.0	8.0	47.7	7.3	49.1	5.9
R37 (1)	59.3	48.6	10.7	49.6	9.7	51.8	7.5
R39 (1)	57.5	51.1	6.4	51.7	5.8	52.9	4.6
R41 (1)	57.1	52.8	4.3	53.1	4.0	53.8	3.3
Number of receivers achieving 5 dBA			4		4		2
Does wall achieve a 7 dBA reduction?			Yes		Yes		Yes
Length of Wall = 1221-feet							
Cost per benefitted receiver			$122,100		$91,575		$244,200

[1]Number in parentheses is the number of residences represented by the receptor.

Area 5 Residences on South Side of Clear Lake – East Central Area – Receptors R43, R53, and R55.

Receptors R43, R53, and R55 represent 3 residences north of Highway 1/169. A 635-foot long 2-segment barrier along the north side of Highway 1/US 169 was modeled to mitigate noise impacts at these locations. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 27 provides the details of the barrier mitigation analysis.

Table 27 – Area 5 – Residence on South Side of Clear Lake – East Central Area

	L_{10} Nighttime Peak-Hour Levels (dBA)						
		20' Wall Analysis		15' Wall Analysis		10' Wall Analysis	
Receptor[1]	No Wall	Level	Reduction[2]	15' Wall	Reduction	10' Wall	Reduction
R43 (1)	56.2	51.9	4.3				
R53 (1)	58.4	53.1	5.3				
R55 (1)	60.4	59.1	1.3				
Number of receivers achieving 5 dBA			1				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 635-feet (2-segments)							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 6 Residences on South Side of Clear Lake – East Area – Receptors R57 and R59.

Receptors R57 and R59 represents 2 residences north of Highway 1/169. A 928-foot long 2-segment barrier along the north side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 28 provides the details of the barrier mitigation analysis.

Table 28 – Area 6 – Residence on South Side of Clear Lake – East Area

	L_{10} Nighttime Peak-Hour Levels (dBA)						
		20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
Receptor[1]	No Wall	Level	Reduction[2]	15′ Wall	Reduction	10′ Wall	Reduction
R57 (1)	63.3	60.7	2.6				
R59 (1)	58.5	53.4	5.1				
Number of receivers achieving 5 dBA			1				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 928-feet (2-segments)							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 7 Residence South of Highway 1/169 near Clear Lake. Receptor R61.

Receptor R61 represents a residence south of Highway 1/169 near Clear Lake. A 485-foot long 2-segment barrier along the south side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 29 provides the details of the barrier mitigation analysis.

Table 29 – Area 7 – Residence on South Side of TH 169 near Clear Lake

	L_{10} Nighttime Peak-Hour Levels (dBA)						
		20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
Receptor[1]	No Wall	Level	Reduction[2]	15′ Wall	Reduction	10′ Wall	Reduction
R61 (1)	62.7	60.6	2.2				
Number of receivers achieving 5 dBA			0				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 485-feet (2-segments)							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 8 Residence South of Highway 1/169 near Clear Lake. Receptor R51.

Receptor R51 represents a residence south of Highway 1/169 near Clear Lake. A 330-foot long barrier along the south side of Highway 1/US 169 was modeled to mitigate noise impacts at these locations. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 30 provides the details of the barrier mitigation analysis.

Table 30 – Area 8 – Residence on South Side of Highway 169 near Clear Lake

	L_{10} Nighttime Peak-Hour Levels (dBA)						
		20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
)Receptor[1]	No Wall	Level	Reduction[2]	15′ Wall	Reduction	10′ Wall	Reduction
R51 (1)	59.6	56.2	3.7				
Number of receivers achieving 5 dBA			0				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 330-feet							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 9 Residence South of Highway 1/169 near Clear Lake. Receptors R63 and R65.

Receptors R63 and R65 represent 2 residences south of Highway 1/169 near Clear Lake. A 1,281-foot long barrier along the south side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 31 provides the details of the barrier mitigation analysis.

Table 31– Area 9 – South Side of Highway1/ 169 near Clear Lake

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
		20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
	No Wall	Level	Reduction[2]	15′ Wall	Reduction	10′ Wall	Reduction
R63 (1)	57.6	52.4	5.2				
R65 (1)	55.7	50.3	5.4				
Number of receivers achieving 5 dBA			2				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 1281-feet							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 10 Residences South of Highway 1/169 near Bradach Road -. Receptors R67, R68, R70, R71, R72, and R73.

Receptors R67, R68, R70 (2 residences), R71, R72, and R73 represent 6 residences south of Highway 1/169 near Bradach Road. A 1,713-foot long barrier along the south side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The lowest cost per residence for this noise barrier was $112,333 for the 20-foot high wall, which is above MnDOT's criterion of $43,500. A noise barrier is therefore not proposed for this location. Table 32 provides the details of the barrier mitigation analysis.

Table 32 – Area 10 – South of Highway 169 – Bradach Road Area

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
		20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
	No Wall	Level	Reduction[2]	15′ Wall	Reduction	10′ Wall	Reduction
R66 (1)	58.3	56.0	2.3	56.2	2.1	56.6	1.7
R67 (1)	54.1	48.6	5.5	49.4	4.7	50.7	3.4
R68(1)	58.7	54.1	4.6	54.5	4.2	55.4	3.3
R70(2)	54.3	46.5	7.8	48.0	6.3	50.0	4.3
R71 (1)	59.0	48.0	11.0	50.5	8.5	53.6	5.4
R72 (1)	58.7	51.0	7.7	53.9	4.8	56.7	2.0
R73 (1)	57.7	52.7	5.0	55.3	2.4	57.1	0.6
Number of receivers achieving 5 dBA			5		2		1
Does wall achieve a 7 dBA reduction?			Yes		Yes		No
Length of Wall = 1713-feet							
Cost per benefitted receiver			$112,333		$168,500		NA

[1]Number in parentheses is the number of residences represented by the receptor.

Area 11 Residence North of Highway 1/169 and East of Clear Lake. Receptor R69.

Receptor R69 represents a residence north of Highway 1/169 and eat of Clear Lake. A 248-foot long barrier along the north side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 33 provides the details of the barrier mitigation analysis.

Table 33– Area 11 – Residence on North Side of Highway 169 East of Clear Lake

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
		20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
	No Wall	Level	Reduction[2]	15′ Wall	Reduction	10′ Wall	Reduction
R69 (1)	62.1	60.8	1.3				
Number of receivers achieving 5 dBA			0				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 248-feet							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Alternative 2A Mitigation Assessment

Area 1A Residence on North Side of Armstrong Lake – Receptors R5, R7, R9, and R11

Receptors R5, R7, R9, and R11 represent residences on the north side of Sixmile Lake. A 3,500-foot long, 20-foot high wall along the south side of Highway 1/169 was modeled to mitigate noise impacts at this location. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 34 provides the details of the barrier mitigation analysis.

Table 34– Area 1A – North of Sixmile Lake

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R5(1)	43.1	40.5	2.6				
R7(1)	43.2	40.0	3.2				
R9(1)	43.2	39.9	3.3				
R11(1)	43.3	42.9	0.4				
Number of receivers achieving 5 dBA			0				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 3500-feet							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 1B Residence on North Side of Armstrong Lake – Receptor R19

Receptor R19 represents a residence on the north side of Armstrong Lake. A 400-foot long, 20-foot high wall along the south side of Highway 1/169 was modeled to mitigate noise impacts at this location. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 35 provides the details of the barrier mitigation analysis.

Table 35– Area 1B – Residence on North of Armstrong

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R19(1)	59.1	54.3	4.8				
Number of receivers achieving 5 dBA			0				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 400-feet							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 2 Residence on North Side of Armstrong Lake – Receptor R23

Receptor R23 represents a residence on the north side of Armstrong Lake. A 500-foot long, 20-foot high wall along the south side of Highway 1/169 was modeled to mitigate noise impacts at this location. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 36 provides the details of the barrier mitigation analysis.

Table 36– Area 2 – Residence on North Side of Armstrong Lake

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R23(1)	55.1	52.5	2.6				
Number of receivers achieving 5 dBA			0				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 500-feet							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 3 Residence on South Side of Clear Lake – Far West Area – Receptor R27

Receptor R27 represents a residence north of Highway 1/169 on the south side of Clear Lake. A 513-foot long, 20-foot high wall on the north side of Highway 1/169 was modeled to mitigate noise impacts at this location. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 37 provides the details of the barrier mitigation analysis.

