

*Minnesota Department of
Transportation (MnDOT) Allied
Radio Matrix for Emergency
Response (ARMER)*

Environmental Assessment

USDA Forest Service
Superior National Forest
Gunflint, LaCroix, Kawishiwi, and Tofte Ranger Districts
Cook, Lake, and St. Louis Counties, Minnesota

September 2012

For additional information, contact: Todd Hess

8901 Grand Avenue Place
Duluth, MN 55808
(218) 626-4371

This page left intentionally blank.

Contents

CHAPTER 1 PURPOSE AND NEED	1
1.1 Document Structure	1
1.2 Introduction.....	1
1.3 Purpose and Need	2
1.4 Project Area	3
1.5 Proposed Action.....	3
1.6 Management Direction, Laws, Policy and Agreements.....	4
1.7 Decision To Be Made	5
1.8 Public Involvement.....	6
1.9 Tribal Involvement.....	7
CHAPTER 2 DESCRIPTION OF ALTERNATIVES	8
2.1 Introduction.....	8
2.2 Alternatives Analyzed in Detail.....	8
Alternative 2, Proposed Action.....	8
Figure 1. Existing snowmobile trail accessing Pine Mountain Site.....	9
Figure 2. Site of proposed Forest Center location.	10
Figure 3. Existing timber access road would be reconstructed.....	10
Figure 4. Existing 220 foot guy-wire at Fernberg.....	11
Figure 5. Existing 60 foot USFS tower at Meander Lake.....	12
Figure 6. Unclassified road U6977 would be reconstructed.....	13
2.3 Alternatives Considered But Not Carried Forward For Further Analysis	14
2.4 Alternative Comparison	16
Table 1. Comparison of environmental impacts of alternatives.	16
2.5 Monitoring	17
3.1 WILDERNESS	18
Table 2. Campsites, portages and lakes in BWCAW from which towers would be visible.....	23
3.2 NON-NATIVE INVASIVE PLANTS.....	26
Table 3. Non-native Invasive Plants known in the MNDOT ARMER Project Area	27
3.3 THREATENED, ENDANGERED, and SENSITIVE WILDLIFE SPECIES	29
3.4 HERITAGE.....	32
Figure 7. Footing of former fire lookout tower.....	33
3.5 INFRASTRUCTURE FOR PROJECT.....	34
Figure 8. Wind Turbine for towers.	35
Figure 9. MnDOT’s generator sound measuring test.....	36
3.6 WETLANDS.....	36

3.7 CIVIL RIGHTS 36

3.8 RECREATION 36

CHAPTER 4-APPENDICES..... 37

4.1 List of Preparers 37

4.2 Distribution Lists 37

4.3 References..... 38

CHAPTER 1 PURPOSE AND NEED

1.1 Document Structure

The Superior National Forest (SNF) has prepared this Environmental Assessment (EA) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This EA discloses the direct, indirect, and cumulative impacts that could result from the proposed action and alternatives. The document is organized into four chapters:

Chapter 1. Purpose and Need for Action: The chapter includes information on the history of the project proposal, the purpose of and need for the project, the agency's proposal for achieving that purpose and need and the decision framework. This section also details how the SNF informed the public of the proposal and how the public responded.

Chapter 2. Alternatives, including the Proposed Action: This chapter provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on issues raised by the public and other agencies. This discussion also includes mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.

Chapter 3. Affected Environment and Environmental Consequences: This chapter describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by issue and resource.

Chapter 4. Consultation and Coordination, Glossary and References: This chapter provides a list of preparers and agencies consulted during the development of the EA, a list of technical terms and their definitions and a list of references used in the EA.

Appendices: The appendices provide more detailed information to support the analyses presented in the EA.

Appendix A: Mitigation Measures

Appendix B: Biological Assessment and Evaluation

Appendix C: Visual Impact Report

Appendix D: Maps

Appendix E: Cumulative Actions

Additional supporting documentation may be found in the project planning record located at the Supervisor's Office, Duluth, MN and on the SNF website. The project record is considered an unpublished appendix to the Environmental Assessment.

1.2 Introduction

Chapter 1 describes the purpose and need for the proposed Special-Use application for new radio tower and communication site locations at Pine Mountain and Forest Center as well as replacing existing radio towers at Fernberg and Meander Lake. Chapter 1 also describes the proposed action,

Forest Plan direction for the special-use authorization, and an outline of issues related to the project identified through public and internal scoping.

Analysis of the project, initiated through the NEPA, provides the framework for determining the effects of the proposed developments. The analysis in this EA will consider potential direct, indirect, and cumulative environmental impacts associated with the proposed activities. The Minnesota Department of Transportation (MnDOT) Allied Radio Matrix for Emergency Response (ARMER) project would occur on four ranger districts of the Superior National Forest, therefore the deciding official will be the Forest Supervisor.

1.3 Purpose and Need

The purpose is to evaluate and consider approving a Special-Use Authorization to allow the Minnesota Department of Public Safety and Transportation to install, operate, and maintain four communication facilities, including radio towers, which will increase the public safety communication network known as the ARMER project. ARMER manages and implements the 800 MHz (megahertz) digital trunked radio communication system by the Minnesota Department of Public Safety and Transportation as indicated in Minnesota State Statute 174.70. When implemented, the system will provide emergency response personnel the means and ability to share information via voice and/or data systems on demand in real time. This includes every city, county, state agency, tribal government and non-government public safety entity operating in the state.

The ARMER radio system operates by line of sight, talking to other ARMER towers. In order for the system to operate effectively, multiple towers are needed to produce a solid blanket of coverage. Some of the last areas in rural or less populated regions of Minnesota lacking this coverage are near and within the Boundary Waters Canoe Area Wilderness (BWCAW). The design of this coverage system is the responsibility of the Statewide Radio Board:

Minnesota Statute 403.36 Subd. 1.e.- The Statewide Radio Board has overall responsibility for the statewide, shared radio and communication system project plan. The commissioner of public safety shall implement the plan adopted by the Statewide Radio Board.

The Statewide Radio Board (SRB) works with the counties of the region to determine the appropriate plan of operation. The SRB has determined a need for 90-95% regional coverage in this area, which includes the lands in the BWCAW. The communication sites proposed would nearly complete the blanket of coverage in this area. Other agencies would have the opportunity to rent space on the radio towers for communication equipment and systems. Potential agencies include Cook, Lake, and St. Louis Counties, the Forest Service, and possibly other government and commercial entities.

The four sites are referred to as: Pine Mountain, Forest Center, Fernberg, and Meander Lake. The proposed sites at Pine Mountain and Forest Center would be new communication sites and allow construction of new radio towers and facilities. The Fernberg and Meander sites are existing communication sites where the proposal would allow existing towers to be replaced with new towers and facilities. A detailed description of the actions for each site location can be found in Chapter 2 under Description of Alternatives.

1.4 Project Area

The project area includes four locations on the Superior National Forest where communication towers are proposed to be replaced or built, along with access routes and potential underground electrical utility line installation. See Map 1 Vicinity in Appendix D. None of these locations are within the BWCAW.

1.5 Proposed Action

Pine Mountain

Pine Mountain is located approximately 10 miles north of Grand Marais, Minnesota and six miles southeast of the nearest BWCAW boundary (see Map 2 Pine Mountain in Appendix D). Pine Mountain once held a Forest Service fire lookout. This structure was removed decades ago, leaving only the concrete footings and an overgrown road bed for access. The hill top is 2,190 feet above sea level. This parcel of land has been identified as part of a possible land exchange with Cook County in the future. If the tower is approved, Cook County is willing to accept the structure as an encumbrance on the land and continue the use of the land. The proposed action for Pine Mountain would involve identifying this location as a new communication site management area. The permit holder would construct a 180 foot radio tower with communication facilities and ancillary uses.

Forest Center

Forest Center is located approximately 10 miles north of Isabella, Minnesota and one mile south of the nearest BWCAW boundary (see Map 3 Forest Center in Appendix D). The Forest Center site was logged in 2010 during the Arrowhead timber contract in accordance with the Tomahawk EA. The proposed action for Forest Center would involve identifying this location as a new communication site management area. The permit holder would construct a 180 foot radio tower with communication facilities and ancillary uses.

Fernberg

Fernberg is located approximately 17 miles east of Ely, Minnesota and one mile north of the nearest BWCAW boundary (see Map 4 Fernberg in Appendix D). The Fernberg Tower has an approved Communication Site Management Plan, signed in 1987 by Clay Beal, Forest Supervisor. There is an existing 220 foot guy-wire radio tower with alternating orange and white painted bands and a red flashing light for nighttime illumination in accordance with FCC regulations. The current tower, owned by Lake County, is showing age and has limited structural capabilities to hold the weight of any additional radio equipment. The replacement of this tower is contingent on Lake County granting permission to MnDOT for implementation. In addition to the guy-wire tower, there are other existing facilities on the site which include: shelter to house current radio equipment, LP gas tank, US Forest Service radio tower, US Forest Service air monitoring equipment, and US Geological Service earthquake monitoring equipment. The proposed action would authorize the permit holder to replace the existing 220 foot guy-wire tower with a shorter 200 foot tower without guy-wires, dull grey in color, a medium intensity white strobe light for daytime illumination and a red flashing light for nighttime illumination.

Meander Lake

Meander Lake is approximately 25 miles northwest of Ely, Minnesota and half a mile east of the nearest BWCAW boundary (see Map 5 Meander Lake in Appendix D). The Meander Lake site is an existing Forest Service owned tower and facilities on the site. The proposed action would be to identify this location as a new communication site management area. The permit holder would remove the existing 60 foot tower and construct a new 180 foot radio tower with communication facilities and ancillary uses.

The construction of each site included in this project would be completed based on available funding and would likely begin as early as autumn 2012.

1.6 Management Direction, Laws, Policy and Agreements

Minnesota Statutes, 174.70 PUBLIC SAFETY RADIO COMMUNICATIONS.

Subdivision 1. Authority of commissioner. The commissioner of transportation may exercise the powers granted in this chapter and in sections 403.21 to 403.34, to plan and implement the communications system as provided in sections 403.21 to 403.34. This authorizes the Department of Transportation to plan, design and implement the ARMER system statewide.

Superior National Forest Land and Resource Management Plan (Forest Plan), 2004:

This project is consistent with implementation of the Forest Plan and the Environmental Assessment tiers to the Forest Plan Final Environmental Impact Statement (FEIS). All applicable Forest Plan Standards and Guidelines would be followed if an action alternative is selected. Relevant standards and guidelines were considered by Forest Service resource specialists and are evaluated in Chapter 3 and in the Biological Evaluation and Biological Assessment (see Appendix B).

The project meets the intent of Objectives for Special Uses O-SU-1 and O-SU-2 in the Forest Plan:

Outside of the BWCAW, generally provide for utility transmission corridors and communication sites. Emphasize the use of common corridors and multiple use sites when granting appropriate right-of-ways (O-SU-1).

Attempt to meet demand for special use activities when consistent with Forest Plan direction and when the proposed use cannot be accommodated on non-NFS land (O-SU-2).

Pine Mountain is located in the General Forest Management Area (MA) (*Forest Plan*, page 3-5). The desired conditions for facilities under this MA allow buildings and structures that provide support of resource management and allow occasional resorts, utility corridors, towers, dams, and similar structures (D-GF-12) and allow roads and bridges being one-lane surfaced with native soil or gravel to two-lanes and paved surfaces (D-GF-13). Standards and guidelines under General Forest MA state that most special-uses can be accomplished (G-GF-3). Thus, the Pine Mountain facility is appropriate for this MA.

