National Park Service
U.S. Department of the Interior
Yellowstone National Park
Idaho, Montana, Wyoming

Electric Transmission/Distribution System Communication and Automation Plan

Environmental Assessment

November 2013

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Summary

Yellowstone National Park in conjunction with NorthWestern Energy (NWE), one of the electricity providers for the park, propose a number of upgrades to improve the reliability, safety, and overall service quality of electrical power distribution to the National Park Service (NPS), concessioners, and visitors. Infrastructure upgrades would occur at seven existing substations located within the park, and one repeater site outside the park. The project proposal also includes a communication system for use by NWE.

NorthWestern Energy, an investor-owned utility that provides electricity and natural gas in the northwest quadrant of the United States, has provided electrical power to Yellowstone National Park since the late 1950s using 50 kilovolt (kV) and 69 kV aerial and buried transmission lines. There are seven electric substations operated by NWE within the park at: Mammoth, Norris, Canyon Village, Lake, Grant Village, Madison, and Old Faithful.

The remote geographical location and lack of a reliable communications system connecting the infrastructure components within the park has meant that a Supervisory Control and Data Acquisition (SCADA) system has never been constructed. SCADA systems are common across the region and country to allow for remote switching of power supply equipment, quicker diagnosis of transmission line breaks and their location, and safer working conditions for electric company personnel.

Extended power outages within the park have caused concerns for the NPS and park concessioners that operate lodging and other visitor facilities within the park. These outages have had negative effects on park operations and visitor experience, creating health and safety concerns and lost revenue for concessioners.

This Environmental Assessment (EA) evaluates four alternatives: a no action alternative and three action alternatives. The Environmental Assessment (EA) evaluates four alternatives: a no action alternative and three action alternatives. Alternative A, the no action alternative describes the current condition if NWE upgrades are not constructed. Alternative B, the NPS preferred alternative would upgrade existing substations and install VHF RF automation and a communication system. Alternative C, this alternative would upgrade existing substations and would install fiber optic cable for SCADA automation; towers would still be needed for a land/mobile radio system. Alternative D, this alternative would upgrade substations and would use a satellite system for indication only; SCADA automation may not be possible due to latency issues with the satellite signal. Communication would occur with satellite phones.

The action alternatives address upgrading the seven substation sites and the Buffalo Mountain repeater site with automation technology by using UHF, Fiber Optic Cable, or a Satellite system. A communication system would either involve installation of a land-mobile radio system for local coverage around the seven substation sites and along the powerline corridor, or by use of satellite phones. NWE would fund any infrastructure upgrades implemented. Funds expended would be recouped over time by NWE from their receipts for electric service.

The NPS preferred alternative is “Alternative B - Upgrade Existing Substations and Install VHF RF Automation and Communication System”.

This EA has been prepared in compliance with the National Environmental Policy Act (NEPA) to provide the decision-making framework that 1) analyzes a reasonable range of alternatives to meet objectives of the proposal, 2) evaluates potential issues and impacts to the park’s resources and values, and 3) identifies mitigation measures to lessen the degree or extent of these impacts. Resource topics that are included in

this document because the resultant impacts may be greater-than-minor include soils, geothermal resources, vegetation and rare plants, wetlands, wildlife, special status wildlife, scenic resources, cultural resources, human health and safety, visitor use and experience, and park operations. All other resource topics were dismissed because the project would result in negligible or minor effects to those resources. No major effects are anticipated as a result of this project. Public scoping conducted to assist with the development of this document resulted in a total of 11 individuals submitting correspondence that included 32 comments. Four individuals were supportive of the proposed action, one was non-substantive, and six were against or recommended variations of the proposed action (i.e., no towers, blend towers into environment, etc.).

Public Comment

If you wish to comment on the EA, you may post comments online at http://parkplanning.nps.gov/NWEPlan, hand-deliver during normal business hours to the mailroom in the park's Administration Building, or mail comments to: NWE Automation Plan; Yellowstone National Park, P.O. Box 168, Yellowstone National Park, Wyoming 82190. This EA will be on public review for 30 days. All comments must be received by December 6, 2013. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. Although you may request to have your personal identifying information withheld from public review, we cannot guarantee that we will be able to do so. Comments will not be accepted by fax, email, or in any other way than those specified above. Bulk comments in any format (hard copy or electronic) submitted on behalf of others will not be accepted.

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Introduction

Yellowstone National Park (YNP) is located primarily in the northwest portion of Wyoming, with segments extending into southwest Montana and southeast Idaho. The park was established by an act of Congress on March 1, 1872 and is managed by the National Park Service (NPS). The 2.2 million acres of the park were "set apart as a public park or pleasuring-ground for the benefit and enjoyment of the people…and to…provide for the preservation, from injury or spoliation, of all timber, mineral deposits, natural curiosities, or wonders within said park, and their retention in their natural condition."

This Environmental Assessment (EA) has been prepared to examine the environmental impacts associated with a proposal to upgrade the reliability, safety, and overall service quality of electrical power distribution to Yellowstone National Park, park concessioners, and visitors. All construction would be located within the current Right-of-Way (ROW), at existing substation facilities within the park, and at one NorthWestern Energy (NWE) operated communication repeater facility outside and just north of the park. This EA was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, regulations of the Council on Environmental Quality (CEQ) (40 CFR §1508.9), and NPS Director's Order (DO)-12 (*Conservation Planning, Environmental Impact Analysis, and Decision-Making*).

Background

NWE is an investor-owned utility and one of the largest providers of electricity and natural gas in the northwest quadrant of the United States. The company serves approximately 673,200 customers – 403,600 electric and 269,600 natural gas – in Montana, South Dakota and Nebraska. NWE is classified as a "mid-sized" utility by most industry standards, but its service territory size is one of the largest in the country. NWE's electric system serves 297 communities and surrounding rural areas covering two-thirds of Montana, eastern South Dakota, and Yellowstone National Park in Wyoming.

NorthWestern Energy has approximately 1,430 full-time employees. NWE's corporate headquarters is in Sioux Falls, S.D., with operational headquarters in Butte, Montana, and Huron, South Dakota. NWE has a current ROW permit, issued by the National Park Service, to operate and maintain an electric transmission and distribution system, and maintain that system within Yellowstone National Park

NorthWestern Energy has provided electrical power to YNP since the late 1950s, mostly through 50 kilovolt (kV) and 69 kV aerial and buried transmission lines. There are seven substations operated by NWE located within the park at: Mammoth, Norris, Madison, Old Faithful, Grant Village, Canyon Village, and Lake. Since the transmission lines do not have redundant sources, diesel generators are located in three of the substations: Old Faithful, Lake (Summer only), and Grant Village.

NWE operates an FCC-registered land/mobile repeater site atop Buffalo Mountain within the Gallatin National Forest. The site is located 2.65 miles SE of Jardine, Montana. NWE is currently licensed to operate the site until January 2022. This site provides a link to NWE's central office in Butte, Montana.

Due to the rugged environment and extreme weather conditions in YNP, power outages occur more frequently and for a longer duration than in other rural areas in NWE's service territory. The majority, 180 of 251 (Table below) outages that occurred within the park during 2010-2011 are tree and nature-caused outages. The ROWs are narrow by many industry standards, and tall trees adjacent to the transmission lines often fall onto the lines causing a power outage.

During some power outages, NWE is able to use their large diesel-powered generators (located at Old Faithful, Grant Village, and Lake [summer months only]) to provide backup power for some developed areas of the park by back feeding the generator power through the transmission lines. At times however, it is not always possible to synchronize across the system with communication and the correct relaying.

During a transmission outage, substations like Canyon do not have generation to provide power to the cabins, lodges, and other facilities. The transmission system has the capability to serve backup generation power to developments such as Canyon through airbreak switches and breakers. However, currently there is only local-operation of those devices, therefore, backup generation power cannot be automatically provided. Also, when Lake is winterized, Grant must be backfed to supply Lake and Canyon. In most of these instances back feeding to these two locations is impossible because the systems do not synchronize and it also requires physical operation of the device. These switches and breakers are very large and mounted high in the substations, requiring the use of long-handled equipment to throw them from one position to another.

NWE personnel are staffed inside the park from Monday-Friday during the summer season only. During the winter season there are no NWE personnel living in the park. If an electric outage occurs in the park during the winter, an NWE lineman has to physically operate the switch to restore power, either commercial or generation. To do so, they must drive to the park from the Bozeman, Montana office, then drive or snowmobile to the problem location. In the winter, response times can be anywhere from 4-48 hours depending on the winter and road conditions. Since safety is NWE's number one priority, they would not send in personnel during extreme weather events or if they feel it is unsafe. The generator at Lake is winterized and is unavailable for electric generation in the winter. Canyon rarely can be picked up in the event of an outage during the winter season. Typically, winter outages are caused by snow loading on trees which most of the time takes down multiple poles, thus extending repair times.

During the summer season there are four NWE personnel living inside the park Monday-Friday. They live at Old Faithful, Lake, Grant, and Canyon. If an outage occurs during this season, the response (depending on traffic) is much quicker. Also, in the summer when loads are higher, NWE cannot guarantee it would be able to feed the electric demand with generation from inside the park. NWE has load shedding schemes presently for Old Faithful to provide power to the most critical needs, and to help prevent a costly upgrade of current diesel generation equipment.

When the park concessioners lose power inside of Yellowstone it creates a number of issues within their facilities. The lack of power means increased safety concerns as guests and employees find themselves in the dark. Power outages affect the visitor experience as guests on vacation are inconvenienced and employees have difficulties trying to perform their jobs. The visitor experience the NPS and concessioners want to deliver is difficult at best during power outages, with extended outages increasing the difficulty. Repeated power outages at locations around Yellowstone create unnecessary wear on electronic equipment and have caused serious and expensive damage to computers, fire systems, kitchen equipment, and mechanical equipment needed to run facilities. Loss of food products during lengthy outages have occurred in the past due to loss of refrigeration. A lack of accurate information about when power might be restored has been a source of irritation to visitors in the past. Loss of revenues has occurred due to financial compensation given to guests or visitors, and loss of perishable inventory.

As of January1, 2013 the Federal Communication Commission (FCC) implemented the FCC *VHF/UNHF Narrowing Bandwidth Mandate*. This mandated NWE to abandon the previously used land/mobile radio system that had a repeater atop Mount Washburn, located within the park. A new narrow band radio system would require additional repeater sites to gain the same coverage, which did not adequately cover the existing NWE powerline corridor.

Purpose and Need

Electric power outages occur frequently in YNP. These outages are caused in part because of numerous trees adjacent to the overhead power transmission and distribution lines throughout the park. The majority of outages that occur on the transmission lines are caused by falling trees and other nature-related causes. Wind and snow-loading of trees often causes them to fall into the lines breaking them and snapping or toppling poles. These outages occur more frequently and for a longer duration that in other

rural areas in NWE's service territory. The ROW along NWE's transmission lines is considered narrow at 20 feet to each side making it difficult to address all potential hazards.

Because of YNP's remote location and the lack of a quality communication system, there is no supervisory control (cannot be remotely monitored or controlled) of the electrical system in the park. The lack of a Supervisory Control and Data Acquisition System (SCADA) has caused the outages to be longer than if there was supervisory control of the system. SCADA systems are common in the rest of the transmission systems throughout the service territory of NWE. A SCADA system in YNP would allow the operational headquarters in Butte, Montana to remotely control switches and breakers to reroute power without the need for a lineman to physically do this on site. The extended outages in Yellowstone have caused concerns for the NPS and the concessionaires that provide services to park visitors. Extended outages have affected the visitor experience and caused public safety concerns by delaying services such as fueling vehicles, making purchases, charging or operating medical equipment, lack of lighting, lack of communications.

Around NWE's transmission system, data is gathered at the System Operation Control Center (SOCC) in Butte, Montana. The SCADA program sends commands back to the field devices to operate when a system is fully automated. The most common field devices that are used on NWE's system utilize electronic relays to operate switches and circuit breakers, which rely on a communication infrastructure connecting the SOCC to the relays or other field devices.

Currently, many NWE devices within YNP are controlled with voltage sensing, ring closing, and timing schemes. Although the current system has been in place and operating for many years, updating this equipment with current automation technology would reduce outage times, provide remote control of field devices, and present more accurate data on the location and cause of each line fault, and improve safety. Automated field devices would help NWE line personnel detect location and fault cause, and can provide information that would allow more precise information to the park regarding the nature and expected length of outages. The automated field devices would also expedite correcting the problem and restoring commercial power.