Table 37– Area 3 – Residence on South Side of Clear Lake – West Area

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R27(1)	58.1	52.2	5.9				
Number of receivers achieving 5 dBA			1				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 513-feet							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 4 Residences on South Side of Clear Lake – West Central Area – Receptors R33, R35, R37, R39, and R41.

Receptors R33, R35, R37, R39, and, R41 represent 5 residences north of Highway 1/169. A 1,221-foot long barrier along the north side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The lowest cost per residence for this noise barrier was $91,575 for the 15-foot high wall, which is above MnDOT's criterion of $43,500. A noise barrier is therefore not proposed for this location. Table 38 provides the details of the barrier mitigation analysis.

Table 38– Area 4 – Residences on South Side of Clear Lake – West Central Area

Receptor[1]	L_{10} Nighttime Peak-Hour Levels dBA						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R33(1)	53.9	48.9	5.0	49.3	4.6	50.2	3.7
R35(1)	54.9	47.0	7.9	47.7	7.2	49.1	5.8
R37(1)	59.4	48.9	10.5	49.8	9.6	51.9	7.5
R39(1)	57.7	51.2	6.5	51.7	6.0	53.0	4.7
R41(1)	57.4	53.1	4.3	53.4	4.0	54.0	3.4
Number of receivers achieving 5 dBA			4		3		2
Does wall achieve a 7 dBA reduction?			yes		yes		yes
Length of Wall = 1221-feet							
Cost per benefitted receiver			$122,100		$122,100		$244,200

[1]Number in parentheses is the number of residences represented by the receptor.

Area 5 Residences on South Side of Clear Lake – East Central Area – Receptors R43, R53, and R55.

Receptors R43, R53, and R55 represent 3 residences north of Highway 1/169. A 635-foot long 2-segment barrier along the north side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 39 provides the details of the barrier mitigation analysis.

Table 39– Area 5 – Residences on South Side of Clear Lake – East Central Area

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R43(1)	56.4	52.5	3.9				
R53(1)	59.9	53.8	6.1				
R55(1)	60.8	59.8	1.0				
Number of receivers achieving 5 dBA			1				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 635 (2-segments)							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 6 Residences on South Side of Clear Lake – East Area – Receptors R57 and R59.

Receptors R57 and R59 represents 2 residences north of Highway 1/169. A 928-foot long 2-segment barrier along the north side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 40 provides the details of the barrier mitigation analysis.

Table 40– Area 6 – Residences on South Side of Clear Lake – East Area

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R57(1)	61.3	59.4	1.9				
R59(1)	59.0	54.5	4.5				
Number of receivers achieving 5 dBA			0				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 928-feet (2-segments)							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 7 Residence South of Highway 1/169 near Clear Lake. Receptor R61.

Receptor R61 represents a residence south of Highway 1/169 near Clear Lake. A 485-foot long 2-segment barrier along the south side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 41 provides the details of the barrier mitigation analysis.

Table 41– Area 7 – Residence on South Side of Highway 169 near Clear Lake

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R61(1)	62.7	60.5	2.2				
Number of receivers achieving 5 dBA			0				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 485-feet (2-segments)							

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 8 Residence South of Highway 1/169 near Clear Lake. Receptor R51.

Receptor R51 represents a residence south of Highway 1/169 near Clear Lake. A 330-foot long barrier along the south side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 42 provides the details of the barrier mitigation analysis.

Table 42– Area 8 – Residence on South Side of Highway 169 near Clear Lake

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R51(1)	59.5	56.0	3.5				
Number of receivers achieving 5 dBA			0				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 330-feet							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 9 Residence South of Highway 1/169 near Clear Lake. Receptors R63 and R65.

Receptors R63 and R65 represent 2 residences south of Highway 1/169 near Clear Lake. A 1,281-foot long barrier along the south side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The barrier did not meet the cost effectiveness criteria therefore a noise barrier is not proposed for this location. Table 43 provides the details of the barrier mitigation analysis.

Table 43– Area 9 – South Side of Highway 169 near Clear Lake

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R63(1)	59.3	52.9	6.4	53.7	5.6		
R65(1)	55.8	48.7	7.1	49.4	6.4		
Number of receivers achieving 5 dBA			2		2		
Does wall achieve a 7 dBA reduction?			yes		no		
Length of Wall = 1281-feet							
Cost per benefitted receiver			$256,200		NA		

[1]Number in parentheses is the number of residences represented by the receptor.

Area 10 Residences South of Highway 1/169 near Bradach Road -. Receptors R67, R68, R70, R71, R72, and R73.

Receptors R67, R68, R70 (2 residences), R71, R72, and R73 represent 6 residences south of Highway 1/169 near Bradach Road. A 1,713-foot long barrier along the south side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The lowest cost per residence for this noise barrier was $112,333 for the 20-foot high wall, which is above MnDOT's criterion of $43,500. A noise barrier is therefore not proposed for this location. Table 44 provides the details of the barrier mitigation analysis.

Table 44– Area 10 – South of Highway 169 – Bradach Road Area

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R66(1)	57.5	54.9	2.6	55.2	2.3	55.8	1.7
R67(1)	54.0	48.3	5.7	49.3	4.7	50.9	3.1
R68(1)	57.7	52.9	4.8	53.6	4.1	54.8	2.9
R70(2)	54.2	46.2	8.0	47.9	6.3	50.2	4.0
R71(1)	59.1	48.1	11.0	50.6	8.5	53.7	5.4
R72(1)	58.9	51.1	7.8	54.0	4.9	56.8	2.1
R73(1)	58.1	52.8	5.3	55.3	2.8	57.3	0.8
Number of receivers achieving 5 dBA			5		2		1
Does wall achieve a 7 dBA reduction?			yes		yes		no
Length of Wall = 1685-feet							
Cost per benefitted receiver			$112,333		$168,500		NA

[1]Number in parentheses is the number of residences represented by the receptor.

Area 11 Residence North of Highway 1/169 and East of Clear Lake. Receptor R69.

Receptor R69 represents a residence north of Highway 1/169 and eat of Clear Lake. A 248-foot long barrier along the north side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 45 provides the details of the barrier mitigation analysis.

Table 45– Area 11 – Residence on North Side of Highway 169 East of Clear Lake

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R69(1)	64.4	63.2	1.2				
Number of receivers achieving 5 dBA			0				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 248-feet							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Alternative 3A (Preferred Alternative) Mitigation Assessment

Area 1A Residence on North Side of Armstrong Lake – Receptors R5, R7, R9, and R11

Receptors R5, R7, R9, and R11 represent residences on the north side of Sixmile Lake. A 3,500-foot long, 20-foot high wall along the south side of TH 1/169 was modeled to mitigate noise impacts at this location. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 46 provides the details of the barrier mitigation analysis.

Table 46– Area 1A – North of Sixmile Lake

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R5(1)	43.1	40.5	2.6				
R7(1)	43.2	40.0	3.2				
R9(1)	43.2	39.9	3.3				
R11(1)	43.3	42.9	0.4				
Number of receivers achieving 5 dBA			0				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 3500-feet							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 1B Residence on North Side of Armstrong Lake – Receptor R19

Receptor R19 represents a residence on the north side of Armstrong Lake. A 400-foot long, 20-foot high wall along the south side of Highway 1/169 was modeled to mitigate noise impacts at this location. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 47 provides the details of the barrier mitigation analysis.

Table 47– Area 1B – Residence on North Side of Armstrong Lake

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R19(1)	58.8	54.2	4.6				
Number of receivers achieving 5 dBA			0				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 400-feet							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 2 Residence on North Side of Armstrong Lake – Receptor R23

Receptor R23 represents a residence on the north side of Armstrong Lake. A 500-foot long, 20-foot high wall along the south side of Highway 1/169 was modeled to mitigate noise impacts at this location. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 48 provides the details of the barrier mitigation analysis.

Table 48– Area 2 – Residence on North Side of Armstrong Lake

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R23(1)	54.9	52.3	2.6				
Number of receivers achieving 5 dBA			0				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 500-feet							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 3 Residence on South Side of Clear Lake – Far West Area – Receptor R27

Receptor R27 represents a residence north of Highway 1/169 on the south side of Clear Lake. A 513-foot long, 20-foot high wall on the north side of Highway 1/169 was modeled to mitigate noise impacts at this location. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 49 provides the details of the barrier mitigation analysis.