The nearest BWCAW boundary to Pine Mountain is Semi-primitive Non-motorized Wilderness MA (*Forest Plan*, page 3-45). Desired social conditions under Semi-primitive Non-motorized Wilderness MA state the opportunities for experiencing isolation and solitude are moderate to low as these areas are generally on main travel routes. The frequency of encountering others in the area is moderate. The area contains maintained trails, portages and campsites. See Chapter 3, Wilderness for discussion on impacts to wilderness MAs.

Forest Center is located in the General Forest MA (*Forest Plan*, page 3-5). The desired conditions for facilities under this MA allow buildings and structures that provide support of resource management and allow occasional resorts, utility corridors, towers, dams, and similar structures (D-GF-12) and allow roads and bridges being one-lane surfaced with native soil or gravel to two-lanes and paved surfaces (D-GF-13). Standards and guidelines under General Forest MA state that most special-uses can be accomplished (G-GF-3). Thus, the Forest Center facility is appropriate for this MA.

The nearest BWCAW boundary to Forest Center is Primitive Wilderness MA (*Forest Plan*, page 3-44). Desired social conditions under Primitive Wilderness MA state the area provides excellent opportunities for isolation and solitude, relatively free from the sights and sounds of humans. The frequency of encountering others is low and these areas are generally off the main travel routes providing a high degree of solitude and challenge for those quite capable of traveling in a pristine area. The area contains maintained trails, portages and campsites. See Chapter 3, Wilderness for discussion on impacts to wilderness MAs.

Fernberg is located in the Semi-primitive Motorized Recreation MA (*Forest Plan*, page 3-24). Standards and guidelines under this MA state that special-uses are permitted that do not detract from the semi-primitive environment or uses needed to access or supply utilities to private land, recreational facilities, or administrative sites (G-SPM-3). These special-use conditions currently exist. The Fernberg site is a replacement of an existing 220 foot tower with a 200 foot tower. This replacement would slightly reduce adverse impacts on the semi-primitive environment in this MA and most recreation users in this Semi-primitive Motorized Recreation MA would be unlikely to note a change. Thus, the Fernberg facility is appropriate for this MA.

The nearest BWCAW boundary to Fernberg is Semi-primitive Non-motorized Wilderness MA (*Forest Plan*, page 3-45). Desired social conditions under Semi-primitive Non-motorized Wilderness MA state the opportunities for experiencing isolation and solitude are moderate to low as these areas are generally on main travel routes. The frequency of encountering others in the area is moderate. The area contains maintained trails, portages and campsites. See Chapter 3, Wilderness for discussion on impacts to wilderness MAs.

Meander Lake is located in the General Forest – Longer Rotation MA (*Forest Plan*, page 3-9). The desired conditions for facilities under this MA allow buildings and structures that provide support of resource management and allow occasional resorts, utility corridors, towers, dams, and similar structures (D-LR-12) and allow roads and bridges being one-lane surfaced with native soil or gravel to two-lanes and paved surfaces (D-LR-13). Standards and guidelines under General Forest – Longer Rotation MA state that most special-uses can be accomplished (G-LR-3). Thus, the Meander Lake facility is appropriate for this MA.

The nearest BWCAW boundary to the Meander Lake site is Primitive Wilderness MA (*Forest Plan*, page 3-44). Desired social conditions under Primitive Wilderness MA state the area provides excellent opportunities for isolation and solitude, relatively free from the sights and sounds of humans. The frequency of encountering others is low and these areas are generally off the main travel routes providing a high degree of solitude and challenge for those quite capable of traveling in a pristine area. The area contains maintained trails, portages and campsites. See Chapter 3, Wilderness for discussion on impacts to this MA.

1.7 Decision To Be Made

Based on the analysis documented in this EA, the Forest Supervisor will decide whether to approve the proposed action to install two new radio towers and replace two existing radio towers, to indicate if modifications to the proposal are needed, to identify any mitigation measures to minimize adverse environmental and social impacts of project implementation, and any monitoring of project implementation.

1.8 Public Involvement

Identifying issues related to the Proposed Action is accomplished by both internal and external solicitation to comment, also referred to as “scoping”. Public comments were solicited via legal notice in the Duluth News Tribune on May 15, 2012. The project proposal was also mailed to 25 adjacent landowners and the Forest-wide mailing list consisting of all individuals who have expressed interest in project proposals on the Forest. The project was listed in the third and fourth quarters of the 2012 Superior Quarterly, and the project was placed on the SNF internet website. Internal scoping was conducted by assembling an interdisciplinary team (IDT) of Forest Service employees in February of 2012 to identify issues related to the special-use applications.

1.8.1 Public Issues

Using the scoping comments from the public, other agencies, and organizations, the interdisciplinary team developed a list of issues to address. These concerns and suggestions were considered in the analysis and addressed as necessary in the EA, specialist reports or project file. The SNF separated the issues into two groups: issues that drive alternatives and issues that do not drive alternatives. Issues that do not drive alternatives were identified as those:

1. outside the scope of the proposed action
2. already decided by law, regulation, Forest Plan, or other higher level decision
3. irrelevant to the decision to be made
4. conjectural and not supported by scientific or factual evidence
5. are limited in extent, duration, and intensity

During the scoping period, twenty comments were received on the project from the public including individuals, organizations, and local government agencies. Some comments were outside of the scope of the project and were not investigated further. Some comments were in support of the proposed action. Several comments mentioned the desire to either limit or increase the agencies and companies allowed to operate on the towers. Other comments were concerned about noise produced from possible wind turbines and one comment was made about the noise produced by the generator. Several comments requested the construction be monitored to ensure it was being performed in accordance with any decision or authorization. A number of comments raised the question of visual impacts to the BWCAW due to tower height and location. Several of those visual impact concerns focused on the Fernberg tower having both daytime and nighttime lighting system. The lights themselves were expressed as a visual impact concern.

Based on public comment, one issue was identified that drove the formation of an alternative to the Proposed Action. This was the issue of visual impacts to the BWCAW, in particular from lighting. Alternative 3 addresses this issue. Also analyzed in Chapter 3 are the No Action Alternative (Alternative 1) and the Proposed Action (Alternative 2).

The following concerns were addressed prior to accepting the special-use application and are addressed in the analysis of this EA.

- Towers should be minimum height to serve the intended purpose – The original special-use application from MnDOT proposed the tower heights up to 330 foot. During meetings, site visits, and other forms of communications between SNF and MnDOT, tower height was reduced to the proposed height identified in this EA. The proposed height is considered adequate to meet the purpose and need for communications in the ARMER network.
- Perform a visual impact study - Both the Proponent and the Friends of the Boundary Waters Wilderness submitted visual impact studies that were reviewed by the IDT.

- Consider noise of electric generator – This was evaluated and will be mitigated if the special-use permit is authorized through the Proposed Action or Alternative 3
- Consider the noise disturbance of wind turbines – This was evaluated in Chapter 3 with no mitigation measures required.

See Section 2.3 for further discussion on how scoping comments were considered in formulating alternatives and conducting the analysis.

1.9 Tribal Involvement

Consultation letters were sent to the Boise Forte, Fond du Lac, and Grand Portage Bands of the Lake Superior Chippewa. No consultation was requested. The Bands were included in the scoping process. No comments were received from the Bands.

CHAPTER 2 DESCRIPTION OF ALTERNATIVES

2.1 Introduction

This chapter describes a no action alternative, a proposed action, and one action alternative. All alternatives will comply with policy, regulation, laws, and ordinances of the federal, state, county, and municipalities that are applicable to the area or operations covered by this proposal.

2.2 Alternatives Analyzed in Detail

Alternative 1, No Action

Under this alternative, the Forest Service would not authorize Special-Use Authorizations to construct new radio towers/facilities at Pine Mountain or Forest Center. The radio towers/facilities at Fernberg and Meander Lake would not be replaced or modified. Radio communication, particularly ARMER, would remain the same as it is currently, lacking in certain areas near and within the BWCAW.

Alternative 2, Proposed Action

Under this alternative, the Forest Service would approve a Special-Use Authorizations to replace, construct, operate, and maintain radio towers/facilities at the four sites. Specific actions at each site are as follows:

Pine Mountain

- The location of the site will be located approximately in the Northwest ¼ of the Southeast ¼ of Section 33, Township 63 North, Range 1 East, 4th Principal Meridian (Lat. 47°53'42.60"N, Long. 90°19'37.50"W). This location was adjusted to be approximately 180 feet southeast of the site identified by MnDOT. This eliminates any possible impact to historic remains of the former US Forest Service fire lookout.
- Identify this location as a new communication site management area by preparing and authorizing a Communication Site Plan.
- For access to the proposed tower site, an existing snowmobile trail leading to the site would have to be widened and improved, in turn, reconstructing the original road to Pine Mountain lookout tower. At a minimum, the road improvements would be completed in accordance with the Forest Service "Special Uses Road Construction Stipulation Requirements" (see Appendix A). It is likely that improvements beyond the minimum will need to be completed to provide access to the tower and facilities during construction and post-construction. The proposed access road location is a winter snowmobile trail and trail use will continue after the facility is constructed unless other agreements are made between MnDOT and the Forest Service. The extent of additional road improvements will be determined by the MnDOT's access needs. Access road construction at this location may include:
 - Clearing and tree/brush removal
 - Building the road bed by placing approximately 1-foot of pit run granular fill material
 - Placing additional fill¹ may be required in some locations along the route
 - Installing culverts as required to maintain drainage
 - Placing crushed aggregate surfacing as desired by user

¹ This fill would be for any ruts and puddles. Filling of wetlands is not proposed in this project.



Figure 1. Existing snowmobile trail accessing Pine Mountain Site.

- Reconstruct road to Pine Mountain.
- Electrical power lines may be installed underground adjacent to and following existing and the reconstructed road rights-of-way. The closest power company operating in the area is Qwest at approximately three miles from the site. If installed, this power line will be included on the existing Quest special-use permit as an amendment. Details and exact route of new power lines will be defined in the amendment to the existing special-use permit prior to installation.
- Construct a 3-legged, self-sustaining steel radio tower, being dull grey galvanized in color to minimize visual impacts.
- The height of the tower will be 180 feet. The tower will contain no FCC markings, lights, or strobes.
- A concrete shelter measuring 12' x 30' x 10' is to be located near the tower to house the communication equipment and a 15-34kV (kilovolt) back-up generator. The shelter is to be covered with brown stone aggregate finish to minimize visual impacts.
- Next to the shelter a 1,000 gallon LP tank measuring 10' x 4' is to be installed for fueling the generator.
- The entire site will be contained in a 50' x 60' area.
- The site will be surrounded by a 7-foot link fence and an additional 3 strands of barbed wire extending 1 foot above the fence. The fence includes a 4 foot pedestrian gate and a 16 foot drive-through gate.
- The ground surface of the fenced area will be covered with a 4-ounce polyester filter fabric to retard growth of weeds yet porous enough to allow water to pass to soil. Class 5 landscape rock will cover the entire area within the communication site.
- Vertical wind turbines and solar panels may be installed on the tower as an ancillary use for recharging battery power.

Forest Center

- The location of the site will be located approximately in the Northeast $\frac{1}{4}$ of the Northwest $\frac{1}{4}$ of Section 20, Township 61 North, Range 8 West, 4th Principal Meridian (Lat. 47°45'19.92"N, Long. 91°22'28.81"W).



Figure 2. Site of proposed Forest Center location.

- Identify this location as a new communication site management area by preparing and authorizing a Communication Site Plan.
- For access to the proposed tower site off of Forest Road 377(Tomahawk Road), improvements to an existing timber access road would be required. At a minimum, the road improvements would be completed in accordance with the Forest Service “Special Uses Road Construction Stipulation Requirements” (see Appendix A). It is likely that improvements beyond the minimum will need to be completed to provide access to the tower and facilities during construction and post-construction. Access road construction at this location may include:
 - Clearing and tree/brush removal
 - Building the road bed by placing approximately 1-foot of pit run granular fill material
 - Placing additional fill may be required in some locations along the route
 - Installing culverts as required to maintain drainage
 - Placing crushed aggregate surfacing as desired by user



Figure 3. Existing timber access road would be reconstructed.