From 2010 to 2011 over 200 power outages occurred within the park lasting from a few minutes to a few days. Most of these outages were caused by trees falling on lines, equipment failures, snow and ice, and wind. The longer outages especially have impacted park visitors, park concessioners, and park operations. Data from outages occurring in 2012 is shown in the tables below.

Table 1 - 2012 Outage Occurrences

	Canyon	Grant	Indian Ck	Lake	Madison Jct	Mammoth	Norris Jct	Old Faithful	West Thumb	Total
Tree In Line	32	22	2	41	5	4	9	17	1	133
Equipment Failure	5	4		5		28		2		44
Snow/Ice	5	4		5	1	1		5		21
Wind	2	3		6			2	1		14
Unknown		1		2		5		1		9
Scheduled Maint.				1		4		1		6
Lightning	1			1	1		1			4
Equip. Overload								3		3
System-Other		1			2					3
Limb In Line		1			1					2
Nature-Other		1			1	1				3
Digging						1		1		2

Public-Other				1				1		2
Other Bird						1				1
Animal-Other						1		1		2
Switching/Relay				1						1
Vehicle Hit					1					1
Total:	45	37	2	63	12	46	12	33	1	251

Table 2 - 2012 Outage Duration/Location/Cause

RANK	LENGTH (mins.)	SUBSTATION	DATE	CUST. OUT	T or D	CAUSE
1	720	Norris Jct.	12/14/2012	24	T	Nature-Tree in Line
2	480	Mammoth	7/28/2012	75	D	System-Equip Failure
3	360	Canyon & So.	3/6/2012	217	T	Nature-Tree in Line
4	360	Madison Jct.	3/17/2012	20	D	Nature-Other
	360	Lake	8/6/2012	20	D	Nature-Tree in Line
6	210	Canyon	4/6/2012	40	T	Nature-Tree in Line
7	120	Lake	4/6/2012	121	T	Nature-Tree in Line
	120	Lake	6/2/2012	121	T	Nature-Tree in Line
9	120	Canyon	6/2/2012	40	T	Nature-Tree in Line
10	100	Canyon	6/27/2012	40	T	Nature-Tree in Line

NWE has used a land mobile radio system within the park until January 1, 2013 when the Federal Communication Commission (FCC) *VHF/UNHF Narrowing Bandwidth Mandate* went into effect. As of that date, all public safety and business industrial land mobile radio systems operating in the 150-512 MHz radio bands had to cease operating using 25 kHz efficiency technology and begin operating using at least 12.5 kHz efficiency technology. The FCC mandate was enacted to ensure more efficient use of the spectrum and greater spectrum access for public safety and non-public safety users. According to NWE engineers, by moving to the narrowband radio requirement, the previous coverage area would be eliminated, meaning that additional radio repeater sites would be required. The past system operated from atop Mount Washburn, located within the north central portion of the park.

NWE does not currently have a narrowband radio system within the park and cell phone coverage is limited. NWE currently uses a few satellite phones though coverage has not been reliable and seems to be hit and miss. An additional communications concern is when outside crews (NWE employees from Bozeman or external) contract crews go into the park. These crews do not have either system available to them. NWE's policies state that all clearances (when someone opens or closes a switch so they can work on a selection of line) must be taken through NWE's radio system so their dispatch and other NWE employees hear what section of line a crew is working on. This is a critical safety procedure that prevents someone from "closing in" or energizing a section of line that someone could be working on.

Purpose

The purpose of the proposal is to provide a reliable and safe electrical distribution system that meets park operational needs and does not unduly impact the visitor experience within the park. Specifically the project is needed to accomplish the following objectives:

1. Increase the reliability and overall service quality of electrical power distribution throughout the park.
2. Reduce impacts to the visitor experience and park operations from disruption of power outages.

3. Improve safety conditions for park visitors, park employees, cooperators, and contractors.

Need

Much of the existing NWE infrastructure was installed in the 1950s is not automated and is prone to frequent outages.

Because of the remoteness of the area and lack of a quality communication system, there is not supervisory control of the electric system in the park. The lack of SCADA control has caused the outages to be longer than if there was supervisory control of the system. As stated above, extended outages have created adverse impacts to park visitors and park operations. These impacts instigated the search for solutions and were the primary driver for the NPS asking NWE to develop alternatives to reduce outage time.

Communication is important between NWE personnel in the field and at the operation centers to allow for clearance procedures, system status, and safety of employees. NWE no longer has an operating land/mobile radio system. Due to terrain, climate, and high number of trees adjacent to a narrow transmission line corridor there are a number of outages every year.

Long and/or frequent outage times negatively affect visitor's experience and cause safety concerns for visitors and NPS/Concessions operations.

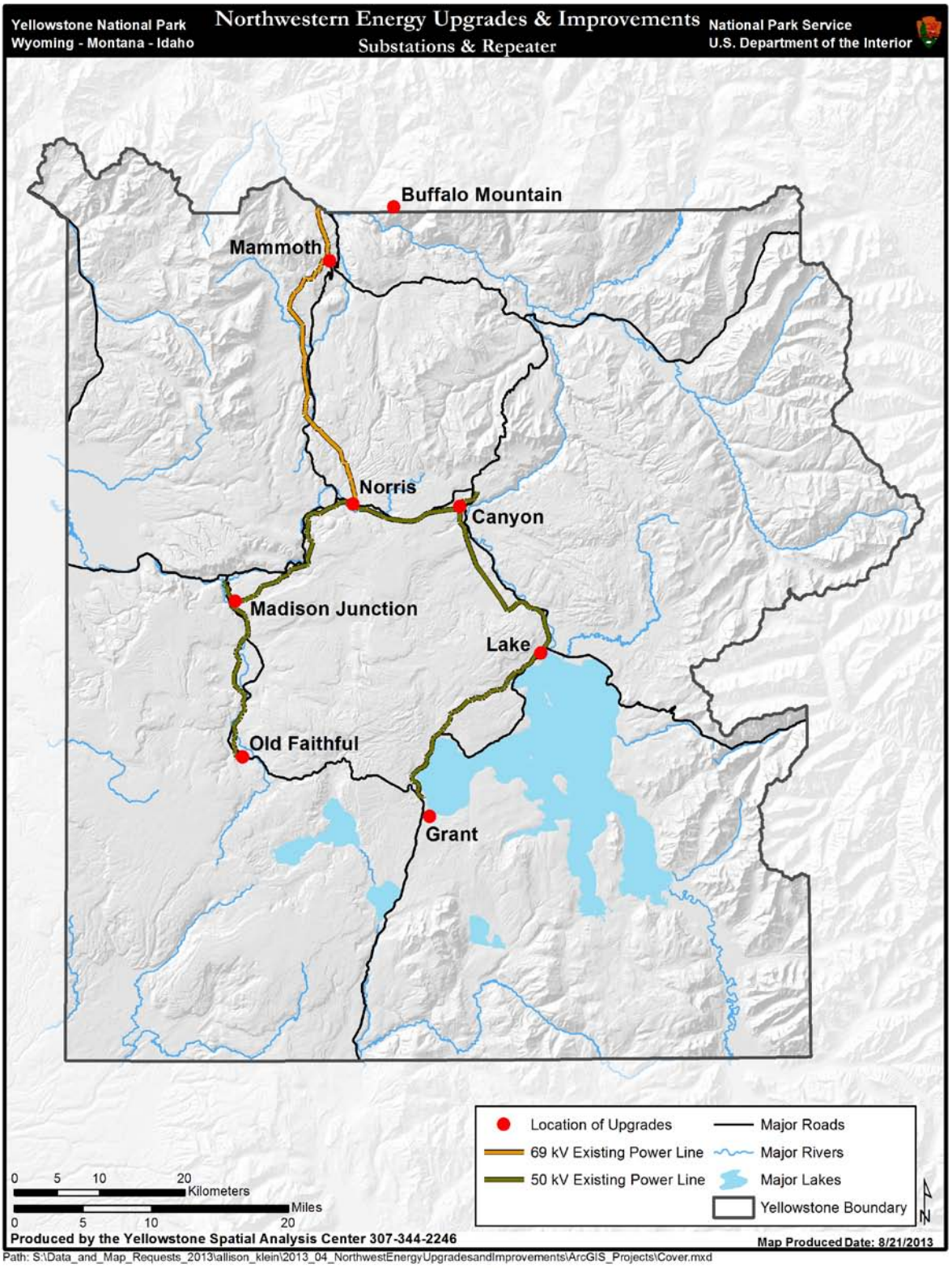


Figure 1 - Project Location and Existing Power Transmission Lines

Relationship to Other Plans and Policies

The Electric Transmission/Distribution System Communication and Automation Plan/EA is consistent with the following plans and policies:

Yellowstone National Park Master Plan (1974) The Master Plan strived to balance human impacts and preservation of park natural, cultural, and scenic resources by developing objectives for General Management, Resource Management, Visitor Use, and Interpretation. The plan specifically addressed the aerial-based utilities on page 30.

> *"All aerial-based utilities including power and telephone transmission lines shall be replaced with substitute facilities that would not infringe upon the natural scene, such as microwave stations, et cetera."*

National Park Service Management Policies (2006) Section 1.5 of the Management Policies directs that the National Park Service must ensure allowed park uses would not cause impairment of, or unacceptable impacts on, park resources and values. A decision to authorize the proposal would be based on a determination that the service:

- is consistent with enabling legislation, and
- is complementary to a park's mission and visitor service objectives, and
- is necessary and appropriate for the public use and enjoyment of the park in which it is located, and
- is not, and cannot be, provided from outside the park boundaries, and
- incorporates sustainable principles and practices in planning, design, siting, construction, and maintenance, and
- adopts appropriate energy and water conservation, source reduction, and environmental purchasing standards and goals, and
- would not cause unacceptable impacts.

Wireless Communications Services Plan (NPS 2008) This plan discusses types of wireless services appropriate for the park, defines guidelines for implementation, and outlines a process for project proposals to follow. This proposal would adhere to this plan.

NPS Directors Order #53: *Special Park Uses* Effective February 23, 2010, this order sets forth policies and procedures for administering special park uses on National Park System lands. As prescribed in this order, the NPS under statutory authority (16 U.S.C. 5) evaluates whether to issue a new or revised right-of-way permit.

Scoping

Scoping is a process to identify the resources that may be affected by a project proposal, and to explore possible alternative ways of achieving the proposal while minimizing adverse impacts. Yellowstone National Park conducted internal scoping with appropriate National Park Service staff, as described in more detail in the *Consultation and Coordination* chapter. The park also conducted external scoping with the public and interested/affected groups and Native American consultation.

External scoping was initiated with the distribution of a scoping letter to inform the public of the proposal to implement a communication and automation plan for the existing power distribution system within Yellowstone National Park and to generate input on the preparation of this environmental assessment. The scoping letter dated May 13, 2013 was mailed to 165 groups, individuals, and agencies that have expressed interest in past planning projects in the park. In addition, the scoping letter was mailed to various federal and state agencies, affiliated Native American tribes, local governments, and local news organizations. Scoping information was also posted on the PEPC website.

During the 30-day scoping period, a total of 11 individuals and businesses submitted correspondence that included comments on the following topics: loss of product and business during outages, visual impacts due to proposed towers, potential for negative impact on historic districts, a need to identify tree heights, justify height needs for towers, consider other alternatives (monitoring telephone cable, green energy, self sufficiency of park's electrical generation, no towers), and hazards to wildlife and birds. The responses included some in favor of the project, some opposed to the project, and some requesting more project information. During tribal consultation, no Native American tribes responded. In response to comments received related to green energy, more efficient use of energy, and self sufficiency of the park regarding electric generation, *NPS Management Policies 2006* 9.1.1.6 (Sustainable Energy Design) "states:

> "any facility development, whether it is a new building, a renovation, or an adaptive reuse of an existing facility, must include improvements in energy efficiency…"

Section 9.1.5 (Utilities) of the same policies states: "

> Energy, water, and wastewater systems would be sited outside park boundaries whenever possible. In-park utilities would be as unobtrusive as possible and have the least possible resource impact. The Service would use municipal or other utility systems outside parks whenever economically and environmentally practicable…"

Section 9.1.7 (Energy Management) states:

> "The National Park Service would conduct its activities in ways that use energy wisely and economically. Park resources and values would not be degraded to provide energy for NPS purposes."

More information regarding scoping and consultation can be found in *Consultation and Coordination* section.