Table 49– Area 3 – Residence on South Side of Clear Lake – West Area

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R27(1)	58.8	52.5	6.3				
Number of receivers achieving 5 dBA			1				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 513-feet							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 4 Residences on South Side of Clear Lake – West Central Area – Receptors R33, R35, R37, R39, and R41.

Receptors R33, R35, R37, R39, and, R41 represent 5 residences north of Highway 1/169. A 1,221-foot long barrier along the north side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The lowest cost per residence for this noise barrier was $91,575 for the 15-foot high wall, which is above MnDOT's criterion of $43,500. A noise barrier is therefore not proposed for this location. Table 50 provides the details of the barrier mitigation analysis.

Table 50– Area 4 – Residences on South Side of Clear Lake – West Central Area

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R33(1)	54.6	49.2	5.4	49.6	5.0	50.5	4.1
R35(1)	55.0	47.0	8.0	47.7	7.3	49.1	5.9
R37(1)	59.3	48.6	10.7	49.6	9.7	51.8	7.5
R39(1)	57.5	51.1	6.4	51.7	5.8	52.9	4.6
R41(1)	57.1	52.8	4.3	53.1	4.0	53.8	3.3
Number of receivers achieving 5 dBA			4		4		2
Does wall achieve a 7 dBA reduction?			yes		yes		yes
Length of Wall = 1221-feet							
Cost per benefitted receiver			$122,100		$91,575		$244,200

[1]Number in parentheses is the number of residences represented by the receptor.

Area 5 Residences on South Side of Clear Lake – East Central Area – Receptors R43, R53, and R55.

Receptors R43, R53, and R55 represent 3 residences north of Highway 1/169. A 635-foot long 2-segment barrier along the north side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 51 provides the details of the barrier mitigation analysis.

Table 51– Area 5 – Residences on South Side of Clear Lake – East Central Area

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R43(1)	56.2	51.9	4.3				
R53(1)	58.4	53.1	5.3				
R55(1)	60.4	59.1	1.3				
Number of receivers achieving 5 dBA			1				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 635 (2-segments)							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 6 Residences on South Side of Clear Lake – East Area – Receptors R57 and R59.

Receptors R57 and R59 represents 2 residences north of Highway 1/169. A 928-foot long 2-segment barrier along the north side of Highway 1/ 169 was modeled to mitigate noise impacts at these locations. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 52 provides the details of the barrier mitigation analysis.

Table 52– Area 6 – Residences on South Side of Clear Lake – East Area

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R57(1)	63.3	60.7	2.6				
R59(1)	58.5	53.4	5.1				
Number of receivers achieving 5 dBA			1				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 928-feet (2-segments)							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 7 Residence South of Highway 1/169 near Clear Lake. Receptor R61.

Receptor R61 represents a residence south of Highway 1/169 near Clear Lake. A 485-foot long 2-segment barrier along the south side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 53 provides the details of the barrier mitigation analysis.

Table 53– Area 7 – Residence on South Side of Highway 169 near Clear Lake

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R61(1)	62.7	60.5	2.2				
Number of receivers achieving 5 dBA			0				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 485-feet (2-segments)							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 8 Residence South of Highway 1/169 near Clear Lake. Receptor R51.

Receptor R51 represents a residence south of Highway 1/169 near Clear Lake. A 330-foot long barrier along the south side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 54 provides the details of the barrier mitigation analysis.

Table 54– Area 8 – Residence on South Side of Highway 169 near Clear Lake

	L_{10} Nighttime Peak-Hour Levels (dBA)						
Receptor[1]	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R51(1)	59.9	56.2	3.7				
Number of receivers achieving 5 dBA			0				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 330-feet							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 9 Residence South of Highway 1/169 near Clear Lake. Receptors R63 and R65.

Receptors R63 and R65 represent 2 residences south of Highway 1/169 near Clear Lake. A 1,281-foot long barrier along the south side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 55 provides the details of the barrier mitigation analysis.

Table 55– Area 9 – South Side of Highway 169 near Clear Lake

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R63(1)	57.6	52.4	5.2				
R65(1)	55.7	50.3	5.4				
Number of receivers achieving 5 dBA			2				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 1281-feet							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Area 10 Residences South of TH 1/169 near Bradach Road - Receptors R67, R68, R70, R71, R72, and R73.

Receptors R67, R68, R70 (2 residences), R71, R72, and R73 represent 6 residences south of Highway 1/169 near Bradach Road. A 1,713-foot long barrier along the south side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The lowest cost per residence for this noise barrier was $112,333 for the 20-foot high wall, which is above MnDOT's criterion of $43,500. A noise barrier is therefore not proposed for this location. Table 56 provides the details of the barrier mitigation analysis.

Table 56– Area 10 – South of Highway 169 – Bradach Road Area

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R66(1)	58.3	56.0	2.3	56.2	2.1	56.6	1.7
R67(1)	54.1	48.6	5.5	49.4	4.7	50.7	3.4
R68(1)	58.7	54.1	4.6	54.5	4.2	55.4	3.3
R70(2)	54.3	46.5	7.8	48.0	6.3	50.0	4.3
R71(1)	59.0	48.0	11.0	50.5	8.5	53.6	5.4
R72(1)	58.7	51.0	7.7	53.9	4.8	56.7	2.0
R73(1)	57.7	52.7	5.0	55.3	2.4	57.1	0.6
Number of receivers achieving 5 dBA			5		2		1
Does wall achieve a 7 dBA reduction?			yes		yes		no
Length of Wall = 1685-feet							
Cost per benefitted receiver			$112,333		$168,500		NA

[1]Number in parentheses is the number of residences represented by the receptor.

Area 11 Residence North of Highway 1/169 and East of Clear Lake. Receptor R69.

Receptor R69 represents a residence north of Highway 1/169 and eat of Clear Lake. A 248-foot long barrier along the north side of Highway 1/169 was modeled to mitigate noise impacts at these locations. The barrier did not achieve a modeled noise reduction of 7 dBA at this receptor location. A noise barrier is therefore not proposed for this location. Table 57 provides the details of the barrier mitigation analysis.

Table 57– Area 11 – Residence on North Side of TH 169 East of Clear Lake

Receptor[1]	L_{10} Nighttime Peak-Hour Levels (dBA)						
	No Wall	20′ Wall Analysis		15′ Wall Analysis		10′ Wall Analysis	
		Level	Reduction	15′ Wall	Reduction	10′ Wall	Reduction
R69(1)	62.1	60.8	1.3				
Number of receivers achieving 5 dBA			0				
Does wall achieve a 7 dBA reduction?			no				
Length of Wall = 248-feet							
Cost per benefitted receiver			NA				

[1]Number in parentheses is the number of residences represented by the receptor.

Noise Assessment Conclusions

Alternative 1

For Alternative 1, State nighttime standards are exceeded at 20 receptor locations. These receptors are scattered along the entire corridor. There are no exceedances of the daytime standard along the existing highway corridor.

An analysis of noise barrier mitigation for eleven impacted areas along the project corridor demonstrated that barriers will not meet MnDOT's cost-reasonableness criteria at any of the areas. Therefore, noise barrier mitigation is not proposed for Alternative 1.

Alternative 2A

For Alternative 2A, State nighttime standards are exceeded at 21 receptor locations. These receptor locations are generally on the east end of the project study area near Clear Lake. Additionally, along the new alignment section in the western segment of the corridor there are 4 additional receptor locations that will experience a modeled increase in noise levels exceeding 5 dBA. These receptors are on the north side of Sixmile Lake. This is adjacent to the portion of the project where the roadway is proposed to be realigned the furthest distance to the south.

An analysis of noise barrier mitigation for 11 impacted areas along the Alternative 2A corridor demonstrated that barriers will not meet MnDOT's cost-reasonableness criteria at any of the areas. Therefore, noise barrier mitigation is not proposed for Alternative 2A.

Alternative 3A

For Alternative 3A (Preferred Alternative), State nighttime standards are exceeded at 20 receptor locations. These receptor locations are generally on the east end of the project study area near Clear Lake. Additionally, along the new alignment section in the western segment of the corridor there are 4 additional receptor locations that will experience a modeled increase in noise levels exceeding 5 dBA. These receptors are on the north side of Sixmile Lake. This is adjacent to the portion of the project where the roadway is proposed to be realigned the furthest distance to the south.