- Electrical power lines may be installed underground adjacent to and following existing and the reinforced access road rights-of-way. The closest power company operating in the area is Cooperative Light and Power at approximately six miles from the site. If desired, this additional power line will be included on the existing Cooperative Light and Power special-use permit as an amendment. Details and exact route of new power lines will be defined in the amendment to the existing special-use permit prior to installation.

- Construct a 3-legged, self-sustaining steel radio tower, being dull grey galvanized in color to minimize visual impacts.
- The height of the tower will be 180 feet. The tower will contain no FCC markings, lights, or strobes.
- A concrete shelter measuring 12' x 30' x 10' is to be located near the tower to house the communication equipment and a 15-34kV back-up generator. The shelter is to be covered with brown stone aggregate finish to minimize visual impacts.
- Next to the shelter a 1,000 gallon LP tank measuring 10' x 4' is to be installed for fueling the generator.
- The entire site will be contained in a 50' x 60' area.
- The site will be surrounded by a 7-foot link fence and an additional 3 strands of barbed wire extending 1 foot above the fence. The fence includes a 4 foot pedestrian gate and a 16 foot drive-through gate.
- The ground surface of the fenced area will be covered with a 4-ounce polyester filter fabric to retard growth of weeds yet porous enough to allow water to pass to soil. Class 5 landscape rock will cover the entire area within the communication site.
- Vertical wind turbines and solar panels may be installed upon the tower as an ancillary use for recharging battery power.

Fernberg

- This site is located at the Southeast ¼ of the Southeast ¼ of Section 8, Township 63 North, Range 9 West, 4th Principal Meridian (Lat. 47°56'49.10"N, Long. 91°29'42.10"W).



Figure 4. Existing 220 foot guy-wire at Fernberg

- Remove the existing guy-wire tower at the site, retaining the existing concrete footings.
- Construct a 3-legged, self-sustaining steel radio tower, being dull grey galvanized in color to minimize visual impacts.
- The height will be 200 feet and contain a dual mode lighting system at the top of the tower in accordance with FCC requirements. This lighting system consists of a medium intensity white strobe light for daytime illumination and a red flashing beacon for nighttime illumination.
- A concrete shelter measuring 12' x 30' x 10' is to be located near the tower to house the communication equipment and a 15-34kV back-up generator. The shelter is to be covered with brown stone aggregate finish to minimize visual impacts.

- Next to the shelter a 1,000 gallon LP tank measuring 10' x 4' is to be installed for fueling the generator.
- The entire tower site will be contained in a 50' x 60' area.
- The site will be surrounded by a 7-foot link fence and an additional 3 strands of barbed wire extending 1 foot above the fence. The fence includes a 4 foot pedestrian gate and a 16 foot drive-through gate.
- The ground surface of the fenced area will be covered with a 4-ounce polyester filter fabric to retard growth of weeds yet porous enough to allow water to pass to soil. Landscape rock of class 5 will cover the entire area within the communication site.
- Vertical wind turbines and solar panels may be installed upon the tower as an ancillary use for recharging battery power.
- Modify the existing Communication Site Plan, once the site is constructed, to include all facilities on the site.

Meander Lake

- This site is located at the Northwest ¼ of the Northeast ¼ of Section 17, Township 65 North, Range 14 West, 4th Principal Meridian (Lat. 48°07'12.6"N, Long. 92°9'33.0"W).



Figure 5. Existing 60 foot USFS tower at Meander Lake

- Remove the existing 60 foot tower at the site, retaining the existing concrete footings.
- Identify this location as a new communication site management area by preparing and authorizing a Communication Site Plan once the site is constructed.
- For access to the proposed tower site, an existing overgrown road trail (unclassified road U6977) that leads to the site would be reconstructed. At a minimum, the road improvements would be completed in accordance with the Forest Service "Special Uses Road Construction Stipulation Requirements" (see Appendix A). It is likely that improvements beyond the minimum will need to be completed to provide access to the tower and facilities during construction and post-construction. The unclassified road U6977 had previously been identified to be decommissioned. This MnDOT ARMER decision would supersede the previous decision, providing access to the communication site and facilities. Sections of the road are steep and the extent of additional road improvements will be determined by the MnDOT's access needs. Access road construction at this location may include:
 - Clearing and tree/brush removal
 - Building the road bed by placing approximately 1-foot of pit run granular fill material

- Placing additional fill may be required in some locations
- Installation of culverts as required to maintain drainage
- Placement of crushed aggregate surfacing as desired by user.



Figure 6. Unclassified road U6977 would be reconstructed

- Electrical power lines may be installed underground adjacent to and following existing and the reconstructed unclassified road rights-of-way. The closest power company operating in the area is Lake Country Power at approximately 16 miles for the site. If desired, this additional power line will be included on the existing Lake Country Power special-use permit as an amendment. Details and exact route of new power lines will be defined in the amendment to the existing special-use permit prior to installation.
- Construct a 3-legged, self-sustaining steel radio tower, being dull grey galvanized in color to minimize visual impacts.
- The height of the tower will be 180 feet. The tower will contain no FCC markings, lights, or strobes.
- A concrete shelter measuring 12' x 30' x 10' is to be located near the tower to house the communication equipment. The shelter is to be covered with brown stone aggregate finish to minimize visual impacts.
- The entire site will be contained in a 50' x 60' area.
- The site will be surrounded by a 7-foot link fence and an additional 3 strands of barbed wire extending 1 foot above the fence. The fence includes a 4 foot pedestrian gate and a 16 foot drive-through gate.
- The ground surface of the fenced area will be covered with a 4-ounce polyester filter fabric to retard growth of weeds yet porous enough to allow water to pass to soil. Landscape rock of class 5 will cover the entire area within the communication site.
- Vertical wind turbines and solar panels may be installed upon the tower as an ancillary use for recharging battery power.
- A shelter, measuring 12' x 12' x 10' and covered with brown stone aggregate finish may be installed near C.S.A.H. 116 (Echo Trail) and set back into the woods to minimize visual impacts. The shelter would contain a 15-34kV back-up generator. The 1,000 gallon LP tank measuring 10' x 4' to fuel the generator will be located next to this shelter and painted in a camouflage pattern to minimize visual impacts. This would allow the LP tank to be easily filled on a regular basis. Electrical power lines would run slightly underground from the generator to the radio tower. The generator will assist in recharging batteries only when solar, wind, and electrical service power is unavailable due to weather or other conditions.

Alternative 3, Alternative to Proposed Action at Fernberg

Under this alternative, the Forest Service would approve a Special-Use Authorization to replace, construct, operate, and maintain radio towers/facilities at the four sites. Specific actions at Pine Mountain, Forest Center, and Meander Lake communication site locations are the same as outlined in Alternative 2.

Based on the data supplied by the proponent, the predicted communication coverage is approximately 8 to 9 miles for a 200 foot tower. According to MnDOT's report *180 ft. Tower vs. 200 ft. Tower*, the communication coverage for a 200 foot tower is about the same as for the 180 foot tower. Since there is little if any difference in communication coverage between the two heights, the Fernberg communication site would be a 180 foot tower. Specific actions at Fernberg communication site are as follows:

Fernberg

- Follow all specific actions associated with Alternative 2 (Proposed Action) except limit the height of the tower to 180 feet. This will eliminate the need for FCC markings, lights, or strobes.

2.3 Alternatives Considered But Not Carried Forward For Further Analysis

- *Consider other site locations*

The proponent initially proposed the following sites but these sites were denied by SNF:

- Cascade (T62N, R2W, Sec. 7) too close to the scenic byway
- Cascade Alternative (T62N, R3W, Sec. 24) suitable State land nearby
- Sawbill (T62N, R4W, Sec. 19) too close to BWCAW and entry point
- Sawbill Alternative (T61N, R5W, Sec. 12) suitable State land nearby
- Forest Center Original (T61N, R8W, Sec. 22) too close to BWCAW entry point

These denied sites are identified on Map 6 All FCC Towers.

- *Limit radio operations on the proposed towers to public agencies in support of the MnDOT ARMER radio system only and not allow leasing of tower space to private or for profit corporations*

This was not carried forward for further analysis because the scope of the project is confined to the construction of radio towers and related facilities. The Forest Service does not dictate who can sublease available space on a radio tower once it is constructed pursuant to FSH 2709.11 Ch.94.1 which states, "Under the agency's policy for communications uses, the proponent does not need agency approval to co-locate the proposed use in or on an existing authorized facility when the proposed use is compatible with the communications site management plan and existing communications uses at the site." (sec. 94.6; 60 FR 55090, Oct. 27, 1995; and 62 FR 68073, Dec. 30, 1997))

- *Increase radio/telephone operations on the proposed towers to include commercial communication equipment*

This was not carried forward for further analysis because the scope of the project is confined to the construction of radio towers and related facilities. The Forest Service does not dictate who can sublease available space on a radio tower once it is constructed pursuant to FSH 2709.11 Ch.94.1 which states, "Under the agency's policy for communications uses, the proponent does not need agency approval to co-locate the proposed use in or on an existing authorized facility when the proposed use is compatible with the communications site management plan and

existing communications uses at the site.” (sec. 94.6; 60 FR 55090, Oct. 27, 1995; and 62 FR 68073, Dec. 30, 1997))

- *Limit the height necessary to serve the intended purpose of the MnDOT ARMER system*
The original special-use application proposed from the proponent included tower heights up to 330 foot. Through discussions and site visits, MnDOT modified their application by reducing the tower height which is reflected in the Proposed Action of this EA. The lower height reduces the radio coverage, however it still meets MnDOT’s needs while minimizing visual impacts.
- *Consider designing the towers with tubular style framework instead of lattice style framework*
This was not carried forward for further analysis because the proponent supplied a tower design that meets or exceeds engineering specifications of health and safety.
- *Consider installing gates or barricades to access roads to prevent unapproved vehicular use*
This was not carried forward for further analysis because a road under a special-use authorization may have a gate installed upon the Authorization Holder’s request or if the Deciding Officer determines vandalism or natural resource damage is prominent. Vandalism and resource damage are not common at existing communication sites on the Forest. If this does become an issue at a later date, supplemental conditions may be added to the special-use authorization.
- *Minimize bird strikes*
This was incorporated into the proposed action by eliminating the guywires at Fernberg.
- *Consider allowing the MnDOT ARMER system to “piggy-back” on existing Forest Service radio system*
This was not carried forward for further analysis because the MnDOT ARMER system and the Forest Service radio system use different radio transmitters/receivers, base station equipment, data systems, and frequencies.
- *Consider co-locating some MnDOT ARMER systems on existing towers such as those along the Gunflint Trail*
MnDOT ARMER systems are currently co-located on 8 of the 11 communication management site locations on National Forest System lands, including the Gunflint Trail. These sites are identified in Map 6. To meet the desired coverage needs of the State Radio Board, additional towers are required near the BWCAW.
- *Minimize visual impact with color scheme*
The proposed action considered visual impacts by requiring towers to be dull grey in color, and facility buildings to be covered with non-reflective earth colored stone sides.
- *Consider designing the towers to resemble native trees in the area*
The minimum height for three of the towers is 180 feet. As a reference, a mature White Pine tree in the Superior National Forest grows to a height of 80-110 feet tall (as noted in the scoping packet). If a tower was designed to resemble other trees in the region, the tower might appear as a “super tree” being twice as tall as other trees in the area.
- *Consider a 199 foot tall tower instead of 200 foot tower in an effort to remain below the height necessary for FCC lighting regulations*

This was not carried forward for further analysis because radio towers are designed much like erector sets with each section being 20 feet long/high. Cutting the last foot off a section would not be feasible or structurally sound. In addition, the FCC considers the height to be the total combination of both the tower and the antenna above the tower structure. A 199 foot tower would contain an antenna that exceeds the 200 foot mark, in essence, requiring a lighting system. However, a 180 foot tower instead of 200 foot tower is considered in Alternative 3.