Impact Topics Retained For Further Analysis

Impact topics for this project were identified on the basis of federal laws, regulations, and orders; 2006 *Management Policies*; and NPS knowledge of resources at the park. Impact topics that are carried forward for further analysis in this EA include:

- Soil Resources
- Geothermal Resources
- Vegetation, Rare Plants and Wetlands
- Wildlife
- Special Status Species
- Scenic Resources
- Cultural Resources
- Human Health and Safety
- Visitor Use and Experience
- Park Operations

Impact Topics Dismissed From Further Analysis

As described in the "Environmental Consequences" chapter in this EA, the NPS takes a "hard look" at all potential impacts by considering the direct, indirect, and cumulative effects of the proposed action on the

environment, along with connected and cumulative actions. In those cases where impacts are either not anticipated or are expected to be minor or less, the issues and impact topics are dismissed from detailed analysis. As described in NEPA regulations, NEPA analysis should focus on issues that are truly significant to the action in question, rather than amassing needless detail (Council on Environmental Quality (CEQ) NEPA regulations, 40 CFR 1500.1 (b)). This section identifies the impact topics dismissed from detailed analysis in this EA and provides the rationale for the dismissal. Generally, issues and impact topics are dismissed from detailed analysis for one or more of the following reasons:

- The resource does not exist in the analysis area.
- The resource would not be affected by the proposal, or the likelihood of impacts are not reasonably expected (i.e., no measurable effects)
- Through the application of mitigation measures, there would be minor or less effects (i.e., no measurable effects) from the proposal, and there is little controversy on the subject or reasons to otherwise include the topic.

The NPS uses the concept of "no measurable effects" to determine whether impact topics are dismissed from further evaluation to concentrate its analyses on issues that are truly significant to the action in question, rather than amassing needless detail (CEQ NEPA regulations, 40 CFR 1500.1(b)). For each issue or topic presented below, if the resource is found in the analysis area or the issue is applicable to the proposal, then a limited analysis of direct, indirect, and cumulative effects is presented.

Water Resources

The Clean Water Act establishes the basic structure for regulating discharges of pollutants into the waters of the United States and for regulating water quality standards for surface waters. The purpose of the Clean Water Act is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." National Park Service's 2006 Management Policies require protection of water quality consistent with the Clean Water Act and state that NPS would perpetuate surface waters and groundwaters as integral components of park aquatic and terrestrial ecosystems.

The proposed project sites do not contain surface waters, except for periodic runoff during storm events. Water quality, water quantity, and drinking water are not expected to be affected by the project. The new substation buildings (approximately 384 square feet) would increase the amount of impervious surface in the area, which could possibly increase the erosion potential of the site. To further assist with erosion and water quality, disturbed areas would be re-vegetated and re-contoured following proposed project activities. The proposed action would result in negligible effects to water resources. Because these effects are minor or less in degree, this topic is dismissed from further analysis in this document.

Floodplains

Executive Order 11988 Floodplain Management requires all federal agencies to avoid construction within the 100-year floodplain unless no other practicable alternative exists. The National Park Service under *Management Policies 2006* and Director's Order 77-2 *Floodplain Management* strive to preserve floodplain values and minimize hazardous floodplain conditions. According to Director's Order 77-2 Floodplain Management, certain construction within a 100-year floodplain requires preparation of a statement of findings for floodplains.

The proposed project sites for the NWE Automation and Communication Plan are not within a 100-year floodplain; therefore, a statement of findings for floodplains would not be prepared. Because there are no floodplains in the project sites, this topic is dismissed from further analysis in this document.

Ethnographic Resources

National Park Service's Director's Order-28 *Cultural Resource Management* defines ethnographic resources as any site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it. According to DO-28 and Executive Order 13007 on sacred sites, NPS should try to preserve and protect ethnographic resources.

Tribal contacts (76 persons) of all 26 Native American Tribes associated with YNP were individually contacted in the initial scoping stage of this project to request information about any ethnographic concerns they may have about this undertaking. To date, no concerns or additional information about ethnographic concerns in the proposed project sites have been received by the park. An individual letter to each of the tribes will also be sent when the Environmental Assessment is out for public review to provide an additional opportunity to comment.

Yellowstone National Park has previously completed an Ethnographic Inventory, *American Indians and Yellowstone National Park: A Documentary Overview* (Nabokov and Loendorf, 2002) and further developed an Ethnographic Resource Inventory (ERI) for use when undertakings are proposed.

Museum Collections

According to Director's Order-24 *Museum Collections*, NPS requires the consideration of impacts on museum collections (historic artifacts, natural specimens, and archival and manuscript material), and provides further policy guidance, standards, and requirements for preserving, protecting, documenting, and providing access to, and use of, National Park Service museum collections are stored in the Heritage and Research Center in Gardiner, Montana, or within one of the park visitor centers. The proposed project would not result in the collection of any material that would become part of the park's museum collection, and the sites do not occur in the vicinity of any existing collections. Museum collections would therefore not be affected by the proposed project, and this topic is dismissed from further analysis in this document.

Air Quality

The Clean Air Act of 1963 (42 U.S.C. 7401 et seq.) was established to promote the public health and welfare by protecting and enhancing the nation's air quality. The act establishes specific programs that provide special protection for air resources and air quality related values associated with National Park Service units. Section 118 of the Clean Air Act requires a park unit to meet all federal, state, and local air pollution standards. The park is classified as a Class I area under the Clean Air Act. The park extends into five counties in three states, including Park and Teton in Wyoming, Park and Gallatin in Montana, and Fremont in Idaho. These five counties do not have air pollution levels that persistently exceed the national ambient air quality standards and are designated at non-attainment status (EPA 2012).

Short-term temporary impacts on air quality in the proposed project sites may occur. Construction activities such as bringing in material and operating heavy equipment would result in temporary increases of vehicle exhaust, emissions, and fugitive dust in the project locations. These would be localized and likely dissipate rapidly. The proposed project would not permanently alter air quality or the air quality classification of the park. Because there would be negligible effects on air quality, this topic is dismissed from further analysis in this document.

Soundscape Management

In accordance with NPS's *Management Policies 2006* and Director's Order-47 *Sound Preservation and Noise Management*, an important component of NPS's mission is the preservation of natural soundscapes associated with national park units (NPS 2006). Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. Natural sounds occur

within and beyond the range of sounds that humans can perceive and can be transmitted through air, water, or solid materials. The frequencies, magnitudes, and durations of human-caused sound considered acceptable varies among National Park Service units as well as potentially throughout each park unit, being generally greater in developed areas and less in undeveloped areas.

The proposed sites for the new towers and substations and all construction activity would occur in what can be considered the frontcountry developed administrative area of the park. Existing sounds in this area are most often generated from vehicular traffic and employees. Because the area already contains man-made noises, the towers and substations are not expected to appreciably increase the noise levels in the general area. Noise levels from generators during power outages would decrease. During construction, human-caused sounds would likely increase due to construction activities, equipment, vehicular traffic, and construction crews. Any sounds generated from construction would be temporary, lasting only as long as the construction activity is generating the sounds, and would have a negligible to minor adverse impact on visitors and employees. Because these effects are minor or less in degree, this topic is dismissed from further analysis in this document.

Lightscape Management

In accordance with *Management Policies2006*, NPS strives to preserve natural ambient lightscapes, which are natural resources and values that exist in the absence of human caused light (NPS 2006). The park strives to limit the use of artificial outdoor lighting to that which is necessary for basic safety requirements. The park also strives to ensure that all outdoor lighting is shielded to the maximum extent possible, to keep light on the intended subject and out of the night sky. Other than safety lighting used during times of night maintenance activities or emergency repairs, lighting is not proposed as part of this project. Because these effects are minor or less in degree, this topic is dismissed from further analysis in this document.

Socioeconomics

The proposed action would neither change local and regional land use nor appreciably impact local businesses or other agencies. Implementation of the proposed action is not expected to impact the economies of nearby communities bordering the park. Impacts to the socioeconomic environment would be negligible, therefore this topic is dismissed.

Prime and Unique Farmlands

The Farmland Protection Policy Act of 1981, as amended, requires federal agencies to consider adverse effects to prime and unique farmlands that would result in the conversion of these lands to non-agricultural uses. Prime or unique farmland is classified by the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), and is defined as soil that particularly produces general crops such as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables, and nuts. Because there would be no effects on prime and unique farmlands, this topic is dismissed from further analysis in this document.

Indian Trust Resources

Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by the Department of Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes. No trust resources would be affected by this project, therefore this topic is dismissed from further analysis in this document.

Environmental Justice

Executive Order 12898 *General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. Because there are no minority or low income populations within the proposed project sites, the proposed action would not have disproportionate health or environmental effects on minorities or low-income populations or communities. The project proposal is geared to benefit all visitors and park staff, regardless of race or income. Because there would be no disproportionate effects, this topic is dismissed from further analysis in this document.

Climate Change and Sustainability

Although climatologists are unsure about the long-term results of global climate change, it is clear that the planet is experiencing a warming trend that affects ocean currents, sea levels, polar sea ice, and global weather patterns. Although these changes would likely affect winter precipitation patterns and amounts in the parks, it would be speculative to predict localized changes in temperature, precipitation, or other weather changes, in part because there are many variables that are not fully understood and there may be variables not currently defined. Therefore, the analysis in this document is based on past and current weather patterns and the effects of future climate changes are not discussed further.

Wilderness

NPS *Management Policies 2006* (NPS 2006) states, "All NPS lands would be evaluated for their eligibility for inclusion within the national wilderness preservation system. For those lands that possess wilderness characteristics, no action that would diminish their wilderness eligibility would be taken until after Congress and the President have taken final action. Wilderness considerations would be integrated into all planning documents to guide the preservation, management, and use of the park's wilderness area and ensure that wilderness is unimpaired for future use and enjoyment as wilderness."

Ninety percent (1,963,000 acres) of the park is recommended wilderness in Yellowstone National Park. The proposed project would not impact recommended wilderness areas because the proposed towers, communication systems, and substations upgrades would be located in the developed administrative areas, which are outside of recommended wilderness. Therefore, this topic is dismissed from further analysis in this document.

ALTERNATIVES

Beginning in February of 2013, an interdisciplinary team of NPS employees met for the purpose of developing project alternatives. This meeting resulted in the definition of project objectives as described in the *Purpose and Need,* and a list of alternatives that could potentially meet these objectives. A total of three action alternatives and the no action alternative were identified for this project. Additional alternatives were identified but were dismissed from further consideration for various reasons, as described later in this chapter. Three action alternatives and the no action alternative are carried forward for further evaluation in this EA. A summary table comparing alternative components is presented at the end of this chapter.

Alternatives Carried Forward

Alternative A – No Action

The no action alternative describes the conditions that would continue to exist if no action was taken. The no action alternative provides a baseline for evaluating changes and related environmental impacts that would occur under the action alternatives.

Under the no action alternative, the seven existing power substations would not be upgraded, no new buildings to house communication equipment would be installed, and associated upgrades to the current communication capacities would not occur. Power outages and outage times would not change. Diesel generators would continue to be used during outages at Old Faithful, Lake, and Grant Village. Maintenance of the existing substation systems and components would continue. The Federal Communication Commission (FCC) rule to implement the FCC *VHF/UNHF Narrowing Bandwith Mandate* and operate at 12.5 KHz efficiency prevents NWE from using their old wideband radio system. For communication purposes NWE currently uses, and would continue to use, a few satellite phones though coverage is not reliable.

Alternative B – Upgrade Existing Substations and Install VHF RF Automation and Communication System

Alternative B proposes to upgrade equipment, add automation and control, and add a land/mobile radio system for NWE use to improve reliability, safety, and reduce outage duration. NWE currently has seven existing power substations located within developed areas in Yellowstone National Park and one radio repeater site outside the park on Gallatin National Forest land. These eight locations are generally not visible to the public. Alternative B would connect the locations via a Very High Frequency (VHF) Radio Frequency (RF) communication system; install a new building at six of the substations to house communication and relaying equipment (one of which would replace the smaller existing building at Norris). The substations at Grant Village and Old Faithful already have adequate buildings. A 60-foot tall metal lattice tower would be installed at six substation sites in the park while the Mammoth substation would have a shorter 30-foot tall tower. A 30-foot tower would be possible at Mammoth by using a nearby existing 100-foot tower located at Elk Plaza (0.76 miles NW) to mount a 20’ antenna on. This would allow the Mammoth substation to relay a signal to Elk Plaza. An existing radio repeater site exists outside the park on USDA National Forest property at Buffalo Mountain (2.65 miles SE of Jardine, MT). Small backup propane-fueled generators would be added at sites that do not have them and located inside the communications buildings. Propane tanks would be installed at locations that do not have existing propane facilities. The generators would provide the capability to provide power to the communication and relaying equipment during an outage. Other upgrades would include: new relaying to improve existing technology for operating devices remotely that would be installed in the new buildings; and upgrading existing airbreak switches and reclosers for SCADA capability. Also, at Norris and Lake Potential Transformer (PT) metering devices would be installed. These are devices which reduce the service voltage by a known ratio and are used for metering electricity in very high voltage circuits.