An analysis of noise barrier mitigation for eleven impacted areas along the Alternative 3A (Preferred Alternative) corridor demonstrated that barriers will not meet MnDOT's cost-reasonableness criteria at any of the areas. Therefore, noise barrier mitigation is not proposed for Alternative 3A (Preferred Alternative).

Other Noise Abatement Measures

Other noise mitigation measures have been considered, as listed in 23 CFR 772.13(c) and are addressed below:

a. *Traffic management measures:* The primary purpose of the facility is to move people and goods. Restrictions of certain vehicles or speeds would be inconsistent with the purpose of the project.
b. *Alteration of horizontal and vertical alignments:* The project was realigned for practical reasons based on grade and safety. Further redesigning the horizontal and vertical alignments to minimize noise impacts would be impractical for this project.

c. *Acquisition of real property or interests therein (predominantly unimproved property) to serve as a buffer zone to preempt development that would be adversely impacted by traffic noise:* Acquisition of property or creating exclusive land use designations for noise mitigation purposes is not a part of the project scope. However, efforts could be made through local planning authorities to regulate land development in such a way that noise-sensitive land uses are either prohibited from being located adjacent to a highway, or that the developments are planned, designed, and constructed in such a manner that noise impacts are minimized.

d. *Noise insulation of public use or nonprofit institutional structures:* Noise insulation does not address the outside environment. Therefore, noise insulation is not proposed as a part of the project. Under MnDOT and FHWA guidelines, only public buildings such as schools and hospitals should be considered for acoustical insulation. No public buildings are located with the Highway 1/169 Eagles Nest Lake noise analysis study area.

18. Transportation

a. Describe traffic-related aspects of project construction and operation. Include: 1) existing and proposed additional parking spaces, 2) estimated total average daily traffic generated, 3) estimated maximum peak hour traffic generated and time of occurrence, 4) indicate source of trip generation rates used in the estimates, and 5) availability of transit and/or other alternative transportation modes.

The proposed project will not generate new trips but is being proposed in response to existing infrastructure conditions, mobility, and safety concerns along Highway 1/169.

b. Discuss the effect on traffic congestion on affected roads and describe any traffic improvements necessary. The analysis must discuss the project's impact on the regional transportation system. *If the peak hour traffic generated exceeds 250 vehicles or the total daily trips exceeds 2,500, a traffic impact study must be prepared as part of the EAW.* Use the format and procedures described in the Minnesota Department of Transportation's Access Management Manual, Chapter 5 *(available at: http://www.dot.state.mn.us/accessmanagement/resources.html)* or a similar local guidance.

This project is proposed to improve the safety and mobility of the existing transportation facility. Therefore, it would not result in negative impacts to the transportation system. Section II. Purpose and Need of this EA/EAW identifies the transportation and safety needs for the project and Section III Alternatives describes which needs are addressed by each of the alternatives in this EA.

c. Identify measures that will be taken to minimize or mitigate project related transportation effects.

The proposed transportation improvements associated with the three Build Alternatives will address present and future infrastructure conditions, mobility, and safety concerns. The No-Build Alternative would not address the mobility and safety concerns.

19. Cumulative potential effects:

(Preparers can leave this item blank if cumulative potential effects are addressed under the applicable EAW Items)

a. Describe the geographic scales and timeframes of the project related environmental effects that could combine with other environmental effects resulting in cumulative potential effects.

Minnesota Rule part 4410.1700, subpart 7, Item B requires that the RGU consider the "cumulative potential effects of related or anticipated future projects" when determining the need for an environmental impact statement. Identify any past, present, or reasonably foreseeable future projects that may interact with the project described in this EAW in such a reasonable way as to cause cumulative impacts. Such future projects would be those that are actually planned or for which a basis of expectation has been laid. Describe the nature of the cumulative impacts and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to these cumulative effects (or discuss each cumulative effect under appropriate Items(s) elsewhere on this form).

In addition to the state definition of cumulative potential effects described above, cumulative impacts are defined by the federal Council on Environmental Quality (CEQ) as "impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions" (40 CFR 158.7). The findings below pertain to both cumulative potential effects and cumulative impacts. In the discussion that follows, the terms "cumulative potential effects" and "cumulative impacts" are used interchangeably.

Cumulative potential effects are not necessarily causally linked to the Highway 1/169 Improvement Project. Rather, cumulative potential effects are the total effect of all known actions (past, present, and future) in the vicinity of the project with impacts on the same types of resources. The purpose of cumulative potential effects analysis is to look for impacts that may be individually minimal, but which could accumulate and become substantial and adverse when combined with the effects of other actions.

<u>Scope of Cumulative Potential Effects</u>

The cumulative potential effects analysis is limited to those resources, ecosystems, and human communities directly affected by the proposed project (i.e. wetlands, water quality, wildlife and vegetation, and noise).

The geographic scale of this cumulative potential effects analysis varies by the resource under examination, as described in EAW 19.c. (see below). The temporal scope of the analysis attempts to consider previous impacts to the resources that occur over time. The year 2034 was used as a reasonable planning horizon for comprehensive planning activities for the area and is used as the temporal horizon for assessing future cumulative impacts.

Past actions in the project vicinity include gravel mining, forest management, and residential development (both seasonal and year round). In addition, there have been transportation infrastructure improvements in the area. All these have resulted in the current state of the built and natural environments in the vicinity of the Highway 1/169 Eagles Nest Lake area project.

b. Describe any reasonably foreseeable future projects (for which a basis of expectation has been laid) that may interact with environmental effects of the proposed project within the geographic scales and timeframes identified above.

The projects listed below that were considered as future actions in this analysis are consistent with the Minnesota State Supreme Court Ruling regarding cumulative potential effects. The projects: 1) are either existing, actually planned for, or for which a basis of expectation has been laid; 2) are located in the surrounding area; and 3) might reasonably be expected to affect the same natural resource.

- MnDOT has several highway preservation projects (relatively low impact projects, with work generally within existing right-of-way) that have been programmed throughout the area including:
  - Highway 169 mill & overlay projects
  - Highway 1/169 roadway reconstruction projects (including the 13 Hills Area, approximately 10miles to the east of the proposed project).
  - Highway 1 Kawishiwi River Bridge Replacement
  - Highway 1 Flood Mitigation (reconstruction to raise roadway profile)

The general location and extent of these projects are illustrated in Figure 22.

- The MnDNR has been actively planning and designing improvements within the newly created Vermilion State Park located just west of the Highway 1/169 Eagles Nest Lake Project study area. The park will eventually offer camping, interpretive programs, hiking and biking trails and boardwalks, and other outdoor adventures. These park amenities will potentially impact several resources including Lake Vermilion, wetlands, bedrock, upland forest grasslands, and other wildlife habitat.
- An extension of the Mesabi Trail, a non-motorized recreational corridor, through the Eagles Nest Lake study area is in the scoping and early planning process. Plans prepared by the St. Louis- Lake Counties Regional Railroad Authority (SLLCRRA) identify an off-road extension of the Mesabi Trail from the new Vermilion Lake State Park (located just west of the Highway 1/169 Eagles Nest Project) to County Road 128/Bear Head Lake State Park Road. This trail extension is part of the 132-mile multi-purpose Mesabi Trail that will ultimately connect the Cities of Grand Rapids and Ely. A specific alignment has not been identified for the segment east of the Vermilion State Park, but MnDOT has been contacted regarding the possibility of using portions of the existing highway alignment for the trail extension if the highway improvements are constructed on a new alignment. The potential environmental effects of the trail corridor are anticipated to be relatively minor but could impact several natural resources including forestlands, wetlands, other wildlife habitat, and soil/bedrock excavation.
- St. Louis County and specifically Breitung and Eagles Nest Townships anticipate low levels of seasonal and year round residential development. These developments primarily occur along the shoreline of area lakes, but more and more "woodlot" developments are occurring in the area. No specific sites in the geographic scope area have been identified and these types of developments are commonly small scale (single lot) developments.

Tower Harbor Project is located several miles to the west of the Highway 1/169 Eagles Nest Lake study area. The project includes reconstruction of the Highway 1/169 Bridge (complete), realignment of TH 135 (complete), dredging of the East Two River between Lake Vermilion and the harbor/marina, and a mixed use development. The Tower Harbor Project has undergone environmental review and completion of the remaining elements of the project are anticipated in the future and will occur as economic conditions allow. The potential impacts are primarily focused in the area around the East Two River and Lake Vermilion, outside of the Highway 1/169 project area.

c. Discuss the nature of the cumulative potential effects and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to these cumulative effects.