2.4 Alternative Comparison

Table 1. Comparison of environmental impacts of alternatives.

Impact	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 (shorter tower at Fernberg)
Visual Impact to BWCAW During Daytime	Contains daytime white strobe light at Fernberg	Contains daytime white strobe light at Fernberg. Meander Lake would be physically more visible. Pine Mountain and Forest Center would be new visual impacts to BWCAW	No white strobe light at Fernberg
Visual Impact to BWCAW During Nighttime	Red flashing light at Fernberg	Red flashing light at Fernberg	No red flashing light. Night time impacts reduced from current condition
Invasive Plants	Some impact from continued use	Some impact from additional use	Some impact from additional use
TES Wildlife	Possible bird strikes from existing guywires and stationary structure at Fernberg	Eliminates bird strikes from guywires but still possible bird strikes from stationary structures	Eliminates bird strikes from guywires but still possible bird strikes from stationary structures
Heritage Sites	No impact	No impact	No impact
Soil Erosion	No impact	Possible impact of erosion requiring mitigation	Possible impact of soil erosion requiring mitigation

2.5 Monitoring

Initial monitoring would include oversight of contractors to ensure that all design and environmental specifications identified in the Special-Use Road Construction Stipulations and other items identified in the EA (see Appendix A Mitigations) are adhered to and followed during construction. Some of these items would include but are not limited to:

- Location on Pine Mountain to not impact possible heritage sites.
- All road reconstruction to prevent erosion and possible water quality impacts.
- Preventive measures to limit non-native invasive plants.

If and when a special-use authorization is issued, yearly inspections performed by the Special-Use Administrator will ensure the Holder follows all terms and conditions set forth in the special-use authorization. Some of these terms and conditions include but are not limited to:

- Preventive measures to limit non-native invasive plants.
- Preventive measures to limit vandalism.
- Prevent disturbance of heritage sites.

CHAPTER 3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the environmental effects to the resource if either Alternative 2 (Proposed Action) or Alternative 3 (Proposed Action with Mitigation) are implemented. It provides the basis for the comparison of the alternatives with the Alternative 1 (No Action). Chapter 3 also considers the direct, indirect, and cumulative effects of the project proposal to adjacent and surrounding resources. Actions considered relevant for cumulative effects are discussed in Appendix E. Cumulative effects analysis for each resource considers these and any other projects specifically discussed in Chapter 3.

3.1 WILDERNESS

3.1.1 Introduction

The BWCAW is a natural area located in the northern third of the Superior National Forest in northeastern Minnesota with a contiguous border along Canada's Quetico Provincial Park, also managed as a wilderness area.

The total acreage within the BWCAW is 1,098,057. Approximately 1175 lakes varying in size from 10 to 10,000 acres with several hundred miles of streams comprise about 190,000 acres (20 percent) of the BWCAW surface area. The BWCAW has approximately 80 entry points, 1200 miles of canoe routes, 12 hiking trails, and 2,000 designated campsites. It offers freedom to pursue the expansive opportunities of solitude and personal or primitive challenges. In the winter months visitors also enjoy opportunities for skiing, dog-sledding, snowshoeing, camping and ice-fishing. The BWCAW is also one of the most heavily used wilderness areas managed by the Forest Service with an average of 34,000 reserved permits annually, and over 250,000 visitors a year.

The analysis for the BWCAW considers how this project and alternatives would impact wilderness character. Wilderness character may be described as the combination of biophysical, experiential, and symbolic ideals that distinguishes wilderness from other lands. These characters combine to form a complex and sometimes subtle set of relationships among the land, its management, and the meanings people associate with wilderness. The primary resource to be analyzed is the character of the wilderness and any visual impacts created by the project.

3.1.2 Analysis Methods

The analysis methods used to measure the effects of this project on the wilderness character resource will emphasize the difference between the No Action and Action alternatives.

The Project Area is near, but not inside of, the wilderness. This analysis considers how any of the actions proposed outside the wilderness would affect the wilderness.

The Forest Service has developed guidelines and methods for wilderness character monitoring. The purpose of monitoring is to provide managers with a tool they can use to answer key questions about wilderness character and stewardship, such as: what is the current state of wilderness character, how is it changing over time, and how do stewardship actions affect and best preserve wilderness character? The guidelines and methods are documented in the General Technical Report "Monitoring Selected Conditions Related to Wilderness Character": a National Framework (USDA Forest Service 2005). The Wilderness Act of 1964 mandates the Forest Service to preserve wilderness character as a whole, not just maintain four separate qualities of wilderness. Synthesizing this information also yields a more holistic picture that is a more powerful and effective tool for

communicating trends of wilderness character to a broad audience, including the public, agency decision-makers and policymakers, and legislators (Failing and Gregory 2003).

The framework defines the four qualities of wilderness as:

- **Untrammeled** - The Wilderness Act states that wilderness "[is] an area where the earth and its community of life are untrammeled by man," and "generally appears to have been affected primarily by the forces of nature." This quality monitors human activities that directly control or manipulate the components or processes of ecological systems inside wilderness. The untrammeled quality is unaffected by this project since no actions are taking place inside the wilderness (e.g. prescribed fire) which might manipulate components or processes of ecological systems inside the wilderness. Thus, this quality is not carried forward for further analysis.
- **Undeveloped** - The Wilderness Act states that wilderness is "an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation," "where man himself is a visitor who does not remain" and "with the imprint of man's work substantially unnoticeable." This quality monitors the presence of structures, construction, habitations, and other evidence of modern human presence or occupation. The undeveloped quality is unaffected by this project since no structures, habitations or other occupation inside the wilderness is created by this project. The towers and supporting infrastructure are located outside the wilderness. Thus, this quality is not carried forward for further analysis.
- **Natural** - The Wilderness Act states that wilderness is "protected and managed so as to preserve its natural conditions." This quality monitors both intended and unintended effects of modern people on ecological systems inside a wilderness since the area was designated. The natural quality of wilderness character may potentially be impacted by actions located outside the wilderness through impacts to water quality, wildlife, and invasive species spread. While the potential impacts of this project to the natural quality are limited by the scope of the project and the distance to the wilderness, these impacts are considered in the wildlife, non-native invasive plants, and infrastructure sections of Chapter 3.
- **Solitude or a Primitive and Unconfined Type of Recreation** - The Wilderness Act states that wilderness has "outstanding opportunities for solitude or a primitive and unconfined type of recreation." This quality monitors conditions that affect the opportunity for people to experience solitude or primitive, unconfined recreation in a wilderness setting. Managers and nature provide opportunities; recreational visitors create experiences (Roggenbuck 2004). An indicator of monitoring trends of this quality is remoteness from occupied and modified areas outside the wilderness, such as communication towers visible from within the BWCAW. This quality can be degraded by settings that reduce opportunities for solitude or a primitive and unconfined type of recreation, such as signs of modern civilization adjacent to wilderness.

The Solitude or Primitive and Unconfined Type of Recreation quality is the primary quality that is evaluated for impacts by the project because it directly relates to how the visibility of communication towers from inside the wilderness could affect opportunities for solitude provided by and expected in a wilderness setting. The conditions necessary for solitude often refer to some degree of separation in sight, sound, and distance ...from within the wilderness and from outside the wilderness (Dawson 2004). Given the complexity of human interactions with their environment and other people, the intent of monitoring this quality is not to understand people's experiences, perceptions, or motivations in wilderness, but instead to focus on the mandate in the Wilderness Act

to provide outstanding opportunities and to monitor how these opportunities are changing over time (USDA FS 2008).

Tower Visualization Analysis Method

There were two different visualization studies submitted for referencing visual impacts for this project. The Minnesota Department of Transportation supplied the *Visualization Study* (dated 2012) covering all four tower locations with the height of each tower as proposed. The Friends of the Boundary Waters Canoe Area Wilderness supplied the Viewshed Analysis by Hayes Surveying & Mapping PC (dated 2010) which identified a possible 450 foot tower at the Fernberg communication site location only. Both the MnDOT and Hayes Surveying & Mapping PC used a “Line of Sight” analysis method listing site observation points or areas on maps, graphs, or both.

The MnDOT study reports there are multiple factors that may affect the visual perception of objects: distance, object size, visual line of sight, observation time, and direction. Perception of an object requires the observer to be positioned within the viewing distance of the object. Visual acuity for a person with 20/20 vision is considered to be the ability to discern objects of 1 arc minute in size. The distance at which MnDOT’s typical communication tower would present an object of 1 arc minute is 7 miles. Beyond this distance vision better than 20/20 or visual aids would be required to perceive the tower. The observer must have an unobstructed view “Line of Sight” to the object. This calculation does not take into consideration vegetation or tree loss due to logging, forest fires, or other natural forces of nature beyond MnDOT’s control. The observer must have time to perceive the object. The greater the distance from the object the longer the time that is required to perceive the object. A traveling observer at a distance from the tower site, conceivably will not be looking in a precise direction for a sufficient amount of time to perceive the object. A stationary observer would be able to perceive the tower from a greater distance. The amount of time required to perceive the tower is significantly reduced by the presence of aviation obstruction lighting and paint markings. The MnDOT Engineers used ESRI ArcMap 9.3.1 software and USGS topographical maps to identify the site observation points and areas.

The Hayes Surveying & Mapping PC study for visual impacts of a 450 foot tower used elevations and distances derived from USGS 1:24,000 quadrangle maps. They estimate that elevation data derived from these maps is accurate \pm five feet. No physical reconnaissance of the area was made. Air photos from 2009 were consulted, but it was not possible to determine the specific effect of tree cover at each site. This study report was not used for this EA because the visual impacts described in the study were for a 450 foot tower which is greater than twice the height of any of the proposed towers and only references one of the four proposed communication site locations of the project.

Indicator

An indicator for outstanding opportunities for solitude inside wilderness is remoteness from occupied and modified areas outside the wilderness. Opportunities for solitude and primitive experiences are affected by many events and conditions well beyond the wilderness boundary as well as inside the wilderness. Remoteness, meaning distance from the sights and sounds of civilization, is important for achieving a sense of solitude (Dawson 2004). In addition, research shows that most wilderness visitors stay on developed trails and that a large proportion of use is concentrated within a few miles of trailheads or access points, especially where day use makes up much of the visitation (USDA FS 2009), and the communication tower sites are near and visible from areas such as this.

Measure

A measure for this indicator is the number of sites of where the tower is visible from within the BWCAW. For this analysis, the effects from the tower structure itself and the lighting system for Fernberg under Alternatives 1 and 2 (a medium intensity white strobe light for daytime illumination and a red flashing beacon for nighttime illumination) are evaluated by the view of modern civilization at receptor sites, and the meaning of these effects on the opportunity for solitude in the BWCAW.

3.1.3 Analysis Area

The analysis area for direct, indirect and cumulative effects of wilderness for this project will focus on land of all ownerships in the BWCAW within the 7 mile radius around each tower location as indicated on the MnDOT's Visualization Study, maps, and graphs.

The timeframe for the direct, indirect and cumulative effects analysis is for the life span of the towers. Such a tower could have an estimated life span of 20-50 years, depending on environmental conditions and technology. As long as the towers are present, they will be visible from various locations within the BWCAW.