With the proposed upgrades, all seven substations would be able to "talk to each other" and then send information (repeat) back to the eighth location, the Buffalo Mountain repeater, which is southeast of Jardine, MT. This microwave mesh network system would require an Ethernet transceiver and tower mounted antenna at each location. The tower would be a maximum of 60 feet tall depending on the site and near field obstructions (tree, buildings, etc). The antenna would be a VHF yagi that would be similar to a TV antenna and have 24-30" elements. When operating optimally, this would give NWE an Ethernet network that would have 128 Kb bandwidth. Once the data hits the Buffalo Mountain repeater it would be transmitted back to the SOCC for remote control and system status.

This configuration would allow SCADA to the SOCC, future Automatic Meter Reading (AMR), and automation at all 7 locations. The automation capabilities would be for the transmission, substation, and generation portions of the electric system. Future automation would include automation equipment on the distribution portion of the system to further improve the reliability at a low cost to benefit ratio for the developed areas.

This alternative would provide a backbone for the mobile radio system for the safe operation of NWE personnel during outage restoration. It would enable SCADA remote control to reduce outage time and improve reliability. It would provide a reliable communication system with redundancy. Construction would take place in already disturbed areas within or directly adjacent to the existing substations/facilities. Construction of this alternative is expected to take one construction season (April-October). Installation of new towers and buildings would introduce new visual elements to the landscape, though most would not be visible from visitor use areas, roads, or trails.

Elements of this alternative are explained in more detail following:

- **Automated Control and Data System** – A SCADA System would be installed at each substation site. The SCADA system transmits and receives data in real time about what is occurring with controls, metering, measuring, safety and monitoring of process devices such as Electrical equipment, Instrumentation devices, telecommunication on industrial applications. Power system elements ranging from pole-mounted switches to entire power plants can be controlled remotely over long distance communication links. Remote switching, telemetering of grids (showing voltage, current, power, direction, consumption in kWh, etc.), even automatic synchronization is used in some power systems. These upgrades would be able to be monitored and controlled by a central office located in Butte, Montana to allow for remote switching of power, fault locations, and to ultimately reduce the duration of power outages within the park. It would also allow for automatic reading of meters measuring power use.
- **Advanced Metering Infrastructure (AMI)** – Advanced metering systems are comprised of state-of-the-art electronic/digital hardware and software, which combine interval data measurement with continuously available remote communications. These systems enable measurement of detailed, time-based information and frequent collection and transmittal of the information. In short, this system would allow for automatic meter reading for electric energy use in the park for energy supplied by NWE. The detailed (short-time interval) information collected could be used to pinpoint problems regarding energy consumption, and help the park move forward in improving its energy efficiency. Infrastructure would include replacing existing meters on buildings with meters that have small antennas and radios that would communicate with the installed towers.
- **Radio Communication System** – On January 1, 2013, all public safety and business industrial land mobile radio systems operating in the 150-512 MHz radio bands must cease operating using 25 kHz efficiency technology, and begin operating using at least 12.5 kHz efficiency technology. This deadline was the result of an FCC mandate that began almost two decades ago to ensure more efficient use of the spectrum and greater spectrum access for public safety and non-public safety

users. Cellular or satellite phones are not a reliable option due to limited coverage and lack of dependability. The proposed land/mobile radio system would consist of radio repeaters located at each of the seven existing substations within the park. Antenna up to 20-feet would be mounted atop a 60 foot metal lattice tower located at each substation, and at Buffalo Mountain. These antennas would be able to communicate with the next substation down the NWE corridor, and so on. The system would allow NWE workers to communicate anywhere along the corridor and via Buffalo Mountain back to the NWE offices in Butte and Bozeman, MT. The coverage area would be focused on the transmission line corridor only within the park. The proposed radio communication system would be used solely by NWE personnel; no public use would be authorized. The existing NPS land/mobile radio system is not an option for NWE use. The frequencies on the NPS system are for federal use and the radios are government property items. The NPS would not be authorized to issue a "Memorandum of Agreement" for its use.

- **Equipment Buildings** – At the existing power substations, new pre-fabricated buildings would be placed to provide needed space for all existing relays to be moved or replaced into the dedicated panels. Mobile radio equipment would also be housed inside the buildings. The standard size for these buildings would be 16 feet by 24 feet to accommodate the relay and communication equipment needed for automation. They would have a metal roof, be built on a 6 inch concrete slab and meet NPS specification for color and finish. At Canyon and Madison, the building size has been reduced to a 16' by 20' because less relay space is needed. At Mammoth a 12' by 20' building is proposed. The smaller building footprint would reduce the environmental impacts and overall size of the substation facilities at these locations. The buildings would be placed to reduce the amount of visual impact. At Norris and Mammoth new buildings would replace existing older control buildings.

Figure 2 - Proposed Building (typical)

- **Communication System Towers** – A new tower would be installed at each of the seven substations, and at Buffalo Mountain. The towers would be 60 feet tall, 24 inches wide, three-legged, of a metal lattice design, and would

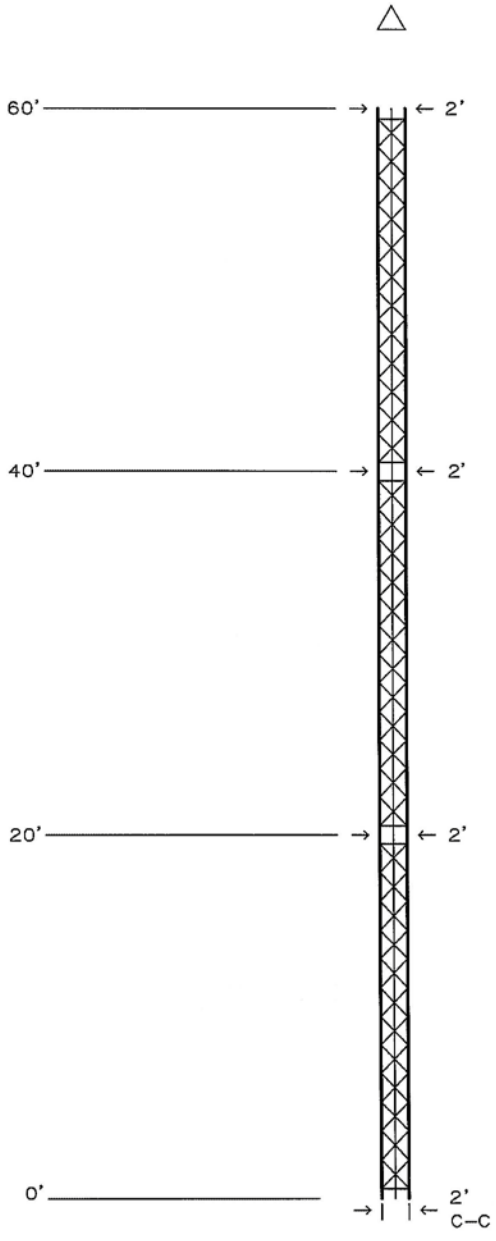


Figure 3 - Proposed Tower Design

have a dull matte finish. The Mammoth substation tower would be 30 feet tall. The Buffalo Mountain tower could be 6 feet wide to support a microwave dish depending on the alternative selected. All towers would be equipped with a VHF antenna that would be similar to a TV antenna and have 24-30 inch elements. No tower lighting is proposed. A concrete foundation (approximately 6'x6'x6'deep) would be placed at each location to support the tower. Figure 1-2, shows a typical design representation of the tower proposed for each site. The NPS conducted a visual analysis of a potential tower for each site in July 2013 to help in analyzing the visual impacts associated with the proposed towers. Photo simulations are provided in Section 3.2. The lattice design of the towers would allow for climbing the structure year-round, an advantage when maintenance of equipment and antennas is required in the winter months. Lattice towers also provide much less deflection due to wind which increases the reliability of equipment mounted on them.

In general, all proposed locations for tower placements were sited to minimize the amount of the visual impact. The towers would have a dull non-shiny finish to reduce the reflective concerns. A whip style antenna, up to 20 feet, would be mounted to the top of the tower to ensure good signal strength between substation towers.

- **Access –** Established park roads would be used to access the substation locations. These roads would not require improvements and would be used in their current condition.
- **Generators** – Each equipment building would be equipped with a propane back-up generator that is served from a 500 gallon propane tank. The generators would only provide power for communication and relay equipment sot that NWE would be able to remotely control switches and have system status indication.
- **Propane Tank** – Each of the propane tanks would be a 500 gallon capacity (1,000 gallon at Buffalo Mountain) and about 3.5'diameter and 8' long. Most tanks would be located within the fenced area of the substation and screened by the equipment building from view by the public. Burial of the tanks within the fenced area is not possible due to a buried cable ground mat that dissipates power sustained by potential lightning strikes. At Old Faithful an existing buried NPS propane tank would be used and LPG would be metered for NWE use. This would eliminate the need for a separate propane tank at this location. Each propane tank would provide fuel for a backup generator that would supply power for communication and relay equipment.
- **Temporary Construction Office** – No temporary construction office would be needed, all coordination of construction would occur from existing NWE buildings at Lake, Grant, and Old Faithful.
- **Construction Staging** – Staging areas would be used for construction, material stockpiling, and equipment storage. Staging would occur only within already disturbed areas immediately adjacent to the substations, or at approved maintenance or service areas within the park approved by the NPS. No new impacts to soils and vegetation would occur from staging areas.

Table 3 - Alternative B Components

Alternative B Components	Equipment Building	Tower	Propane Tank	Communication
Mammoth	12’ X 14’ (Communications) + 12’x7’(generator) Concrete slab buildings	30’ tower, plus 20’ omni-directional antenna mounted to side of tower	Generator + 500 gallon above ground tank	Narrow band Land/Mobile Radio on proposed towers
Norris	16’ X 24’ Concrete slab building	60’ tower, plus 20’ omni-directional antenna mounted to top of tower	Generator + 500 gallon above ground tank	Narrow band Land/Mobile Radio on proposed towers
Canyon	16’ X 20’ Concrete slab building	60’ tower, plus 20’ omni-directional antenna mounted to top of tower	Generator + 500 gallon above ground tank	Narrow band Land/Mobile Radio on proposed towers
Lake	16’ X 24’ Concrete slab building	60’ tower, plus 20’ omni-directional antenna mounted to top of tower	Generator + 500 gallon above ground tank	Narrow band Land/Mobile Radio on proposed towers
Grant Village	No building construction needed	60’ tower, plus 20’ omni-directional antenna mounted to top of tower	Generator + Use existing tank	Narrow band Land/Mobile Radio on proposed towers
Old Faithful	No building construction needed	60’ tower, plus 20’ omni-directional antenna mounted to top of tower	Generator + use existing underground propane tank	Narrow band Land/Mobile Radio on proposed towers
Madison	16’ X 20’ Concrete slab building	60’ tower, plus 20’ omni-directional antenna mounted to top of tower	Generator + 500 gallon above ground tank	Narrow band Land/Mobile Radio on proposed towers
Buffalo Mountain (Outside park boundary)	12’ X 20’ Concrete slab building	60’ tower, plus 20’ omni-directional antenna mounted to top of tower	Generator + 1,000 gallon above ground tank	Narrow band Land/Mobile Radio on proposed towers

Mammoth Install a new 12'x14' building on a 6" concrete slab for proposed communications equipment, install 12'x7' building on 6" concrete slab for proposed generator, install a 30-foot tower on a 6'x6'x6' concrete foundation, reroute conduit to the new building and remove the old building, install a propane tank. Install a 20' omni-directional antenna to the side of the existing 100' tall Elk Plaza tower.