Impacts from the Highway 1/169 Eagles Nest Lake Area Project have been discussed previously. The main project impacts are wildlife/vegetation, wetlands, water quality, and noise. Cumulative impacts to these resources from the proposed project and anticipated future projects listed above are discussed in the following sections.

Wildlife Habitat and Vegetation

Existing Conditions

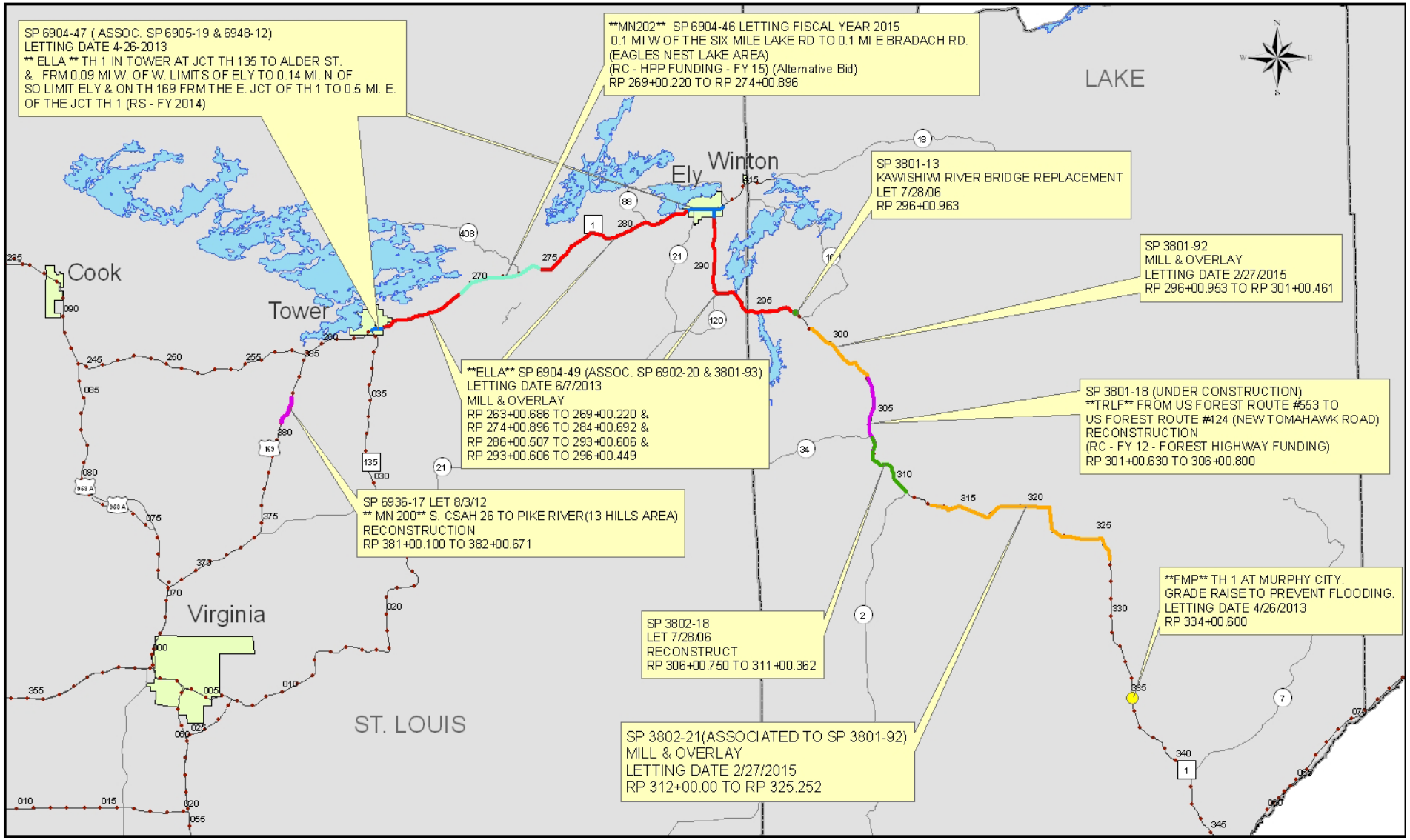
This portion of northeastern Minnesota is characterized by natural uplands comprised of northern mesic mixed forest. Several lakes and wetlands are also found throughout the Highway 1/169 Eagles Nest Lake Project Area and the surrounding region. Scattered seasonal and year round residential developments are present and tend to occur at higher densities surrounding area lakes. Where development has occurred in the study area, disturbances to vegetation and wildlife have also occurred. The health and abundance of wildlife populations is largely dependent on the quality and quantity of habitat available to support them. In the project vicinity there are substantial areas of natural vegetation and wildlife habitat. Especially in the vicinity of area lakes, the development has resulted in habitat fragmentation, reducing overall quality of wildlife habitat.

Threatened and endangered animal resources have been identified in the study area (see EAW Item 13.b).

Impacts from Proposed Action

Alternative 1 would have fringe impacts on vegetation and wildlife habitat within the vicinity of the existing roadway, while the western third of Alternative 2A and 3A have greater potential of impacting undisturbed areas with the realignment of the highway corridor.

Figure 22 – MnDOT Highway 1/169 Construction Projects



As documented in EAW Item 7. Cover Types, the Build Alternatives under consideration will impact wetlands and forested areas:

- Alternative 1 – 13.27 acres of wetland and 48 acres of upland forest
- Alternative 2A – 6.52 acres of wetland and 73 acres of upland forest; and
- Alternative 3A (Preferred Alternative) – 10.92 acres of wetland and 75 acres of upland forest.

Item 13 describes potential impacts to federally listed and proposed-for-listing species, including coordination with US Fish and Wildlife staff that will continue during project development to determine measures that could be used to minimize project impacts on the species.

Impacts from Other Actions

The known foreseeable future projects in the vicinity of the Highway 1/169 Eagles Nest Lake Project could result in loss of natural vegetation, forested areas, wetlands, and wildlife habitat. These impacts are likely be of the same overall scale as past transportation and land development projects in the area (i.e., relatively few proposed actions and individual actions would not be extensive in scale).

Cumulative Potential Effects

Based on the assessment of the potential for impacts above, extensive, substantial adverse cumulative impacts to vegetation and wildlife are not anticipated to result from the proposed project and foreseeable future actions.

Wetlands

Existing Conditions

Some wetlands in the vicinity of the project area have been affected directly or indirectly over time as a result of past human settlement/development, while others remain in their natural state.

Impacts from Proposed Action

As described in EAW Item 12. Physical Impacts on Water Resources, the Build Alternatives under consideration (Alternatives 1, 2A, and 3A) would potentially result in approximately 6.6 to 13.3 acres of permanent wetland impacts. These impacts would be mitigated in accordance with state and federal regulatory requirements either through banking and/or on-site mitigation.

Impacts from Other Actions

Some wetlands in close proximity to the project area may be affected by the foreseeable future projects. However, these impacts mitigated as required by state and federal regulations.

Cumulative Potential Effects

Wetlands in Minnesota are protected by Federal law (the Clean Water Act – Section 404) and State law (Minnesota Wetland Conservation Act and Executive Orders) that mandate "no net loss" of wetland functions and values. These federal and state laws

require the avoidance of wetland impacts when possible, and when avoidance is not possible, impacts must be minimized and compensated (mitigated). The Minnesota Wetland Conservation Act requires mitigation of wetland impacts be provided at a minimum 1:1 ratio. Therefore, no substantial cumulative wetland impacts are anticipated to result from the Highway 1/169 Eagles Nest Lake Area project plus other past or reasonably foreseeable actions.

Water Quality

Existing Conditions

Under existing conditions stormwater runoff from impervious surfaces typically drain across land and/or to vegetated ditches and, ultimately, to surrounding water resources (e.g. wetlands, Armstrong Creek, Armstrong Lake, Clear Lake).

Impacts from Proposed Action

As discussed in EAW Item 17, the proposed project would result in additional areas of impervious surface due to reconstruction of the existing roadway to accommodate wider shoulders and additional turn lanes. The alternatives that involve new alignment (Alternatives 2A and 3A) would have additional impervious area from the proposed realignment in the western segment of the project area.