3.1.4 Affected Environment

The *Forest Plan* (page 3-66) Wilderness Chapter states that the desired future conditions of both the physical and social aspects of the wilderness resource differ slightly between management areas that help describe the key receptor sites below. This establishes a framework, along with the wilderness character framework, for managers allowing them to provide a range of wilderness opportunities for the public while maintaining the overall goals of preservation. The wilderness has been divided into four different MA (*Forest Plan*, pages 3-43 through 3-47):

Pristine Wilderness: Areas of pristine wilderness provide outstanding opportunities for isolation, solitude and risk, and are relatively free from the evidence of contemporary human activities. The frequency of encountering others is rare and trails, portages and campsites are not constructed or maintained.

Primitive Wilderness: This area provides excellent opportunities for isolation and solitude, relatively free from the sights and sounds of humans. The frequency of encountering others is low and these areas are generally off the main travel routes providing a high degree of solitude and challenge for those quite capable of traveling in a pristine area. Area contains maintained trails, portages and campsites.

Semi-primitive Non-motorized Wilderness: Opportunities for experiencing isolation and solitude are moderate to low as these areas are generally on main travel routes. The frequency of encountering others in the area is moderate. The challenge and risk in these areas is moderate to low. Area contains maintained trails, portages and campsites.

Semi-primitive Motorized Wilderness: Opportunities for experiencing solitude and isolation are low. Motorized watercrafts are permitted and will be noticeable along major travel routes and portages and near major entry points. The frequency of encountering others is moderate to high. Area contains maintained trails, portages and campsites.

The following identifies the MA within the affected wilderness analysis area for each site location.

- Pine Mountain: Semi-primitive Non-motorized Wilderness
- Forest Center: Pristine Wilderness and Primitive Wilderness
- Fernberg: Pristine Wilderness, Primitive Wilderness, Semi-primitive Non-motorized Wilderness, and Semi-primitive Motorized Wilderness
- Meander Lake: Primitive Wilderness, Semi-primitive Non-motorized Wilderness, and Semi-primitive Motorized Wilderness

Research reveals that there are 17 threats to wilderness resources and values, five of which involve primitive experiences: excessive administrative access, facilities, and intrusive management; advanced technology; trespass and legal use of motorized and mechanical equipment; aircraft noise from aircraft over flights, and urbanization encroaching on the wilderness boundaries (Hendee and Dawson 2001).

The visibility of natural surroundings, or the lack of visibility of civilization, contributes to the important social values in wilderness of humility and being part of something larger, and strongly contributes to the wilderness character of an area (USDA FS 2008). Wilderness managers cannot reduce all views of modern civilization affecting wilderness, but they can take actions at administrative sites and work with local communities (USDA FS 2008) to prevent the degradation of this quality and enhance the quality tourists to the area seek. Even remote areas are being exposed to effects from modern civilization. For example, an emerging concern is increased illumination from light pollution or "sky glow," from the combined lights of cities and towns, which include lighted cell towers that are sometimes hundreds of miles away that produce a dull glow in the night sky. The propagation of this light pollution from sources to outlying areas can negatively affect wilderness character (UM, ACNWTC, ALWRI 2012). Researchers warn that without serious control of light pollution, places with truly dark nights, such as wilderness areas, will see degraded night sky quality in less than 20 years. However, there is reason to be optimistic. "Unlike losing a species to extinction, topsoil to erosion, or yet-to-be explored virgin lands to development, the night sky is 100% recoverable"(Durisco 2001). A sky view without signs of modern civilization will be a legacy for future generations.

In a recent study (Schneider 2010) on constraints to visiting the BWCAW, visitors described constraints of time and access causing shortened experiences, base-camping, and reduced opportunities for solitude. Because the periphery of the BWCAW is quite busy in the summer months, often a visitor must move into the interior to find better opportunities for solitude and since time is often a constraint, visitors linger near the periphery which not only allows them to encounter more people, but it increases their chances of experiencing the effects of occupied and modified areas outside the wilderness diminishing their sense of remoteness. Visits to wilderness in general are becoming shorter and closer to home, and thus an increasingly large percentage of all wilderness visits are for a day or less. Simply going further into the interior to escapes views of the towers may not be possible due to these time constraints as well as the thick brushy vegetation in this type of ecosystem.

There are currently 18 radio towers within seven miles of the BWCAW boarder. Nine of these existing towers contain FCC lighting systems. By using the Visual Impact parameters supplied by MnDOT, it can be reasonably assumed any of these towers are visible from the BWCAW. Other existing visual impacts include roads, entry points, and structures near the BWCAW. Ongoing aircraft flights also generate occasional visual impacts.

3.1.5 Environmental Consequences Direct and Indirect Effects

Alternative 1 (No Action)

No new towers or facilities would be constructed. There would be no known changes in visual impacts to wilderness at the four project locations. The existing Fernberg tower would remain at 220 feet, and would remain visible from within the wilderness both during the day and at night with the existing lights. Other existing visual impacts to the wilderness would continue at similar levels to the present condition² discussed under Affected Environment.

Alternative 2 (Proposed Action)

The MnDOT Visualization Study was used to identify the line of site observation points for recreation locations within the BWCAW where each proposed communication tower could be viewed during daylight hours. During night hours, only the Fernberg 200 foot tower would be seen due to a lighting system.

Table 2. Campsites, portages and lakes in BWCAW from which towers would be visible.

Tower	BWCAW Lake/River/Trail	Campsites	Portages	On Lake Only
Pine Mountain	Ram Lake S. SE.	1		

Tower	BWCAW Lake/River/Trail	Campsites	Portages	On Lake Only
Forest Center	Isabella Lake N. NE.	4		
	Isabella River	1		
	Bog Lake	4		
	Island River			yes
	Quadga Lake	4		
	Cargo Lake			yes
	Boga Lake	1		

Tower	BWCAW Lake/River/Trail	Campsites	Portages	On Lake Only
Fernberg 180/200 (visual impacts for both heights are so similar one table is being used)*	Snowbank Lake and Trail	12		
	Grub Lake	1		
	Wooden Leg Lake			yes
	Lake One S. SW.	8		
	Lake Two S. SW.	7		
	Lake Three	7	1	
	Rock of Ages Lake	1		

² It is possible that MnDOT may eventually identify lands on other ownerships for the ARMER towers under the No Action Alternative. It is uncertain if or where this would occur and is not considered reasonably foreseeable.

Path Lake	1		
Parent Lake S. SE.	1		
Kekekabic Trail	1		
Witness Lake			yes
Kawishiwi River	7	5	
S. Kawishiwi River	6	1	
Moose Lake	2		
Wind Lake to Wind Bay		1	

*At night, the 180 foot tower would not be seen. The 200 foot tower would have a light system that would cause a red light to be seen at night.

Tower	BWCAW Lake/River/Trail	Campsites	Portages	On Lake Only
Meander Lake	Ramshead Lake N. and E.	2		
	Ramshead Creek		1	
	Nina Moose Lake N. Central and NE.	3		
	Meander Creek S.			yes
	Mule Creek			yes
	Mute Creek			yes
	Upper Pauness Lake N. Central	2		
	Wetland E. of Shell Lake			yes
	Shohola Lake and Creek			yes
	Manes Nord Creek W.			yes
	Portage River			yes
	Bill Creek			yes
	Woksapiwi Lake			yes
	Unnamed Lake between Shell and Agawato Lakes			yes
	Area between Little Indian Sioux River and Urho and Ted Creeks			yes
	Bootleg Lake S. Central W.	1		
	NW. of Bootleg Lake			yes
	Bezhik Creek			yes
	Unnamed lakes and Wetlands W. of Big Moose Lake			yes
Big Moose Lake S.E.	1			

New towers and associated facilities would be constructed at Pine Mountain and Forest Center. These would have a height of 180 feet and contain no FCC markings, lights, or strobes. The Pine Mountain Tower would result in very little additional visual impacts to the BWCAW compared to Alternative 1 (possibly at one campsite at Ram Lake). The Forest Center Tower would be noticeable from several points in the BWCAW (e.g. Isabella and Bog Lakes).

The existing tower at Meander Lake would be replaced with a new tower and associated facilities. This would have a height of 180 feet and contain no FCC markings, lights, or strobes. This would have a greater visual impact than Alternative 1 due to the increase in tower height. The existing tower at Fernberg would be replaced with a new tower and associated facilities. This would have a height of 200 feet and contain FAA lighting system. The Fernberg tower would result in nearly the same visual impact of the lighting system as identified for Alternative 1.

The direct effects of seeing a tower and its lighting system (medium intensity white strobe light for daytime illumination and a red flashing beacon for nighttime illumination) from the wilderness may negatively impact a visitor's consciousness, nostalgia, or connection with early people, skills of exploration and travel in wild places, and connecting with nature's processes and ecology (Roggenbuck 2004). The indirect effects of seeing a tower and its lighting system from the wilderness may negatively impact a visitor's consciousness and thoughts of becoming hardy in body and mind, self-reliant, self-confident, becoming a part of the wild or an ecological citizen, developing respect for nature, and increasing humility and joy (Roggenbuck 2004).

Alternative 3 (Alternative to Proposed Action at Fernberg)

Under Alternative 3, the communication site locations for Pine Mountain, Forest Center, and Meander Lake would be the same as noted in Alternative 2. However, the Fernberg communication site would be lowered to 180 feet. By lowering the height, the need for FCC markings, lights, or strobes, is eliminated.

Adverse impacts to wilderness character values and visual effects from Alternative 1 and 2 would be reduced by the lowered height of the Fernberg tower in Alternative 3, in particular at night. During the night hours, the tower would not be visible since a red flashing light would not be required.

The daytime visual impacts would be very similar for both Alternative 2 and 3, yet there would be no medium intensity white strobe light during the day at Fernberg under Alternative 3. According to the MnDOT Visualization Study, of the 1 million lines of site profiles calculated around the Fernberg tower within 7 miles, 2.51% of these profiles present an unobstructed view of the 180 foot tower. The study reports that the visual difference between a 200 foot tower and 180 foot tower is "minimal", and that the variance is .31% less visualization points. The impact is so similar, Table 2 was used to show Fernberg at both heights identified for Alternatives 2 and 3.

3.1.6 Cumulative Effects

Past, Present, and Reasonably Foreseeable Management Actions

Human disturbance of the visual landscape in the BWCAW occurs on an occasional basis in the form of visible aircraft. These aircraft may be fire patrol operated by the Forest Service, or other aircraft outside the wilderness that are visible. This impact is temporary and recurring, while the towers are long-term alterations to the visible landscape. The cumulative impact from the aircraft in addition to the towers is limited because of the limited impact of the towers, the different nature of the impacts and that aircraft use levels would be unaffected by this project.

Cumulative effects from long-term structures including towers are limited because the 18 existing towers that could reasonably be seen in the BWCAW are not close to or in the proximity of the proposed tower locations (see Map 6 for locations of existing towers). No other towers or tall structures are known to be in a planning process within the analysis area besides the proposed AT&T tower near Ely, MN. It is possible that a communication tower proposed by AT&T Corporation will

be constructed near Ely, MN. The AT&T tower would be 450 feet tall and have an artificial light. It would be visible from the BWCAW (Hayes 2010). A review of the visual impact studies conducted for the AT&T tower (Hayes 2010) and for this project (Appendix C) indicates that there is little to no areas inside the wilderness where both towers could be seen simultaneously. This is because the proposed AT&T tower site is located about 9.7 miles west of the Fernberg site.

When visual impacts across the BWCAW are considered, under Alternative 2 there would be a limited increase in adverse cumulative effects to the wilderness due to the cumulative increase in new towers visible from the wilderness (the two new towers proposed at Pine Mountain and Forest Center) and the increase in tower height at the Meander site. This increase is considered limited due to the lack of lights on the new towers, the limited height of the new towers, the familiarity of these features on the landscape, and limited locations in the BWCAW they would be visible. Under Alternative 3, the increase in cumulative effects from the two new towers would also include a reduction in adverse cumulative effects in areas of the wilderness near the Fernberg site due to the reduction in height and lack of a light for the Fernberg tower replacement.