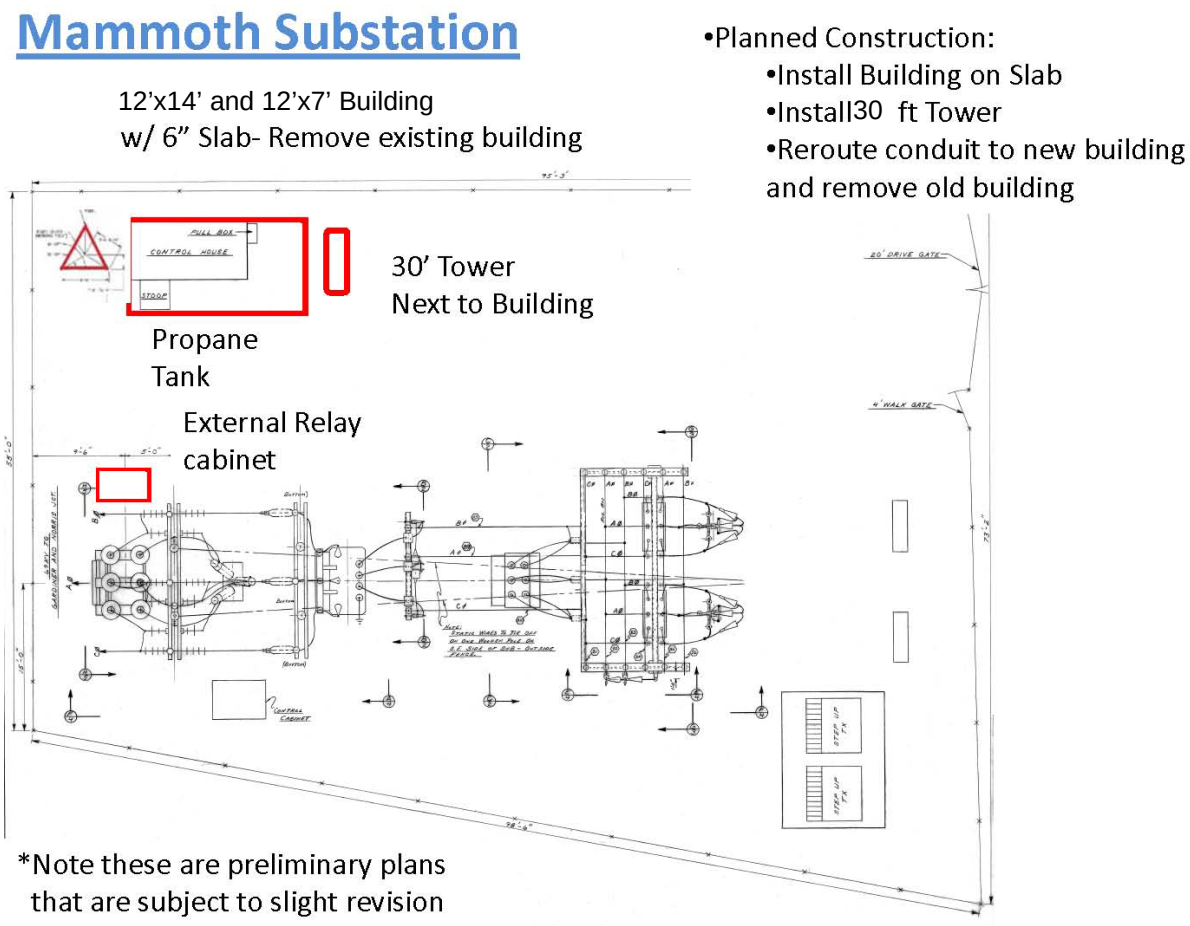


Figure 4 - Mammoth Substation

Norris Remove about 40 feet of existing fence, install a new 16'x24' building on a 6" concrete slab. This new building would replace the current control building that is 10'x12' in size. Install a 60-foot tower on a 6'x6'x6' concrete foundation, move relays, reroute conduit to new building, install 2 each three-phase PT, install a propane tank.

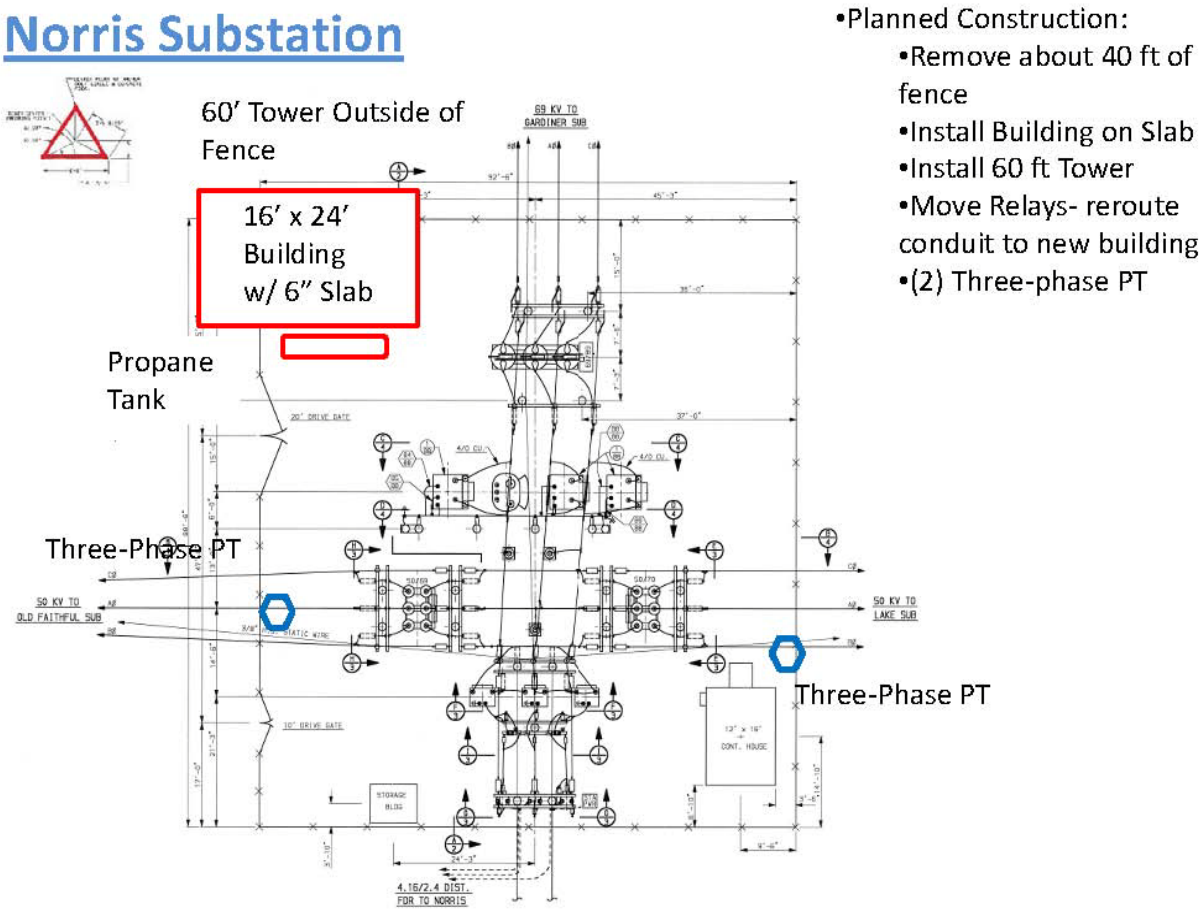


Figure 5 - Norris Substation

Canyon Install a new 16'x20' building on a 6" concrete slab, install a 60-foot tower on a 6'x6'x6' concrete foundation, remove the existing battery cabinet and reroute conduit to the new building, install a propane tank.

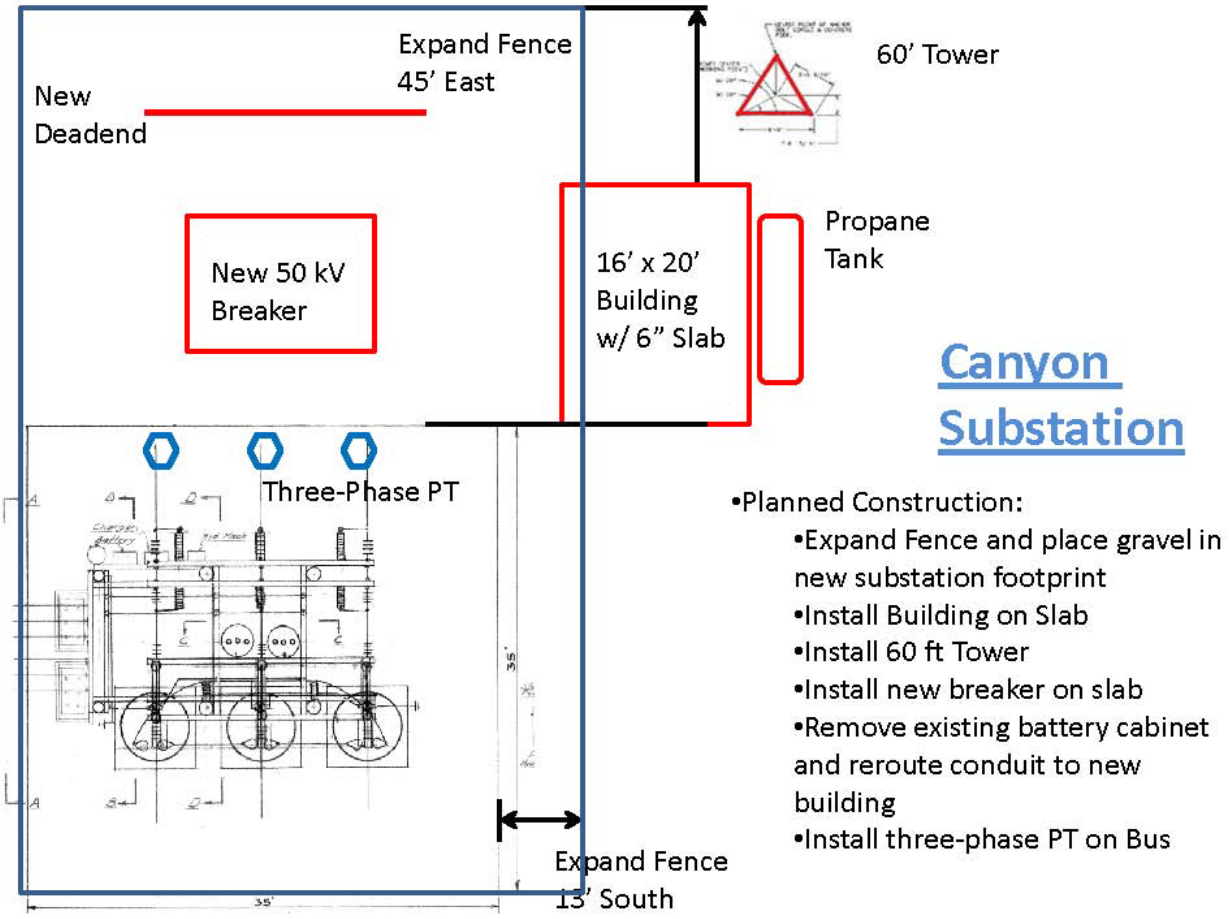


Figure 6 - Canyon Substation

Lake Remove a portion of the fence to allow the installation of a new 16'x24' building on a 6" concrete slab, install a 60-foot tower on a 6'x6'x6' concrete foundation, reroute conduit to the new building, install an upgrade for the generator controls, install 4 each single phase PT, provide for a future electronic recloser upgrade, install a propane tank.