Best management practices being incorporated into the roadway design include grass roadway side slopes and ditches, rock check dams, and infiltration areas that will pre-treat storm water runoff. These BMPs will help mitigate the adverse effects of the increased impervious surfaces. They will improve the quality of storm water being discharged compared to existing (untreated) conditions.

All of the Build Alternatives would require bedrock excavation. As described in Item 10 of the EAW, a process for characterizing rock to assess the risk for acid rock drainage and to determine appropriate BMPs to minimize and/or mitigate potential impacts has been identified in coordination with MnDNR and MPCA staff.

The use of the BMPs and mitigation described above and detailed in EAW Item 11.b.ii would avoid/minimize potential for surface water quality impacts from the proposed project.

Impacts from Other Actions

The foreseeable future actions may result in increased impervious surfaces and/or storm water quality/quantity (discharge rate) effects. However, these projects will be required to provide BMPs and/or mitigation in conformance with NPDES and/or watershed regulations, minimizing surface water impacts. Extensive bedrock excavation is not likely to be required for the other foreseeable future actions.

Cumulative Potential Effects

Federal, state, and local surface and groundwater management regulations require mitigation be provided in conjunction with proposed development and roadway projects. Given the design standards and management controls available for protecting the quality of surface waters, it is likely that potential impacts of the project, along

with other foreseeable actions, will be minimized or mitigated to a substantial degree. Therefore, adverse cumulative effects on water quality are not anticipated.

Traffic Noise

Existing Conditions

As previously stated, the average daily traffic volume on this segment of Highway 1/169 is 2,600 trips. Immediately adjacent to Highway 1/169, several areas currently experience noise levels that exceed state nighttime noise standards.

Impacts from the Proposed Action

As stated in Section 5.A.24 of the EAW form, the proposed action will have varying levels of noise impacts on surrounding properties. In some areas the proposed action would increase noise levels to greater than existing conditions (but not necessarily above state noise regulatory thresholds), while in other areas noise levels will be reduced. Noise abatement (noise barriers/walls) was considered but not deemed cost effective and therefore no barriers are proposed.

Impacts from Other Actions

Analysis of future traffic noise for the proposed project included forecast traffic increases that take foreseeable future development project traffic into account. Therefore, no additional, cumulative traffic noise would result from the future actions.

Cumulative Potential Effects

Based on the assessment of the potential for impacts above, adverse cumulative impacts to noise levels are not anticipated to result from the proposed project and foreseeable future actions.

Conclusion

The potential impacts to resources identified are either not significant and/or can be avoided or minimized through existing regulatory controls, as described above. During the development of this EA/EAW, no potentially significant cumulative impacts to the resources affected by the Highway 1/169 Eagles Nest Lake Area project have been identified.

20. Other potential environmental effects:

If the project may cause any additional environmental effects not addressed by items 1 to 19, describe the effects here, discuss the how the environment will be affected, and identify measures that will be taken to minimize and mitigate these effects.

Not applicable.

RGU CERTIFICATION. *(The Environmental Quality Board will only accept **SIGNED** Environmental Assessment Worksheets for public notice in the EQB Monitor.)*

I hereby certify that:

- The information contained in this document is accurate and complete to the best of my knowledge.
- The EAW describes the complete project; there are no other projects, stages or components other than those described in this document, which are related to the project as connected actions or phased actions, as defined at Minnesota Rules, parts 4410.0200, subparts 9c and 60, respectively.
- Copies of this EAW are being sent to the entire EQB distribution list.

Signature: _____ Date: 12-10-2014

Lynn Clarkowski, P.E.
Chief Environmental Officer
Office of Environmental Stewardship
Minnesota Department of Transportation

B. ADDITIONAL FEDERAL SOCIAL, ECONOMIC AND ENVIRONMENTAL ISSUES

This section details those environmental subject areas not addressed as part of the EAW form presented in Section V.A.

1. Section 4(f) of the Transportation Act of 1966

Section 4(f) legislation as established under the Department of Transportation Act of 1966 (49 USC 303, 23 USC 138) and as revised in 2005 by the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) [which included moving the Section 4(f) regulations to 23 CFR 774] provides protection for publicly owned parks, recreation areas, historic sites, wildlife and/or waterfowl refuges from conversion to a transportation use. The project has been reviewed for potential Section 4(f) involvement. The proposed project will not encroach onto any property protected by Section 4(f). As a result, Section 4(f) does not apply to the proposed project.

2. Section 6(f) of the Land and Water Conservation Fund Act of 1965

Protection is provided for outdoor recreational lands under the Section 6(f) legislation (16 USC 4602-8(f) (3)) where Land and Water Conservation (LAWCON) funds were used for the planning, acquisition or development of the property. The project has been reviewed for potential Section 6(f) involvement. The project will not use any outdoor recreational land acquired, planned, or developed with LAWCON funds. As a result, Section 6(f) does not apply to the proposed project.

3. Right-of-Way and Relocation

Acquisition of right-of-way would be required for all of the Build Alternatives considered. Alternative 1 would require the least amount of new right-of-way with approximately 35 acres needed, while Alternative 3A (Preferred Alternative) has the highest amount with approximately 86 acres of additional right-of-way needed. Alternative 2A would require approximately 82 acres. A number of assumptions were used to estimate the amount of right-of-way needed since the Build Alternatives considered are all still in a stage of preliminary design and final right-of-way needs are not known. Below is a list of methodologies/assumptions used in determining the amount of right-of-way needed for each of the Build Alternatives:

1. MnDOT maps were used in defining the limits of the existing Highway 1/169 right-of-way.

2. A 200-foot wide proposed minimum right-of-way (100-feet on each side of the centerline for each alternative) was used to determine the need of new and/or additional right-of-way. If the preliminary construction limits exceeded this distance the larger area was used.

3. If the proposed centerline of Highway 1/169 matched the existing highway alignment it was assumed that the currently right-of-way was sufficient and no new right-of-way would be needed.

Figure 23 shows the types of landowners (i.e., private/corporate, private/individual, and public) within the project area. No relocations are anticipated for any of the Build Alternatives. If during the final design process of the preferred alternative it is determined that relocation(s) are necessary, the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, and 49 CFR Part 24 will be followed, which provides that assistance be granted to persons, businesses, farms, and non-profit organizations that are displaced by public improvements, such as the Highway 1/169 Eagles Nest Lake Area Project.

The existing Highway 1/169 roadway was constructed on easements from property owners decades ago. The detailed terms of the easements vary for each parcel, and the terms are in the process of being assessed by MnDOT right-of-way staff. Some of the easements for the western portion of the corridor have clauses allowing the landowner to request that MnDOT vacate the easement on relatively short notice. All of the alternatives would require negotiation or re-negotiation of easements and/or property acquisition throughout the corridor.

4. Social and Community Impacts

Construction Period – Temporary Impacts

As described in Section III. Alternatives, the alternatives considered would have varying degrees of social and community impacts associated with construction detours resulting from the need to close Highway 1/169 in order to construct/reconstruct the improved highway section. This segment of Highway 1/169 is located in an area of northeastern Minnesota that is primarily rural with limited public infrastructure (roadway network). As a result, the only identified detour route would be approximately 39 miles utilizing Highway 135, County Road 21 and County Road 26. By comparison it is just under 22 miles between Tower and Ely via Highway 1/169. Figure 8 in Section III. Alternatives, depicts the likely detour route. As described in Section III – Evaluation and Screening of Level 3 Alternatives, the additional vehicle miles traveled and vehicle hours traveled would increase user costs and result in substantially increased travel times for area residents, businesses, visitors/tourists, school districts (busing of students), and would impact emergency service response across the region.

Alternative 2A proposes to reconstruct the eastern highway segment on the existing alignment to the extent possible. As a result, Alternative 2A would require extended periods when the highway would be closed and traffic would be detoured. While the entire eastern segment of the corridor would not likely need to be closed for the duration of construction, through traffic would be directed to follow a detour for the duration of construction of this segment resulting in substantial construction period impacts. Local access (not necessarily an improved highway corridor) to private properties and public roadways (e.g. County Road 128/Bear Head State Park Road, CR 599) would be provided. However, access would likely be limited from either the west (via Tower) or the east (via Ely), but not from both directions for extend periods of construction.