The communication industry is growing and new towers could be installed on nonfederal lands (outside of the project area for this EA) at any time without the knowledge of the Forest Service. These actions are not considered reasonably foreseeable.

3.1.7 Conclusion of Direct, Indirect and Cumulative Effects

Alternative 1 would have no additional effects on wilderness character because no additional towers would be constructed. The Fernberg tower would remain at 220 feet and would continue to be visible from various locations in the wilderness both during the day because of its height and the need for lighting system.

Alternative 2 would have a slightly greater impact on wilderness character because new towers would be constructed at Forest Center and Pine Mountain, while Meander Lake is a replacement tower that is taller. These three towers would be visible during the day only with no night illumination. The Fernberg Tower would be 20 feet shorter than Alternative 1 yet would have nearly the same effects because of the continued need for day and night lighting system.

Alternative 3 would have the same effects as Alternative 2 at the Forest Center, Pine Mountain and Meander Lake communication site locations. However, this alternative would have slightly fewer negative effects to wilderness character due to the Fernberg communication site location being 180 feet tall, eliminating the need for a lighting system for both day and night time. Alternative 3 would improve a visitor's experience of remoteness from civilization and increase the opportunity for solitude and primitiveness from inside the BWCAW compared to Alternatives 1 and 2 in regards to the Fernberg tower.

3.2 NON-NATIVE INVASIVE PLANTS

3.2.1 Introduction

Non-native invasive species are generally defined by two characteristics: 1) they were not historically (i.e., pre-European settlement) present in a region's ecosystems, and 2) they have the ecological ability to invade and persist in native plant and animal communities, and often become dominant species at the expense of native species.

Ground disturbance associated with MNDOT ARMER Project activities could create conditions

favorable to the introduction or spread of non-native invasive plants (NNIP). This potential effect is analyzed in this section of the EA.

3.2.2 Analysis Methods

The Superior National Forest non-native invasive plant GIS layer was compared to proposed project locations to determine the likelihood that the project would lead to new weed infestations.

3.2.3 Analysis Area

The analysis area for direct and indirect effects for this project includes all federal land contained within each of the four communication site locations (about 1 acre at each site), including the routes proposed for power line installation. These analysis areas were selected because it includes the areas where project activities would occur which cause the direct and indirect effects to NNIP. The analysis area for cumulative effects includes lands of all ownerships within the site location because private lands within project area boundaries share a number of physical characteristics (e.g. soils, landforms, etc.) with adjacent National Forest System lands. These characteristics influence land uses, which in turn influence NNIP distribution throughout the project area.

The time period for direct, indirect, and cumulative effects is two to five years from the time project activities begin. This time frame was chosen because most project activities should be completed within five years. While the towers and electrical power lines would be present beyond five years, disturbance associated with construction would have occurred and stabilized to the new environmental conditions and is unlikely to reach new areas during operation after this timeframe.

3.2.4 Affected Environment

Table 3 displays the non-native invasive plants that are known to occur in the analysis area. This list was developed based on results from NNIP inventory data collected on the Superior National Forest. Non-native invasive plants are typically spread in several ways such as vehicle wheels or bodies, livestock, wildlife, boat traffic, or human foot traffic. Non-native invasive plants typically enter an area along a corridor of ground disturbance such as a road or trail. Depending on numerous factors such as shade tolerance, degree of invasiveness, dispersal mechanisms, and habitat availability, NNIP may or may not spread into adjacent forested or non-forested ecosystems. Typical areas that have some weed infestation in the analysis area are roadsides, trails, portages, gravel pits, parking areas, campgrounds, helispots, and administrative sites.

In general, the analysis area has a fairly low level of NNIP infestation (Table 3). Orange hawkweed, yellow hawkweeds, and oxeye daisy are the most common NNIP. They are found at low abundance levels at the Meander Lake and Fernberg sites, and even lower levels at the other two sites. The Fernberg site also has spotted knapweed, bull thistle, tansy, and St. Johnswort at low levels; these NNIP were treated at the Fernberg site in 2011. They are found at low abundance levels at the Fernberg and Meander Lake sites, and even lower levels at the Pine Mountain and Forest Center sites.

Species	MN Status*	Life History/ Habitat Summary	Acres	Ecological Risk**
----------------	-------------------	--	--------------	--------------------------

Table 3. Non-native Invasive Plants known in the MNDOT ARMER Project Area				
Species	MN Status*	Life History/ Habitat Summary	Acres	Ecological Risk**
Spotted knapweed <i>Centaurea maculosa</i>	P	Short lived perennial, spread entirely by seeds, dry to mesic uplands (Wilson and Randall 2002)	0.002	High
Bull thistle <i>Cirsium vulgare</i>	No status	Biennial, spread by seed, occupies disturbed sites (Lym and Christianson 1996)	0.0002	Low
Orange hawkweed <i>Hieracium auranticum</i>	No status	Perennial, spread by seed and rhizome, widespread in disturbed upland sites (Callihan et al. 1982)	2***	Moderate
Yellow hawkweeds <i>Hieracium</i> sp.	No status	Several similar non-native invasive yellow hawkweeds occur in Project Area; perennial, spread by seed and rhizome, widespread in disturbed upland sites (Gleason and Cronquist 1991)	2***	Moderate
St. Johnswort <i>Hypericum perforatum</i>	No status	Perennial, spread by seed and rhizome, dry to mesic uplands (Fitzsimmons and Burrill 1993)	0.002	Moderate
Oxeye daisy <i>Leucanthemum vulgare</i>	No status	Perennial, spread by seed and rhizome, widespread in disturbed upland sites (Gleason and Cronquist 1991)	2***	Moderate
Common tansy <i>Tanacetum vulgare</i>	P	Perennial, spread by seed and rhizome; disturbed uplands (Voss 1996)	0.0002	Moderate
<p>* P = Prohibited noxious weed (Minnesota Statutes 18.76 to 18.91) that must be controlled.</p> <p>** Species represents either a low, moderate, or high threat to natural communities (USDA Forest Service 2010).</p> <p>Risk given in table represents risk in most susceptible habitat.</p> <p>*** Estimated acres based on miles of road in Project Area.</p>				

3.2.5 Environmental Consequences Direct and Indirect Effects

Alternative 1 (No Action)

Although no ground disturbance would occur, it does not mean that there would be no NNIP in the project area or that there is no potential for NNIP to be introduced or spread. Any non-native invasive plant in the analysis area would continue to exist and would probably be spread in the analysis area along typical corridors for weed dispersal such as roads, trails, gravel pits, and parking lots. Any public or administrative vehicle use in the analysis area (e.g., passenger vehicles, trucks, road maintenance equipment, ATVs) would have the potential to spread NNIP. Wildlife and human foot traffic in the analysis area would also have the potential to spread NNIP, but the likelihood of spread by these means would be lower than from vehicle use. Overall, this alternative would have the least amount of ground disturbance and, therefore, the least risk of weed spread.

Alternative 2 (Proposed Action)

Ground disturbance associated with tower construction activities, access road reconstruction activities, and installation of buried power lines could lead to the spread of NNIP at these project sites. The risk of impacts from NNIP spread would be low for the Pine Mountain, Forest Center, and Meander sites since the NNIP abundance is very low at these sites. The biggest risk of NNIP spread would be associated with construction of the Fernberg tower since there are known NNIP at the site. NNIP could spread at this site as a result of construction activities, but the impact to native plants and wildlife habitat would be minimal since the NNIP would primarily be found on the footprint of the construction, not in the surrounding forest. The effects would be minimized by the fact that the tower site would be landscaped with weed barrier fabric and gravel to prevent future weed encroachment, and by the fact that NNIP were treated at the site in 2011.

The Meander Lake, Forest Center, and Fernberg sites are close to the BWCAW boundary (1/2 mile, one mile, and one mile from the BWCAW boundary respectively). Despite proximity to the BWCAW, there is low risk that NNIP would spread to the BWCAW as a result of this project. Several events would need to happen for NNIP to move from a proposed tower site into the BWCAW. First, NNIP would need to get established in disturbed areas of the tower sites near the BWCAW. Second, some vector (most likely wind or wildlife) would have to transport weed seeds from established populations over 1/2 mile to 1/4 mile into the wilderness, where no project activities or ground disturbance is proposed. Lastly, NNIP would have to establish in competition with undisturbed native vegetation, which is unlikely. A recent study of non-native plants on BWCAW portages found that non-natives were restricted to portages or within one meter of a portage (Dickens et al. 2005); they did not establish well when competing with native trees, shrubs, and forbs. Similarly, in recent monitoring of unclassified roads, no spread was observed from weed infestations along unclassified roads into adjacent undisturbed forest vegetation (USDA Forest Service 2008).

Alternative 3 (Alternative to Proposed Action at Fernberg)

Environmental consequences for Alternative 3 would be the same as noted in Alternative 2.

3.2.6 Cumulative Effects

There would be negligible cumulative effects of Alternative 1 on NNIP spread. Because no tower-related construction would occur under Alternative 1, there would be no additional ground disturbance to cause further NNIP spread under Alternative 1. For all the action alternatives, one past action that could influence NNIP spread is timber harvest that took place at the site of the Forest Center tower in the last couple of years. The effects of NNIP spread at this site were considered in the Tomahawk EA. Some NNIP spread could result from the timber harvest at this site and contribute to greater NNIP spread under the action alternatives. Another ongoing action that would have a beneficial effect on NNIP spread is NNIP treatments. On April 27, 2006, Forest Supervisor Jim Sanders signed a decision to implement a Forestwide NNIP management EA, which would provide for treatments of NNIP in the project area (USDA Forest Service 2006) under all alternatives. Such treatments would minimize impacts from NNIP spread directly, indirectly, and cumulatively caused by project activities. The net cumulative effect of these actions would most likely be a small increase in NNIP at the tower sites.

3.3 THREATENED, ENDANGERED, and SENSITIVE WILDLIFE SPECIES**3.3.1 Introduction**

The proposed project activities could affect threatened, endangered, or Regional Forester Sensitive

Species (RFSS). This potential effect, as well as the effects of alternatives, to threatened, endangered, or RFSS known to occur in the project area is analyzed in this chapter (see also Biological Evaluation/Biological Assessment in Appendix B).

3.3.2 Analysis Methods

Management Indicator Habitats (MIH) and Management Indicator Species (MIS) form the basis to assess and monitor wildlife habitat. Changes in the amount and distribution of habitats and population levels as compared with composition guides provide reference against which to measure the effects of management. The proposed four acres of disturbance (one acre at each site) will have miniscule impact on current vegetation. No substantial forest-wide impacts are expected in the amount and distribution of habitats and population levels for MIH and MIS due to the relatively miniscule scale of this project. Therefore, no detailed MIS or MIH analysis is needed, but appropriate mitigation measures and Forest Plan Standards and Guidelines would be applied to these four sites.

The SNF wildlife inventory and MN-DNR Natural Heritage Information System (NHIS) GIS layer was compared to proposed project locations to determine the likelihood of occurrence. There are no known occurrences of Canada lynx or RFSS at any of the tower sites. Regardless, it is assumed that suitable habitat conditions exist and is available for those species with moderate to high probabilities of occurrence.

3.3.3 Analysis Area

The analysis area for direct and indirect effects for this project includes all federal land contained within each of the four communication site locations. This analysis area was selected because of the scattered and small relative size of these tower sites. The direct, indirect and cumulative effects area for Canada lynx and RFSS are the sites and the immediate area surrounding them.