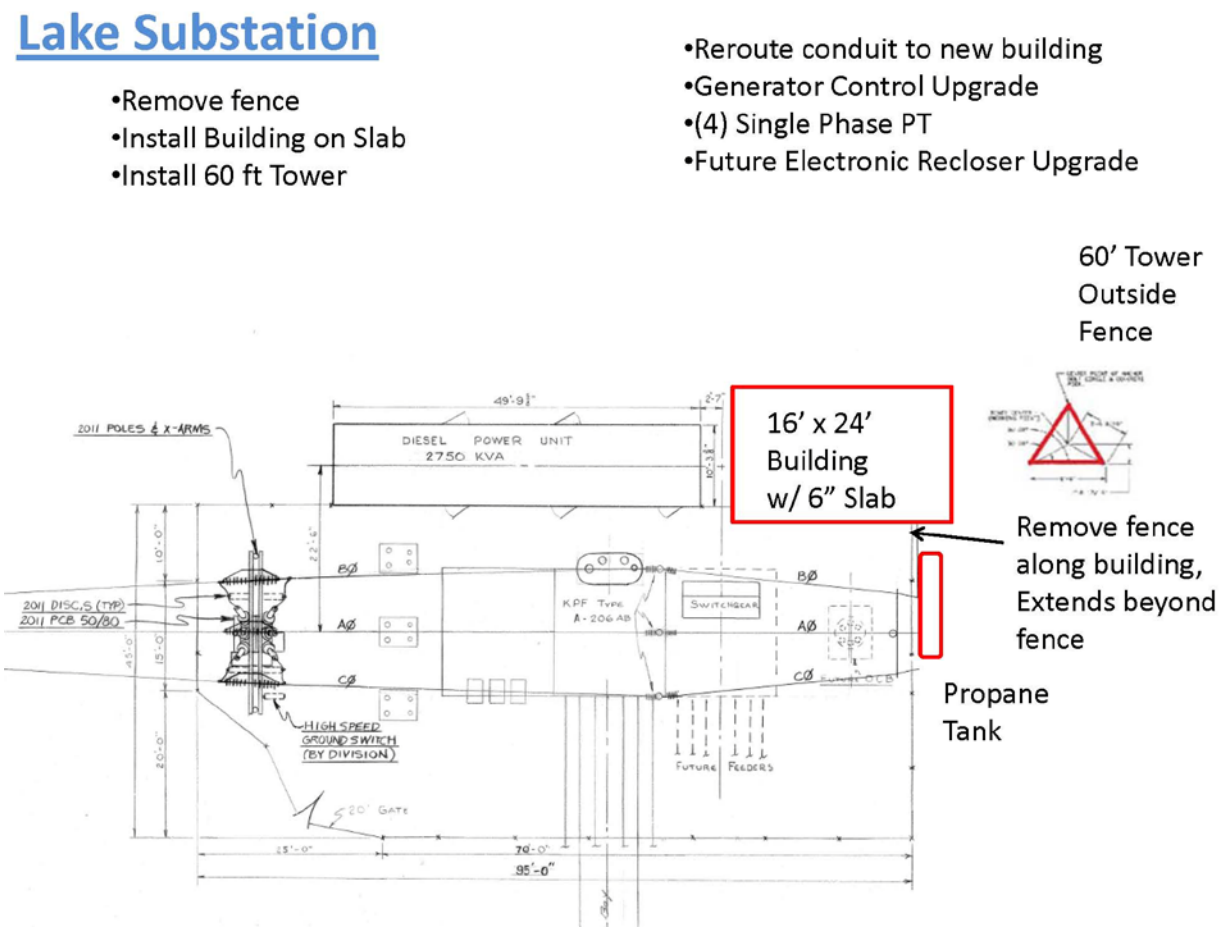


Figure 7 - Lake Substation

Grant Install a 60-foot tower on a 6'x6'x6' concrete foundation, upgrade the generator controls, provide for a future electronic recloser upgrade.

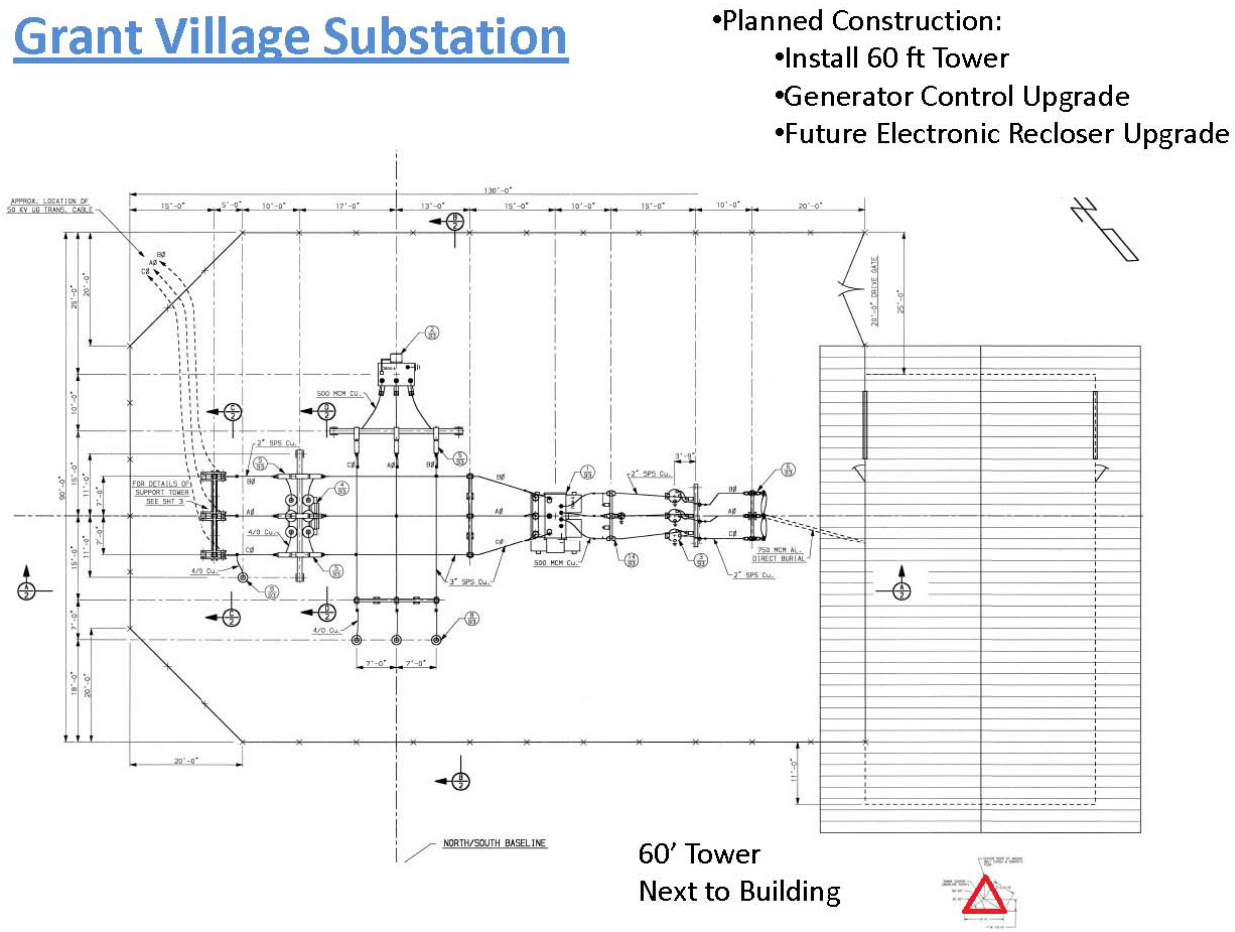


Figure 8 - Grant Village Substation

Madison Install a new 16'x20' building on a 6" concrete slab, import fill material as a base for the new building, install a 60-foot tower on a 6'x6'x6' concrete foundation, install a new dead-end structure, replace transmission switches, remove the existing battery cabinet and install in the new building, install a propane tank.

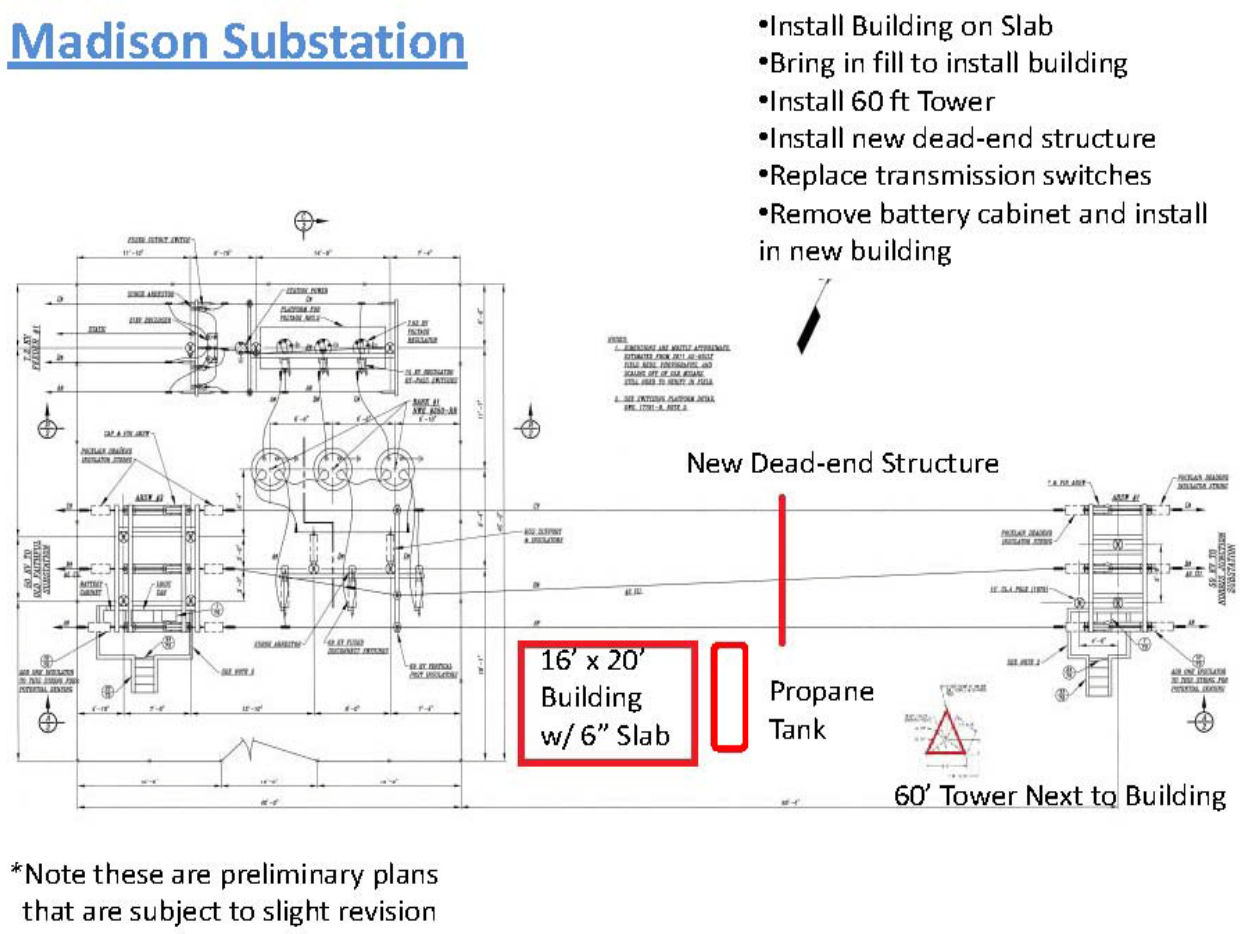


Figure 9 - Madison Substation

Old Faithful Install a new 16'x24' building on a 6" concrete slab, install a 60-foot tower on a 6'x6'x6' concrete foundation, reroute conduit to the new building, upgrade the generator controls, provide for a future electronic recloser upgrade, replace transmission switches, install a propane tank.

Figure 10 - Old Faithful Substation

Buffalo Mountain Install a new 12'x20' communication building on a 6" concrete slab, install a 60-foot x 6' wide lattice tower on a 13'x13' concrete foundation, reroute conduit to the new building, remove existing building, install backup generator and a 1,000 gallon propane tank.

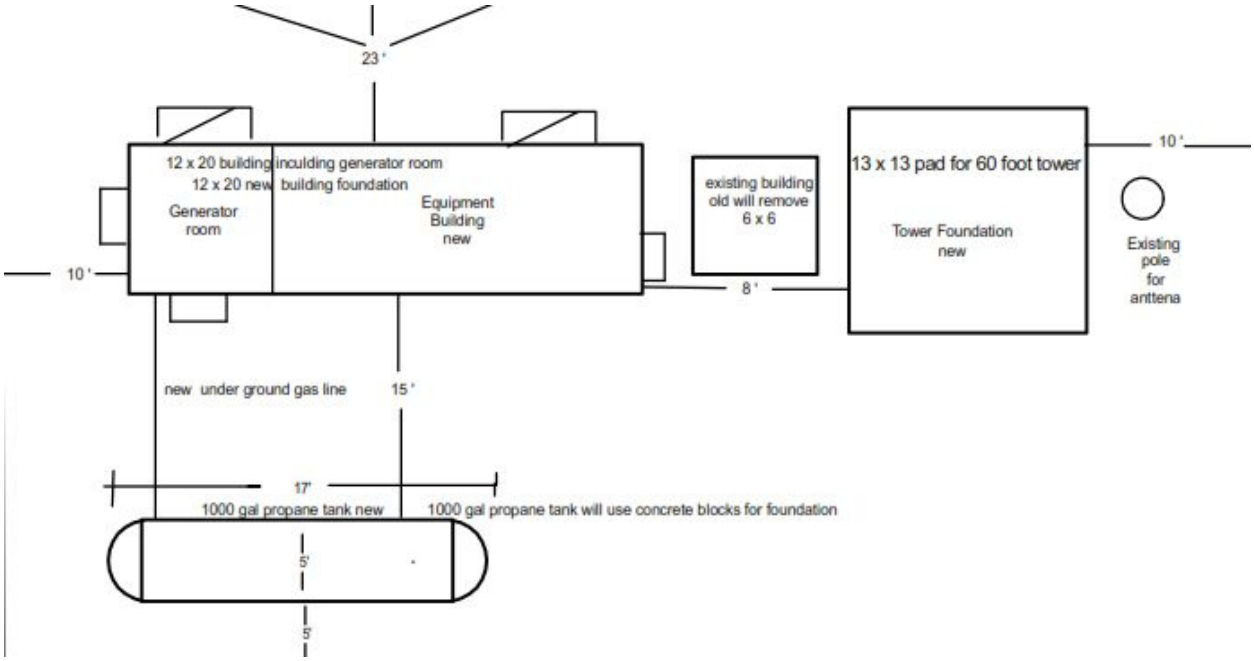


Figure 11 - Buffalo Mountain Repeater

Alternative C – Upgrade Existing Substations and Install Automation and Communication System Via Fiber and Microwave

This alternative would install approximately 90 miles of fiber optic cable within the existing ROW for the transmission lines. Towers, as described in Alternative B, would be required to support antennas for a land mobile radio communication system for NWE personnel. Proposed equipment buildings, generators, propane tanks would be the same as described for Alternative B. This alternative would enable SCADA remote control to reduce outage time and improve reliability.