Several local agencies and stakeholders have raised concerns associated with extended closures of the highway to traffic during construction and detouring traffic. The severity of these temporary social and community disruptions/impacts is not easily quantified due to limited available data related to local economic conditions (sales receipts), travel patterns (origins/destinations), and frequency and location of emergency calls. However, the City of Tower and the Bois Forte Band of Chippewa Reservation (Fortune Bay Casino, Hotel, and Conference Center) have indicated that Highway 1/169 provides transportation system access to numerous businesses and that the local economy relies heavily on Highway 1/169 traffic passing through on the way to/from the eastern portions of Vermilion Lake, the City of Ely, and the Boundary Waters Canoe Area Wilderness (BWCAW). A letter from Bois Forte is included in the Alternatives memorandum in Appendix A of this document.

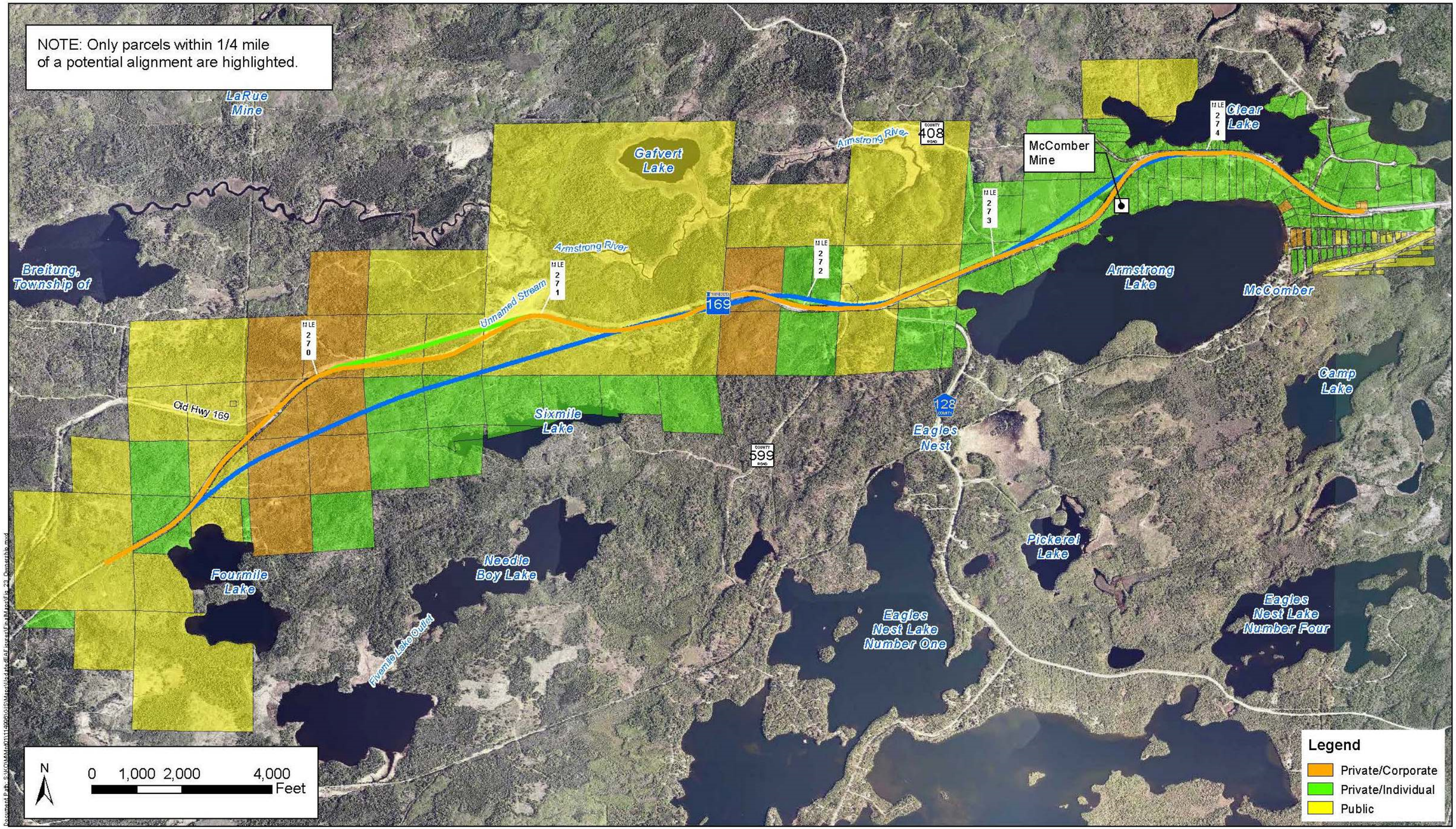
Alternatives 1 and 3A will have relatively minor social and community impacts during construction because these alternatives allow for the existing highway to remain open to traffic during construction. It is assumed there will be intermittent short-term closures that could temporarily impact movements through the project area and for access to some of the adjacent land uses. Also, mobility (travel speeds) along the corridor will be somewhat affected by short-term closures and in areas where construction activities are in close proximity to the existing road.

A detailed construction staging plan for the Preferred Alternative will be developed during final design indicating when and where detours would be needed and what level of access will be provided to adjacent properties.

Long-term Impacts

All of the Build Alternatives considered for this project would improve the existing roadway condition and mobility with the inclusion of added passing opportunities, turn lanes, and improved geometric design conditions and roadway surface (pavement). Therefore, the project would not cause any adverse long-term impacts to the surrounding communities. No categories of those uniquely sensitive to transportation (i.e. children, elderly, minorities, and/or persons with mobility impairments) would be affected by the project. Some residents adjacent to the project would experience minor changes in local road intersection configurations or driveway access, but these impacts would be minor.

Figure 23 – Ownership



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5. Considerations Relating to Pedestrians and Bicycles

The existing conditions in the project area have limited pedestrian and bicycle accommodations. The existing Highway 1/169 roadway within the project area has narrow shoulders and limited sight distance due to substandard horizontal and vertical curves, which are not conditions that are conducive to pedestrian and bicycle use.

All the alternatives considered would have 8-foot shoulders (6-foot paved, 2-foot gravel). All alternatives would also improve sight distance in the area, increasing visibility of both motor vehicles and pedestrians/ bicyclists using the corridor.

6. Environmental Justice

The purpose of Executive Order 12898 is to identify, address, and avoid disproportionately high and adverse human health or environmental effects on minority and low-income populations.

Background

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, dated February 11, 1994, directed that "each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its program, policies, and activities on minority populations and low-income populations in the United States…" 'Minority' and 'low income' are defined in the federal environmental justice guidance. Disproportionate is defined in 2 ways: the impact is "predominantly borne" by the minority or low-income population group, or the impact is "more severe" than that experienced by non-minority or non-low-income populations. This project has federal funding and federal permit requirements and is considered a federal project for purposes of compliance with the Executive Order.

Project Area Demographics

The first step in the environmental justice evaluation and documentation process is to determine if an environmental justice 'population' is present in the project area. Review of census data (i.e., race and income characteristics) is a useful starting point for this assessment. A map locating block groups and census tracts for the project area vicinity can be found in Appendix G.

Minority Populations

The information used in this analysis is from the 2010 Census. The smallest unit of Census data analysis is the block group. Minority data for the project area is summarized by census block group in Appendix G. The term "minority" is defined using race and ethnicity definitions from Census

2010[12]. Minority populations are identified when the minority percentage in a given block group exceeds the minority percentage of the county.

As indicated in the census data, the population in the project area is predominantly white, while minority populations comprise a very low percentage of the population. For the identified block groups within the project area, Census 2010 data indicate a minority population between 1.8 and 5.3 percent. The St. Louis County average is 7.0 percent. As such, the data does not indicate that minority 'populations' are likely within the project area.

Low-Income Populations

For the purposes of this study, the term "low-income" is defined as persons with incomes below the 2010 poverty level. Income data for the study area came from the year 2008-2012 American Community Survey (ACS) 5-year Estimates. Because these data are not available at the block group level, data from the census tract within the project area are reported. Low-income populations are identified when the percentage of low-income persons in a given census tract exceeds the percentage of low-income persons in the county.