The time period for direct, indirect, and cumulative effects is two to five years from the time project activities begin. This time frame was chosen because most project activities should be completed within five years. While the towers and electrical power lines would be present beyond five years, disturbance associated with construction would have occurred and stabilized to the new environmental conditions and is unlikely to reach new areas during operation after this timeframe.

3.3.4 Affected Environment

All four sites are located in or immediately surrounded by forested habitat conditions that vary by site. Currently, the primary habitat types within the project communication site locations are a mixture of aspen, birch, balsam fir with some red and jack pine.

3.3.5 Environmental Consequences Direct and Indirect Effects

Effects common to action Alternatives

The direct, indirect and cumulative effects of this project on threatened, endangered, or RFSS would be negligible.

Alternative 1 (No Action)

The No Action alternative will not change the existing condition of habitat and species use at each site. Mortality of bats and birds are likely to occur but is unpredictable and un-measurable. This alternative will have no effect on Canada lynx and its critical habitat, and have no impact to RFSS. There are no cumulative effects with this alternative. The current tower at Fernberg contains guywires. These guywires could cause mortality risks to bats and birds commonly referred to by the

public as “bird strikes”. This alternative would not decrease or increase mortality rates beyond what is currently occurring.

Alternative 2 (Proposed Action)

The proposed four acres of disturbance (one acre at each site) will have miniscule impact on current vegetation and habitat. These sites are considered to be permanent vegetation and habitat disturbance in the area immediately surrounding the tower sites and are expected to diminish rapidly due to the recovery of vegetation. No substantial forest-wide impacts are expected in the amount and distribution of habitats and population levels for MIH and MIS due to the relatively miniscule scale of this project.

Mortality of bats and birds are likely to occur but is unpredictable and un-measurable. Fast moving songbirds may experience higher mortality than slower flying raptors and bats with their echo location senses. Being fixed structures the four towers should pose a lesser risk to bats and birds than a wind turbine that has moving blades³, and a radio tower with guywires. However, these indirect effects would be reduced by the proposed design of the towers which have no guywires.

Canada Lynx

This alternative would result in a small amount of habitat disturbance at the radio tower sites. Changes in available lynx habitat would be negligible because of the small scale and extent of the project. Overall, impacts to critical habitat for lynx would be negligible. Based on the information in the Biological Assessment (see Appendix B), Alternative 2 is expected to have *no effect* on Canada lynx and its critical habitat.

Regional Forester Sensitive Species

The Biological Evaluation (see Appendix B) determined that this project would impact some species but not others. The various determinations of effect for Regional Forester-listed sensitive species are listed in Table 2 of the BE. The reasons for this determination are: changes in available habitat for some RFSS would be negligible because of the small scale and extent of the project, and the lack of suitable habitat affected by the project for other RFSS species. Alternative 2 *May Impact Individuals or Habitat* (MIH) or have no effect to RFSS. There is no indication that the viability of any RFSS is at risk in the planning area based on this proposed project.

Alternative 3 (Alternative to Proposed Action at Fernberg)

The various determinations made for RFSS would be the same for Alternative 3 as with Alternative 2. Alternative 3 would have the fewer relative effects than Alternative 2 only based on the lower height of the potential new tower at the Fernberg site which would reduce the risk to flying bats and birds. This reduced risk is not measurable. There is no indication that the viability of any RFSS is at risk in the planning area based on this proposed project.

3.3.6 Cumulative Effects

Cumulative effects for Alternative 2 and 3 of this project on threatened, endangered, or RFSS are expected to be negligible. Future planned vegetation management projects in these areas will be analyzed for effects to Canada lynx, RFSS, MIH, MIS and wildlife habitat. This will also factor in management on State and County lands that will continue throughout the forest also in accordance

³ Wind turbine in this paragraph refers to a windmill type of turbine with blades not located close to the main structure. The turbine proposed to be installed on the towers stands vertical within a couple of feet to the main structure. See Figure 8.

with their management plans and objectives, yet due to the small scale proposals included in the these projects, cumulative effects from these projects would not add additional adverse effects on threatened and endangered species or RFSS. For the reasons in this analysis and BA/BE, negligible cumulative effects are anticipated for MIIH.

3.4 HERITAGE

3.4.1 Introduction

This chapter describes the Federal Government's mandate of Section 106 (36 CFR 800) of the National Historic Preservation Act (NHPA) of 1966 to take into consideration heritage resource sites that would be affected by the alternatives described in Chapter 2. Historic properties are discrete locations on the landscape which display evidence of past human activity. Traditional Cultural Properties (TCP's) are districts, sites, buildings, structures, or objects that are valued by a living community for the role they play in sustaining the communities cultural integrity (King 2004: 364). For the purposes of this analysis, the term heritage resources, or heritage resource site, will refer to both of these aforementioned property types.

3.4.2 Analysis Methods

When a project is proposed on the Superior National Forest, heritage resource specialists assist in the analysis of potential project effects. Heritage analysis methods include 1) review of historic documents, archival materials, historic aerial photographs, past heritage survey coverage, and overviews relevant to the project area; 2) analysis of the proposed project and its potential to adversely affect heritage resources; 3) review of public comments concerning the proposed project and its potential effect; and 4) consultation with interested parties including tribes, descendent communities, heritage advocacy groups, and the Minnesota State Historic Preservation Officer. Through this analysis, heritage resource specialists determine whether the project is an "undertaking" which has the potential to effect heritage resources within the project area.

Two types of survey methodology that are utilized by heritage resource professionals on the Superior National Forest include Block and Ground Surveys. Block surveys utilize helicopter flyovers to identify clearings and/or building remains associated with historic homesteads, logging camps, and linear features such as railroad lines. Heritage resources identified during a block survey are subsequently ground verified and mapped. Block surveys have been conducted on all tower locations except Forest Center.

Ground surveys are conducted in areas which exhibit high-medium probability for buried archaeological sites. Such areas include islands, lakeshores, river margins, glacial features such as beach benches, and historic trail corridors. Ground survey methods include surface walkover and/or sub-surface testing via shovel probes as allowed. Ground survey has been conducted on the Forest Center and Pine Mountain proposed tower locations, but were not required in tower locations that have previous ground disturbance, which include Meander and Fernberg.

Analysis of potential visual impacts was also completed for heritage resources as the construction of towers could indirectly affect the historic view shed of certain historic properties. Visual impacts can be subjective, but generally, if an object can be seen from or obscures a historic property from being seen, it could be considered an adverse effect to the property. These adverse visual effects can diminish a historic properties integrity, which negatively impacts the historic significance and eligibility of the property to the National Register of Historic Places. The *Nationwide Programmatic Agreement for Review of Effects on Historic Properties for Certain Undertakings Approved by the*

Federal Communications Commission (47 CFR 1.1307), as amended, has given direction that the area of potential effect for visual impacts of a tower 200 feet or less will be considered visible ½ mile from the proposed tower. Given the 1/2 mile visibility guideline for 200 feet or less, all known eligible or unevaluated historic buildings/structures within a 1 mile buffer from each tower were given consideration for visual impacts. Archaeological sites are generally considered eligible to the National Register of Historic Places for their ability to provide data from subsurface artifact and features; therefore the analysis of potential indirect visual effects was not extended to archaeological sites.

3.4.3 Analysis Area

The analysis area for direct and indirect effects of this project will focus on the federal lands within each of the four communication tower proposed site locations. Cumulative effects of the project will include all areas of ground disturbance on federal lands as well as the 1 mile visual impacts radius previously mentioned.

The timeframe for the direct effect accompanies the ground disturbing activities that will approximately be 2 to 5 years. The indirect and cumulative effects are for the lifespan of the four proposed towers. The towers have an estimated lifespan of 20-50 years, depending on environmental and technological conditions. If the towers are present, they will have the potential to cause visual indirect effects to historic buildings and structures.

3.4.4 Affected Environment

Since 1978, five heritage resource surveys have been conducted within the project area. Performed in conjunction with earlier Forest Service management activities, these surveys were conducted by professional cultural resource specialists and complied with all applicable federal laws and standards. Included in this survey coverage are approximately 3 block surveys and 2 intensive surveys. Approximately 51 acres of intensive ground survey has been completed within, and just adjacent to the proposed project locations. One heritage resource site (previously removed lookout tower foundation) is located adjacent to a proposed communication tower site. This site, which retains no standing historic structures, is unevaluated to the National Register of Historic Places.



Figure 7. Footing of former fire lookout tower.

3.4.5 Environmental Consequences Direct and Indirect Effects

Alternative 1 (No Action)

There would be no direct, indirect, or cumulative effects under Alternative 1 because there would not be any ground disturbing activities or visual impacts.

Alternative 2 (Proposed Action)

Heritage resource sites would be excluded from the ground disturbance, with the site boundaries marked with flagging as appropriate in the field prior to project implementation. This would eliminate direct effects to the heritage resource. Post project monitoring of mitigation measures (site avoidance buffers) and maintenance of confidentiality with respect to heritage resource locations would effectively eliminate impacts, thus heritage resources would experience no direct or indirect effects under Alternative 2. Additionally, no historic buildings or structures were identified within a 1 mile buffer around each of the four proposed towers, thus heritage resources would experience no indirect visual effects under Alternative 2.

The Superior National Forest has a signed Programmatic Agreement (PA) with the State Historic Preservation Office (SHPO) that directs the types of survey and consultation for heritage resources. The heritage review procedures have been reviewed by SHPO and are consistent with the provisions of the PA. The direct, indirect, and cumulative effects of the action alternative on heritage resources have been evaluated following the provisions of the PA. Based on the completed surveys, including data review and analysis, the Superior National Forest Heritage Program concludes that, with implementation of the specified mitigation measures, there would be no effects to heritage resources under the action alternative.

Alternative 3 (Alternative to Proposed Action at Fernberg)

Due to the only difference between Alternative 2 and Alternative 3 being the shorter height of the tower (180 feet), the determinations made for direct, indirect, or cumulative effects to Heritage resources identified for Alternative 2 are the same for Alternative 3.

3.4.6 Cumulative Effects

Implementation of mitigation measures (such as “flag and avoid”) and maintenance of confidentiality with respect to heritage resource locations would effectively eliminate direct and indirect effects as they relate to Alternative 2 and 3. Thus, there would be no cumulative effects to heritage resources, as all potential direct and indirect effects would be avoided. In addition, no historic buildings or structures were identified using GIS analysis of a 1 mile buffer around all four proposed towers, thus there would be no cumulative visual effects to heritage resources.

3.5 INFRASTRUCTURE FOR PROJECT

3.5.1 Access Road Impacts

The road construction and maintenance would be completed in accordance with the Forest Service stipulation requirements by implementing temporary and permanent erosion control measures and proper design and construction of any stream or wetland crossings (see Appendix A), impacts from the road on surface water quality and aquatic organism passage is expected to be negligible (including water quality in the BWCAW).