This alternative would use fiber optic cable buried within the existing NWE right-of-way corridor to provide SCADA for the electrical equipment. The fiber would installed in 2 inch conduit and placed at a depth of about 24-36" underground. Installation of the cable would require trenching or plowing cable within the 40-foot wide corridor. Some tree cutting may be required to try and avoid wetlands, rare plant sites, or archeological sites along the corridor. In areas where these sites cannot be avoided it may be necessary to trench or plow through the site, or bore under the site. The distance required for installation, plus the rugged terrain would mean that construction activities would occur over multiple peak seasons. Construction is anticipated to take three to four years- with a construction season of 5-6 month a year, full time work with at least two crews. Actual schedules would be dependent upon weather (snow and frost) conditions.

Table 4 - Alternative C Components

Alternative C Components	Equipment Building	Tower (for land/mobile radio system)	Propane Tank	Communication System
Mammoth	12’ X 14’ (communications) 12 X 7’ generator Concrete slab buildings	30’ tower at substation, antenna on existing Elk Plaza tower	500 gallon above ground tank	Narrow band Land/Mobile Radio on proposed towers
Norris	16’ X 24’ Concrete slab building	60’ tower, plus 20’ omni-directional antenna	500 gallon above ground tank	Narrow band Land/Mobile Radio on proposed towers
Canyon	16’ X 20’ Concrete slab building	60’ tower, plus 20’ omni-directional antenna	500 gallon above ground tank	Narrow band Land/Mobile Radio on proposed towers
Lake	16’ X 24’ Concrete slab building	60’ tower, plus 20’ omni-directional antenna	500 gallon above ground tank	Narrow band Land/Mobile Radio on proposed towers
Grant Village	No building construction needed	60’ tower, plus 20’ omni-directional antenna	Use existing tank	Narrow band Land/Mobile Radio on proposed towers
Old Faithful	No building construction needed	60’ tower, plus 20’ omni-directional antenna	No tank, use existing underground tank adjacent to the site.	Narrow band Land/Mobile Radio on proposed towers
Madison	16’ X 20’ Concrete slab building	60’ tower, plus 20’ omni-directional antenna	500 gallon above ground tank	Narrow band Land/Mobile Radio on proposed towers
Buffalo Mountain (Outside park boundary)	12’ X 20’ Concrete slab Communication-only building	60’ tower, plus 20’ omni-directional antenna	1,000 gallon above ground tank	Narrow band Land/Mobile Radio on proposed towers

Alternative D – Upgrade Existing Substations and Install Indication and Communication System via Satellite Phones

This alternative consists of installing a Very Small Aperture Terminal (VSAT), such as exists at Old Faithful, at each of the seven substations within the park. The VSAT system would allow the SOCC to

monitor system status and receive indication of system problems much earlier that currently occurs. A VSAT is a two-way satellite ground station with a dish diameter of approximately 4-feet. This alternative would require a structure to mount the antenna (a small dish type) and to keep it above the snow. This structure though, at approximately 6-feet, would be much shorter than what is being proposed in alternative B. All proposed equipment buildings, generators, propane tanks would be the same as described for Alternative B. Automation (SCADA) of the system is not possible with a satellite-based system due to the latency involved in sending and receiving signals. The satellite system would provide "indication only" of trouble within the system. The NWE electric system works on 60 cycles per second. The latency of the satellite signals is about 3 cycles. This signal can also be affected by weather and terrain and is considered too slow for safe operation of a SCADA system. NWE linemen would still be required to physically visit the site and manually throw the switches and breakers. This system would be the least expensive to construct and would introduce the fewest new elements onto the landscape. This alternative though would not provide for automation of the system, and would not allow for a land mobile radio system or AMR, would be susceptible to snow outages, and would not provide safety benefits or reliability improvements to the existing system. Construction of this alternative is expected to take one construction season (April-October).

Table 5 - Alternative D Components

Alternative D Components	**Equipment Building**	**Short Structure for Satellite Dish**	**Propane Tank**	**Communication System**
Mammoth	12'X 14' +12'X7' Concrete slab bldgs.	Yes (approx. 6')	500 gallon above ground tank	Satellite phones No towers
Norris	16' X 24' Concrete slab building	Yes (approx. 6')	500 gallon above ground tank	Satellite phones No towers
Canyon	16' X 20' Concrete slab building	Yes (approx. 6')	500 gallon above ground tank	Satellite phones No towers
Lake	16' X 24' Concrete slab building	Yes (approx. 6')	500 gallon above ground tank	Satellite phones No towers
Grant Village	No building construction needed	Yes (approx. 6')	Use existing tank	Satellite phones No towers
Old Faithful	No building construction needed	Yes (approx. 6')	No tank, use existing underground tank adjacent to the site.	Satellite phones No towers
Madison	16' X 20' Concrete slab building	Yes (approx. 6')	500 gallon above ground tank	Satellite phones No towers
Buffalo Mountain (Outside park boundary)	12' X 20' Concrete slab Comm.- only building	Yes (approx. 6')	1,000 gallon above ground tank	Satellite phones No towers

Mitigation Measures

The following mitigation measures were developed to minimize the degree and/or severity of adverse effects and would be implemented during construction of any of the action alternatives, as needed:

General Construction

- Because disturbed soils are susceptible to erosion until re-vegetation takes place, standard erosion control measures such as silt fences and/or sand bags would be used to minimize any potential soil erosion.
- The NPS project manager would be responsible for ensuring that the project remains within the construction limits.
- Fugitive dust generated by construction would be controlled by spraying water on the construction site, if necessary.
- To reduce noise and emissions, construction equipment would not be permitted to idle for long periods of time.
- To minimize possible petrochemical leaks from construction equipment, the contractor would regularly monitor and check construction equipment to identify and repair any leaks.

Soils

- To minimize the amount of ground disturbance, staging and stockpiling areas would be in previously disturbed sites, away from visitor use areas to the extent possible. All staging and stockpiling areas would be returned to pre-construction conditions following construction.
- Construction zones would be identified and fenced with construction tape, snow fencing, or some similar material prior to any construction activity. The fencing would define the construction zone and confine activity to the minimum area required for construction. All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone as defined by the construction zone fencing.

Vegetation

- Re-vegetation and re-contouring of disturbed areas would take place following construction and would be designed to minimize the visual intrusion of the structure. Re-vegetation efforts would strive to reconstruct the natural spacing, abundance, and diversity using native species. All disturbed areas would be restored as nearly as possible to pre-construction conditions shortly after construction activities are completed. Weed control methods would be implemented to minimize the introduction of noxious weeds. Some trees may be removed, but other existing vegetation at the site would not be disturbed to the extent possible.

Wildlife, Birds, & Federally Threatened, Endangered and Special Status Species

- Construction workers and supervisors would be informed about special status species. Contract provisions would require the cessation of construction activities if a species were discovered in the project area, until park staff re-evaluates the project. This would allow modification of the contract for any protection measures determined necessary to protect the discovery.
- Any proposed towers would be free-standing and not use guy wires for support. No lighting would be present on any proposed tower.

Archeological Resources

- Should construction unearth previously undiscovered cultural resources, work would be stopped in the area of any discovery and the park would consult with the state historic preservation officer and

the Advisory Council on Historic Preservation, as necessary, according to §36 CFR 800.13, *Post Review Discoveries*. In the unlikely event that human remains are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (1990) would be followed.

- The NPS would ensure that all contractors and subcontractors are informed of the penalties for illegally collecting artifacts or intentionally damaging paleontological materials, archeological sites, or historic properties. Contractors and subcontractors would also be instructed on procedures to follow in case previously unknown paleontological or archeological resources are uncovered during construction.

Geothermal Resources

- Contact the park geologist if any of the following conditions are encountered: 1. A pre-existing hole in the ground the size of a basket ball, or larger, 2. Standing or flowing water, either hot or cold, 3. Any concentrations of either carbon dioxide or hydrogen sulfide are measured, 4. If during excavation a red clay layer is encountered, or 5. Temperatures above 80 degrees Fahrenheit are measured (early morning).

Visual Resources

- To minimize visual impacts, the surfaces of the tower would be treated such that they would minimize refection. Galvanized metal lattice towers would be treated with an acid wash that would quickly weather the material and reduce its shiny qualities. Towers would be located to take advantage of screening offered by existing trees, and in locations to best minimize visual impacts.

Visitor Use & Experience

- Construction would be done to minimize impacts to visitors. To avoid noise during quiet hours, no night work would occur.

Alternatives Considered and Dismissed

The following two alternatives were considered for project implementation, but were ultimately dismissed from further analysis. Reasons for their dismissal are provided in the following alternative descriptions.

Tower Design -A Wooden Glue Laminated Beam (60- foot height) was considered as an option to a metal lattice tower. While this type of tower can blend fairly well in a forested setting, most of the sites are not visible to the public. When the site is visible, this type of tower can appear bulky and imposing, and can appear as out of place due to their squared corners and large size. This type of tower is difficult to maintain as a bucket truck is needed to access the pole (6-8 months a year). During the winter months NWE would not be able to maintain the poles which could lead to a communications outage during the time of year that experiences the most outages. This type of tower also deflects more in the wind than a lattice tower, and deflection issues would cause system reliability concerns. Additional excavation depth would be required to install this type of tower, a minimum of 8 foot setting depth would be needed. In active geothermal areas (i.e., Old Faithful, Norris, etc.) the NPS strives to minimize excavation.

Install Automation and Communication System Via Fiber Optic Cable atop existing and replaced Transmission Line Poles

This alternative would have used fiber optic cable that could be strung on the poles supporting existing transmission lines within the existing NWE ROW. Because of code violations, All Dielectric Self–Supporting Optical Cable (ADSS) would not have been an option for this project. This would require Optical Groundwire (OPGW), where this is placed in the same location as the static wire.

If fiber optic cable were to be strung on the existing transmission line poles, the low structural integrity of the existing poles would need to be addressed. It is estimated that at least 40% of all poles along the 90

mile corridor would need replaced. New pole design specifications may also require taller poles. In addition, since the wire is on top of the poles that typically fail due to falling trees during storms; this would greatly affect the reliability of this system. It is very likely that a communication outage would occur at the same time as a power outage, if it was tree or storm related. Construction would occur during the non-winter months over multiple years. Additional maintenance issues would need to be addressed that would involve access to the problem sites in the winter and working on the line with no accessibility for line trucks and other necessary equipment.

This alternative for automating the rerouting of power and control of the system would likely fail for the same reasons for the power outage occurred. In most cases this alternative would not increase the reliability or reduce outage duration. This alternative was dismissed because it only partially meets the purpose and need for the project and the project objectives.

Alternative Summaries

Table 1 summarizes the major components of Alternatives A, B, C, and D, and compares the ability of these alternatives to meet the project objectives (the objectives for this project are identified in the *Purpose and Need* chapter). As shown in the following table, Alternative B and C both meet each of the objectives identified for this project, while the No Action and Alternative D do not address all of the objectives.