As indicated in the ACS income data, the median household income of St. Louis County is $46,231 and 16.1 percent of persons within the County have income below the 2012 poverty level. For the identified census tract (Tract 154) within the project area, the ACS data reports 8.0 percent of persons with income below the 2012 poverty level. Since the low-income percentage of Census Tract 154 is less than that reported by St. Louis County, the data do not indicate that low-income populations are likely within the project area.

In addition to the review of census data, a field review was conducted for the project area. The area is characterized by low density single family homes and seasonal cabins. No developments that would appear to be 'communities' were identified in the project area.

Environmental Justice Analysis

Available census data and the field review did not indicate that minority and low-income populations are likely to be present in the project area. Therefore, a detailed analysis as defined by Executive Order 12898 is not required for the proposed action to determine if there are disproportionately high or adverse effects.

Environmental Justice Finding

The purpose of Executive Order 12898 is to identify, address, and avoid disproportionately high and adverse human health or environmental effects on minority and low-income populations. Project impacts are distributed evenly throughout the project corridor, and the proposed improvements

[12] Minority: Black or African American, Hispanic, Asian American, American Indian/Alaskan Native, and Native Hawaiian or Pacific Islander.

will not have disproportionately high or adverse human health or environmental effects on any minority population or low-income population.

7. Section 404 Permit

A Section 404 Individual Permit (IP) would be required for any of the Build Alternatives since there will likely be 5 acres or more of wetland impacts associated with the proposed project. Based on the preliminary estimates, the Preferred Alternative will have approximately 10.92 acres of wetland impact.

MnDOT has conducted Section 404 Pre-Permit Application meetings with the US Army Corps of Engineers (USACE). As described in Section VI.A.6, an informal NEPA/Section 404 process with the USACE and USEPA is also being used for this project; and the agencies have provided concurrence on purpose and need, range of alternatives, and the preferred alternative as part of this process. The USACE has also indicated that the preferred alternative would meet the Least Environmental Damaging Practicable Alternative (LEDPA) criteria in Section 404. Additional wetland discussion and details can be found in Section V.A.11.b.iv of this EA.

VI. PUBLIC/AGENCY INVOLVEMENT

A. PUBLIC AND AGENCY OUTREACH

The Highway 1/169 Eagles Nest Lake Area Project development process included a public and agency involvement program that was initiated at the on-set of the study, and was ongoing and active throughout the project development process. The target audiences for the involvement program include:

- Area Residents
- Highway 169 Advisory Group
- St. Louis County
- Commuters/Users
- Resource Agencies (MnDNR, MPCA, etc.)

There were several elements to the involvement program, each of which is detailed below.

1. Public Meetings

Several public informational meetings regarding the Highway 1/169 Eagles Nest Lake Area Project have been held dating to December 2008. The purpose of the early scoping meetings was to provide information to the public, receive comments, and answer questions regarding the proposed project. More recently, public meetings have been held in February 2013, March 2013, October 2013, May 2014, and October 2014 Participants have included area property owners/residents, business owners, the Highway 169 Task Force, and local officials. Verbal comments have been received during these meeting including preferences on the concept alternative(s), potential issues and impacts, and other project concerns. These meetings have been announced in local newspapers, through radio advertisements, and on MnDOT's website.

As noted in Section B. below, a public meeting will be held as part of the public comment period for this EA. The public meeting will provide an opportunity for attendees to ask questions and formally submit public comments verbally and/or in writing.

2. Project Management Team (PMT)

The project development process has been guided by a PMT consisting of staff from MnDOT District 1 – Duluth, MnDOT Office of Environmental Stewardship, and FHWA. The PMT has met on a regular basis throughout the project development process. The purpose of the PMT has been to guide the development of the alternatives, recommend project solutions, and to review and comment on the preliminary design and environmental documentation of the preferred roadway improvements.

3. Project Web Page

An informational project web page has been established at: http://www.dot.state.mn.us/d1/projects/Hwy169eagles/. The site

provides an additional means of distributing information. The site is periodically updated to reflect project developments, planning/design changes, and to address new issues.

Because of the level of interest/comment from some project stakeholders regarding the potential for water quality impacts related to rock excavation/ARD, MnDOT will continue to make information available to the public during final design and permitting. For example, as test results become available and as BMP decisions are made as a result of consultation with MnDNR and MPCA staff, the project website will be updated to provide the information to the public.

4. Summary of Early Coordination Comments

As a result of the above early coordination meetings plus correspondence received from stakeholders and public agency contacts, comments and concerns about the proposed project were received. The substantive comments and concerns received are summarized below:

- Comments were received with concerns over potential business impacts if substantial detour routing would be required for construction.
- Comments were received from landowners in the project vicinity with concerns regarding bedrock excavation and potential for acid drainage production and related water quality concerns from weathering of sulfides in the bedrock.
- Concerns were expressed about travel safety and that many run off the road type incidents go unreported.
- Comments were received regarding the need for improved passing opportunities since the corridor has higher levels of slow moving vehicles, especially during seasonal peak periods.
- Concerns were expressed regarding the existing steep ridge near the western limits creates seasonal conditions (winter) where the roadway is shaded most of the day and icy conditions are difficult to remove without the aid of sunlight.

This early coordination process has provided the opportunity for interested individuals to express their ideas and concerns. MnDOT will continue to cooperatively work with the public and other agencies to address these and additional concerns.

5. Cooperating Agencies

Cooperating Agencies provide input related to their relevant areas of expertise during the project development and NEPA document preparation process. The following agencies were invited by FHWA to be Cooperating Agencies for this project, and have accepted:

- U.S. Army Corps of Engineers (USACE)
- U.S. Environmental Protection Agency (USEPA)

6. NEPA/Section 404 Merger Process

In a process parallel to the Cooperating Agency input described above, MnDOT, FHWA, USEPA, and USACE have also agreed to follow an informal process that merges decision-making under the National Environmental Policy Act (NEPA) and Section 404 of the Clean Water Act. The NEPA/Section 404 Merger process recognizes that both NEPA and Section 404 review processes involve the evaluation of project purpose and need, the development of alternatives, the assessment of impacts, and the balancing/mitigation of impacts in a Preferred Alternative.

This coordination process, as listed below, is structured around 4 concurrence points to establish progress on the above-noted steps. The 4 concurrence points are: 1) Purpose and Need, 2) Range of Alternatives Considered, 3) Preferred Alternative, and 4) Mitigation of impacts.

Written concurrence was received in September 2014 from USACE and USEPA on the first two concurrence points (purpose and need and range of alternatives). Concurrence on the preferred alternative was received from both agencies in November 2014.

B. PUBLIC COMMENT PERIOD AND PUBLIC HEARING

A public hearing will be held during the EQB mandated 30-day public comment period for the EA/EAW. The public hearing will include a presentation of the proposed project alternatives and a summary of the environmental process to date, followed by an opportunity for the public to provide comments in writing or orally, for the project record. Comments will be received at the hearing and throughout the 30-day public comment period, and will become a part of the official project record.

C. REPORT DISTRIBUTION

Copy(ies) of this document have been sent to agencies, local government units, libraries, and others as per Minnesota Rule 4410.1500 (Publication and Distribution of an EAW).

D. PROCESS BEYOND THE PUBLIC COMMENT PERIOD

Following the comment period, MnDOT and the FHWA will make a determination as to the adequacy of the environmental documentation. If further documentation is necessary it could be accomplished by preparing an Environmental Impact Statement (EIS), by revising the Environmental Assessment, or clarification in the Findings of Fact and Conclusions, whichever is appropriate.

If an EIS is not necessary, MnDOT will prepare a Findings of Fact and Conclusions (FOF&C) and a Negative Declaration for the state environmental requirements. The FOF&C will identify any additional information that has become available since the publication of the EA/EAW. If the FHWA agrees that the EA is adequate and the project does not have the potential to result in significant environmental harm, it will issue a Finding of No Significant Impact (FONSI). Notices of the federal and state decisions and availability of the above documents/determinations, will be placed in the Minnesota Environmental Quality Board (EQB) Monitor. MnDOT will

distribute notification of the decisions to the EA/EAW distribution list and publish notices in local media announcing the decisions. Copies of these documents will be made available to the public upon request.

Because of the level of interest/comment from some project stakeholders regarding the potential for water quality impacts related to rock excavation/ARD, MnDOT will continue to make information available to the public during final design and permitting. For example, as test results become available and as BMP decisions are made as a result of consultation with MnDNR and MPCA staff, the project website will be updated to provide the information to the public.

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