3.5.2 Utility Line Installation

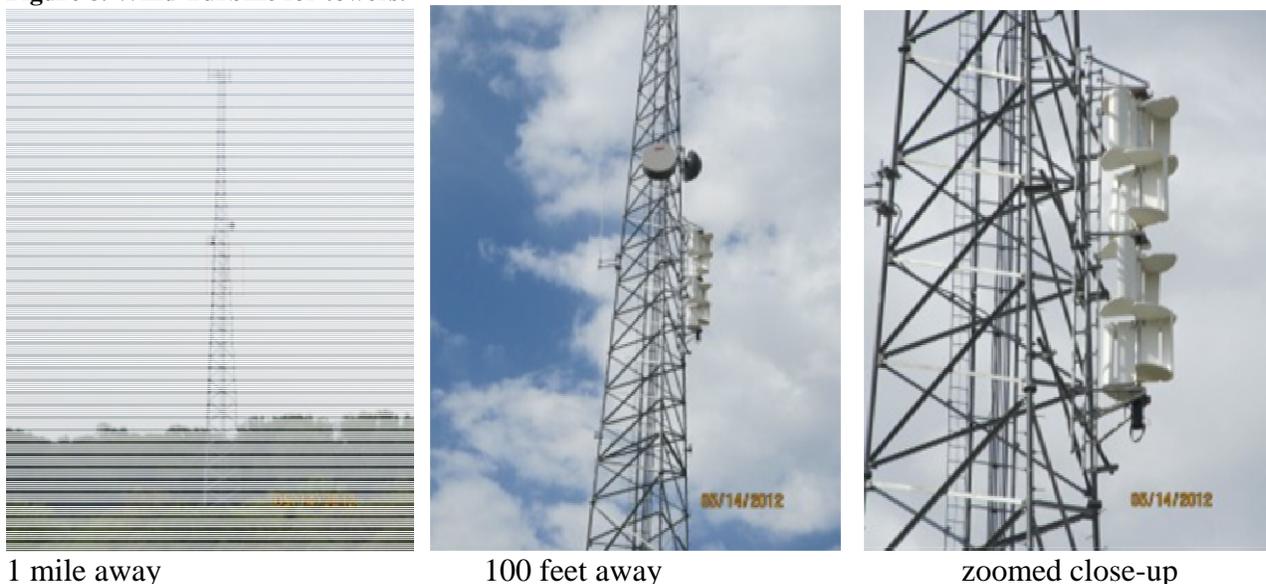
Electrical power lines would be authorized in Alternatives 2 and 3 if the proponent desires the installation. Coordination would occur between MnDOT, the various power companies in the area, and the Forest Service to have these utilities installed along the right-of-way of existing and proposed reconstructed roads. Burial of utility lines along existing right-of-ways is a common practice on the Forest and implementation of such projects has been shown to have minimal or no adverse effects to the environment (Todd Hess, special use coordinator, personal communication; see also Middle Mile Project CE in project file). Since road rights-of-way are located in pre-disturbed lands, minimal or no direct or indirect effects would occur (including to water quality in

the BWCAW).

3.5.3 Wind Turbine and Generator

During scoping, concerns surfaced of the possible visual and noise impact associated with the vertical wind turbines. There is one location in the state where the proposed equipment is installed and operating. The turbine is owned by the University of Minnesota and St. Thomas University. MnDOT visited this site to determine how much, if any noise was produced by the equipment. From distances of 1 mile, 100 feet, and at the base of the tower, the only sound heard was wind blowing through the trees and tower. Further, technical specifications for the turbine state that it generates a sound level of 3 dBA at 25 meters (Wind Turbine Technical Specifications, project file). This sound level would be inaudible to the human listener under all or nearly all conditions even within 25 meters. Due to attenuation with distance, no sound would be audible in the BWCAW from the turbine. The turbine would create no noise impacts.

Figure 8. Wind Turbine for towers.



During scoping, concerns surfaced of the possible noise impact that might be associated with the 34kV generator possibly running constantly to recharge battery power used by the radio equipment. MnDOT's original proposal had a 34kV generator but changed the size during the scoping period to a smaller 15kV generator. It was also originally understood the generator would operate 24 hours a day. Further clarification was made in which the generator would operate only when solar, wind, or commercial electrical power sources are unavailable to recharge the battery supply for radio equipment. The generator would be housed inside a sound attenuating barrier facility.

The sound level was measured by the proponent to be less than 65dBA from a distance of 23 feet when housed in the mitigated structure. Based on the '26 log D' sound attenuation equation (USDA Forest Service 2012), the generator is estimated to produce a sound level of 11 dBA about half a mile away at the BWCAW boundary. This is a very low sound level and is substantially less than the sound level of 30 dBA typically found in a 'secluded woods' (MPCA 2008). The sound level produced by the generator would likely be inaudible at least 90% of the time at the wilderness boundary based on analysis done for typical ambient sound levels in Northeastern Minnesota (USDA Forest Service 2012). Inside the wilderness, sound from the generator would be even lower. There would be very little to no impact to the wilderness.



Figure 9. MnDOT's generator sound measuring test

3.5.4 Site Development

Each proposed site location contains approximately 1 acre. Forest Center and Fernberg are located at sites where the land is disturbed. Any construction would result in no additional adverse effects. The reconstructed roads at Pine Mountain and Meander Lake would result in some disturbance of the land but with the mitigation measures identified in Appendix A, minimal or no adverse effects would occur.

3.6 WETLANDS

3.6.1 Wetlands

The project area does not contain any identified wetlands. Therefore, there would be no impacts to wetlands.

3.7 CIVIL RIGHTS

3.7.1 Civil Rights and Environmental Justice

Forest Service activities must be conducted in a discrimination-free atmosphere. This would apply to construction activities that may occur upon implementation of communication site location improvement projects. Executive Order 12898 of February 11, 1994, Environmental Justice as part of environmental policy, calls for consideration of the environmental, health, and economic effects on minority and low-income areas including the consumption patterns of fish and wildlife. None of the three actions are expected to have any direct, indirect, or cumulative effects on minorities and low-income populations.

3.8 RECREATION

3.8.1 Recreation

The project area does not contain any established recreational sites other than BWCAW as identified under the Wilderness section of this EA. Therefore, any impact to recreation is expected to be negligible. See the Wilderness section for impacts to the wilderness.

CHAPTER 4-APPENDICES

4.1 List of Preparers

Analysis Team Members

Interdisciplinary Team Leader
Todd Hess, Realty Specialist

Wilderness Specialist
Ann Schwaller, Natural Resource Wilderness Specialist

Plant Specialist
Jack Greenlee, Botanist

Wildlife Specialist
Alan Dohmen, Forest Wildlife Biologist

Heritage Specialist
Heather Hoffman, Archaeologist

Engineering Specialist
Lori McIntyre, Civil Engineer

Recreation and Civil Rights Specialist
Judy Ness, Natural Resource Recreation Manager

NEPA Specialist
Peter Taylor, Environmental Coordinator

Consultants
John Wytanis, Tofte District Ranger
Sandy Skrien Public Service Team Leader
Ranee Olson Assistant Ranger
Elizabeth Schleif, Real Estate Program Manager
Patti DeShaw, Realty Specialist
Casey McQuistin, Soil Scientist
Marty Rye, Wetlands Specialist

4.2 Distribution Lists

Frederick & Thomas Anderson
Tracy Klein
Cynthia & John Cantrell
MN DNR Division of Ecological and Water Resources
Wilma Rahn - Lake County Board of Commissioners
Good G. Stephen
Ray Payne
Stephen B. Erickson
Ray A. Bisco

Alan Goodman - Lake County Highway Department
Olsen Gerald M.
Lolita M. Schnitzius
Nancy McReady - Conservationists With Common Sense
Paul Martin
Mary Manning
Paul Danicic - Friends of the Boundary Waters
Town of Morse
Kris Wegerson
Richard W. Kayser
Robert & Carolyn Morrow
Robert LaTourell - LaTourell's Resort & Outfitters
Shane Chatleain - MnDOT Office of Electronic Communication

4.3 References

Alan Dohmen, Superior National Forest Wildlife Program Manager, *Biological Assessment and Evaluation*, June 29, 2012

Boutcher, Cole, Hennessy, Landres, and Schlenker, USDA Forest Service, Rocky Mountain Research Station, *Applying the Concept of Wilderness Character to National Forest Planning, Monitoring, and Management*, December 2008.

Commissioner of Public Safety and the State Homeland Security Director Mancel Mitchell, *Public Safety Statewide Radio Project, Project Plan and Scope Statement*, Revised 2002.

Dan Durisco, "Preserving Pristine Night Skies in National Parks and the Wilderness Ethic," *Protecting Dark Skies*, Volume 18 Number 4, 2001

Executive Order 12898 of February 11, 1994

Federal Communication Commission FCC 04-22, Appendix B: Nationwide Programmatic Agreement for Review of Effects on Historic Properties for Certain Undertakings Approved by the Federal Communication Commission, September 2004.

Hayes Surveying & Mapping PC, *Viewshed Analysis: Visibility of Proposed Tower near Ely, MN from Within Boundary Waters Canoe Area Wilderness*, May 31, 2010.

Joseph W. Roggenbuck, "International Journal of Wilderness," *Managing for Primitive Recreation in Wilderness*, Volume 10 Number 3, December 2004

Minnesota Department of Transportation Office of Electronic Communication, Communication Planning Director Michael Hogan, *SF-299 for Pine Mountain*. Special-Use Application, January 4, 2011.

Minnesota Department of Transportation Office of Electronic Communication, Communication Planning Director Michael Hogan, *SF-299 for Forest Center*. Special-Use Application, February 11, 2011.

Minnesota Department of Transportation Office of Electronic Communication, Communication

Planning Director Michael Hogan, *SF-299 for Fernberg*. Special-Use Application, February 11, 2011.

Minnesota Department of Transportation Office of Electronic Communication, Communication Planning Director Michael Hogan, *SF-299 for Meander Lake*. Special-Use Application, February 16, 2011.

Minnesota Department of Transportation Office of Electronic Communication, Communication Planning Director Michael Hogan, *Concept and Logical Architecture for a Statewide Wireless Communications Plan*, Revised (September 2002).

Minnesota Department of Transportation Office of Electronic Communication, *Visualization Study*.

Minnesota Department of Transportation Office of Electronic Communication, *180 ft. Tower vs. 200 ft. Tower*.

Minnesota Department of Transportation Office of Electronic Communication, *Power Sources and Noise Levels*.

Minnesota State Statute 174.70 Public Safety Radio Communications, (2011).

Minnesota State Statute 403.36 Statewide Radio Board, (2011).

Shane Chatleain, ARMER Facilities and Contract Manager, Minnesota Department of Transportation Office of Electronic Communication, email: *RE: Noise from Wind Turbine*, April 4, 2012.

Shane Chatleain, ARMER Facilities and Contract Manager, Minnesota Department of Transportation Office of Electronic Communication, email: *RE: 34kV or 15kV Generator*, May 16, 2012.

Shane Chatleain, ARMER Facilities and Contract Manager, Minnesota Department of Transportation Office of Electronic Communication, email: *RE: Details on Visual Impact Desired*, April 20, 2012.

USDA Forest Service, Superior National Forest *Land and Resource Management Plan (Forest Plan)*. Eastern Region, Regional Forester Randy Moore, July 2004.

USDA Forest Service 2012 Scoping Comments for the ARMER MnDOT Project

USDA Forest Service, Environmental Assessment: Tomahawk Project Area, April 2004.

USDA Forest Service, Rocky Mountain Research Station, *Monitoring Selected Conditions Related to Wilderness Character*, April 2005.

USDA Forest Service, Rocky Mountain Research Station, *Technical Guide for Monitoring Selected Conditions Related to Wilderness Character*, June 2009.

USDA Forest Service, Rocky Mountain Research Station, *Keeping It Wild: An Interagency Strategy*

to Monitor Trends in Wilderness Character Across the National Wilderness Preservation System, July 2008.

USDA Forest Service, Rocky Mountain Research Station, *The Boundary Waters Canoe Area Wilderness: Examining Changes in Use, Users, and Management Challenges*, March 2012.

USDA Forest Service 2006 Environmental Assessment: Forestwide NNIP Management,

USDA Forest Service 2012. Federal Hardrock Mineral Prospecting Permits Final Environmental Impact Statement, Section 3.1 Noise.

USDA Forest Service 2012. IDT meeting and site visit notes: March 2, 2012; April 25, 2012; and May 10, 2012.

The Wilderness Act of September 3, 1964 (Pub.L. 88-577).

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.