Table 6 - Summary of Alternatives and How Each Alternative Meets Project Objectives

Alternative Elements	Alternative A No Action	Alternative B VHF RF System plus Tower	Alternative C Fiber Optic plus Towers	Alternative D Satellite System plus Satellite Phone
Supervisory Control and Data Acquisition System (SCADA)	No SCADA system	SCADA system installed	SCADA system installed	No SCADA, system status indication only (latency issues prevent SCADA)
Communication System/New tower required for system?	Satellite phones, cell phones when coverage permits/No	Land-mobile radio system/Yes	Land-mobile radio system/Yes	Satellite Phones, cell phones when coverage permits/No
Equipment Building	No new buildings, existing facilities only	New buildings at all but Old Faithful and Grant	New buildings at all but Old Faithful and Grant	New buildings at all but Old Faithful and Grant
Towers required for SCADA System	No, SCADA not installed	Yes, towers at each substation and Buffalo Mountain	Yes, but tower only required at Mammoth (30')w/antenna on Elk Plaza, and a 60' tower at Buffalo Mountain	No, though short structures would be required to keep satellite dish above snow in winter
Generators	No	Yes	Yes	Yes
Propane Tanks	No	Yes, but not at Old Faithful (use existing)	Yes, but not at Old Faithful (use existing)	Yes, but not at Old Faithful (use existing)
Construction required outside of existing substation sites	No	No	Yes, either trench or sting fiber optic line down entire ROW within park	No
Project Objectives	**Meets Project Objectives?**	**Meets Project Objectives?**	**Meets Project Objectives?**	**Meets Project Objectives?**
Increase the reliability and overall service quality of electrical power distribution throughout the park.	No. Power outages would continue as in the past, linemen would need to drive from Bozeman to the park in winter months to manually throw switches and troubleshoot the system. No automation of the system would occur	Yes. SCADA automation equipment would be installed to allow remote switching of equipment and quicker locates of breaks in the line.	Yes. SCADA automation equipment would be installed to allow remote switching of equipment and quicker locates of breaks in the line.	No, SCADA not installed, electric system status is all that is transmitted. Latency of satellite signal prohibits ability to remotely control switches/breakers.
Reduce impacts to	No. Resource	Yes. Power	Yes. Power	No, delays would

visitor services and park operations from disruption of power outages and provide expected outage restoration times	impacts associated with diesel generator exhaust and noise would continue as in the past.	generation from large diesel generators could be minimized by hours our days in many instances, by getting power back on the grid as soon as possible	generation from large diesel generators could be minimized by hours our days in many instances, by getting power back on the grid as soon as possible	continue as at present. No automation of equipment would occur.
Improve safety conditions for park visitors, park employees, cooperators, and contractors.	No. A new radio system would not be installed. No automation of substation equipment would occur.	Yes. A land mobile radio system would be installed using towers at each of the substations to relay reliable signals enabling communications for NWE personnel working in the powerline corridor. Automation of equipment would improve safety to NWE personnel, National Park Service, Employees, Concessioner's and visitors, as contrasted with needing to manually throw switches and breakers.	Yes. A land mobile radio system would be installed using towers at each of the substations to relay reliable signals enabling communications for NWE personnel working in the powerline corridor. Automation of equipment would improve safety to NWE personnel, National Park Service, Employees, Concessioner's and visitors, as contrasted with needing to manually throw switches and breakers.	No. Satellite phone system is unreliable, no automation of substation equipment would occur.

Table 7 summarizes the anticipated environmental impacts for Alternatives A, B, C, and D. Only those impact topics that have been carried forward for further analysis are included in this table. The *Environmental Consequences* chapter provides a more detailed explanation of these impacts.

Table 7 - Environmental Impact Summary by Alternative

Impact Topic	Alternative A – No Action	Alternative B VHF RF System plus Tower	Alternative C Fiber Optic plus Towers	Alternative D Satellite System plus Satellite Phone
Soil Resources	Minor, short- and long-term, adverse	Minor, short- and long-term, adverse	Moderate, short- and long-term, adverse	Minor, short- and long-term, adverse
Geothermal Resources	Negligible, short- and long-term, adverse	Negligible, short- and long-term, adverse	Moderate, short- and long-term, adverse	Negligible, short-term, adverse
Vegetation & Wetlands	Minor, short- and long-term, adverse	Minor, short- and long-term, adverse	Moderate, short- and long-term, adverse	Minor, short- and long-term, adverse

Impact Topic	Alternative A – No Action	Alternative B VHF RF System plus Tower	Alternative C Fiber Optic plus Towers	Alternative D Satellite System plus Satellite Phone
Wildlife	Minor, Long-term, Adverse and Beneficial	Minor, Short- and Long-term, Adverse	Minor, Short- and Long-term, Adverse	Minor, Short- and Long-term, Adverse
Federally Threatened, Endangered and Special Status Species	Minor, Short- and Long-term, Adverse	Minor, Short- and Long-term, Adverse	Minor, Short- and Long-term, Adverse	Minor, Short- and Long-term, Adverse
Visual Resources	Negligible, Short- and Long-term, Adverse	Minor, Short- and Long-term, Adverse	Minor, Short- and Long-term, Adverse	Negligible, Short- and Long-term, Adverse
Cultural Resources	Minor, Short- and Long-term, Adverse	Minor, Short- and Long-term, Adverse	Moderate, Short- and Long-term, Adverse	Minor, Short- and Long-term, Adverse
Human Health and Safety	Minor, Short- and Long-term, Adverse	Minor, Short- and Long-term, Adverse	Minor, Short- and Long-term, Adverse	Minor, Short- and Long-term, Adverse
Visitor Use and Experience	Minor and Adverse, and Moderate and Beneficial	Minor Short- and Long-term Adverse, and Moderate Short- and Long-term Beneficial	Minor Short- and Long-term Adverse, and Moderate Short- and Long-term Beneficial	Minor Short- and Long-term Beneficial
Park Operations	Negligible to Moderate, Short-term, Adverse	Moderate, Short- and Long-term, Beneficial	Moderate, Short- and Long-term, Beneficial	Minor, Long-term, Beneficial

Environmentally Preferable Alternative

According to the CEQ regulations implementing NEPA (43 CFR 46.30), the environmentally preferable alternative is the alternative "that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources. The environmentally preferable alternative is identified upon consideration and weighing by the Responsible Official of long-term environmental impacts against short-term impacts in evaluating what is the best protection of these resources. In some situations, such as when different alternatives impact different resources to different degrees, there may be more than one environmentally preferable alternative."

Alternative A, *No Action*, would not provide any improvement in the reliability or safety of the current NWE electrical transmission and distribution system within the park. The current method of switching power during outages involves manually throwing large switches mounted high above ground level using "extenda poles". The lack of a reliable communications system for NWE employees further increases the safety risk of working on the lines and transferring power. The current functioning of the existing substations do not improve health and safety standards in terms the power company being able to work on and maintain the line which is contrary to assuring safe surroundings. Although it minimizes potential impacts to park resources because there would be no construction, it does not achieve a balance between these resources for the long-term because the eventual lack of power would likely result in closing of park facilities and services to the public. This alternative also does not meet the criteria for improving the

reliability of electric service because the existing substations and communication system employed by NWE personnel do not reduce outage times, and continue to use an unreliable satellite phone system.

Alternative B (*VHF RF System plus Towers*) is the environmentally preferred alternative because, while it places new and additional infrastructure on the ground, it would increase the reliability of the electric transmission and distribution in the park by reducing outage frequency and duration by using a SCADA system that allows remote switching from a central office. Safety of visitors and employees would be enhanced by reducing outage frequency and duration allowing medical facilities less disruption, medical equipment recharging by visitors, and less disruption to operations within the park. NWE line worker safety would be increased by removing the need to manually operate large switches and breakers within the substations, reducing frequency and duration of outages to visitors, staff, and residents of the park. Improvements would be made by providing a working environment for the power company workers that improves health and safety related working conditions. New facilities would be placed at existing substations, of which most are currently not visible to the public.

Alternative C (*Fiber Optic plus Towers*) is not the environmentally preferable alternative because it would require 3-4 years of construction occurring in the park's backcountry, and would impact wildlife, geothermal areas, wetlands, archeological sites, and rate plants within the corridor. While this alternative does meet the objectives of the project, it does so with additional impacts, takes more time, and increases cost.

Alternative D (*Satellite System plus Satellite Phones*) is not the environmentally preferable alternative because, although there would be no construction or ground disturbing activities that would damage previously undisturbed elements of the biological and physical environment. The reliability of the existing electric transmission system is not improved; the alternative would not allow for remote control of substation equipment, workers would still assume risk by throwing switches manually; Communications with other line workers and central office remain unreliable.

Preferred Alternative

No new information came forward from public scoping or consultation with other agencies to necessitate the development of any new alternatives, other than those described and evaluated in this document. Alternative B is the environmentally preferable alternative and better meets the project objectives; therefore, it is also considered the NPS preferred alternative. For the remainder of the document, Alternative B is referred to as the preferred alternative.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the affected environment (existing setting or baseline conditions) and analyzes the potential environmental consequences (impacts or effects) that would occur as a result of implementing the proposed project. Direct, indirect, and cumulative effects are analyzed for each resource topic carried forward. Potential impacts are described in terms of type, context, duration, and intensity. General definitions are defined as follows, while more specific impact thresholds are given for each resource at the beginning of each resource section.

- **Type** describes the classification of the impact as either beneficial or adverse, direct or indirect:
  - *Beneficial*: A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.
  - *Adverse*: A change that moves the resource away from a desired condition or detracts from its appearance or condition.
  - *Direct*: An effect that is caused by an action and occurs in the same time and place.
  - *Indirect*: An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable.
- **Context** describes the area or location in which the impact would occur. Effects may be site-specific, local, regional, or even broader.
- **Duration** describes the length of time an effect would occur, either short-term or long-term:
  - *Short-term* impacts generally last only during construction, and the resources resume their pre-construction conditions following construction.
  - *Long-term* impacts last beyond the construction period, and the resources may not resume their pre-construction conditions for a longer period of time following construction.
- **Intensity** describes the degree, level, or strength of an impact. For this analysis, intensity has been categorized into negligible, minor, moderate, and major. Because definitions of intensity vary by resource topic, intensity definitions are provided separately for each impact topic analyzed in this EA.

Cumulative Impact Scenario

The CEQ regulations which implement NEPA require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7).

Cumulative impacts were determined by combining the impacts of the alternatives with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects at the park and, if applicable, the surrounding region. The geographic scope for this analysis includes actions within and outside the park's boundaries, while the temporal scope includes projects within a range of approximately ten years. Given this, the following projects were identified for the purpose of conducting the cumulative effects analysis, listed from past to future:

- **Parkwide Road Improvement Plan (1992)** – This plan proposes to preserve and extend the service life of principal park roads, enhance their safety, and continue access to Yellowstone National Park and its features.

- **Parkwide Telephone Modernization EA (1992) -** This EA proposed modernization of the park's substandard, inefficient telephone system that is difficult and expensive to maintain and does not provide an adequate level of service. The purpose of this EA was to describe the effects of a parkwide telephone modernization program. The vast majority of new cables would follow existing routes or be installed in previously disturbed terrain, thus, under NPS policies; these cable routes would be categorically excluded from further environmental compliance.

- **Mammoth Cellular Sites EA (1998) -** This EA proposed two sites for construction of a cellular tower to serve the Mammoth area. The preferred site was the Elk Plaza site.

- **Old Faithful / Grant Cellular Site EA (1999) -** This EA proposed construction of two cellular towers, one in the Old Faithful area and the other in the Grant Village area. The Grant site was within the existing footprint of an already disturbed area used for communications purposes. The Old Faithful site was adjacent to an already disturbed site near an underground water storage tank.

- **Tower Roosevelt Comprehensive Plan / EA (2009) -** This plan proposed moderate development in the Tower-Roosevelt Area to protect resources and enhance visitor experience. The proposal included planning zones, prescriptions, design standards, and projects with a net gain of 11,025 square feet of building development and 33,000 square feet of pavement. Changes were proposed in the area adjacent to the existing gas station, the Tower administrative area, the Tower Fall General Store, and Yancy's Hole. A new barn would replace an existing barn in the corral area. The plan proposed changes to relocate the existing parking area in front of Roosevelt Lodge to enhance the historic views.

- **Wireless Communications Services Plan / EA (2009) -** Under the preferred alternative, cell towers would be excluded from recommended wilderness, from along park road corridors, and from minor developed areas such as Norris and Madison. The preferred alternative would also restrict towers, antennas, and wireless service to a few developed areas in order to protect park resources and limit the impact on park visitors. This would limit cell phone service to major park developments and would limit WiFi service to hotels and stores. Cell phone reception outside developed areas is not intended, and therefore would be variable. In addition, the preferred alternative addressed moving the current cell tower at Old Faithful to reduce its visibility from the historic district and geyser basin, improving and consolidating communications facilities on Mount Washburn and adding cellular service to the Lake and Fishing Bridge areas.

- **Native Fish Management Plan (2010)** – This plan proposes to conserve native fish from threats of non-native species, disease, climate induced environmental change, and provides guidance and an adaptive framework for managing fisheries and aquatic resources.

- **Tower-Roosevelt Comprehensive Plan (2010)** – This plan proposed to alter or improve visitor services, facilities (buildings, roads, and paved parking areas), and utilities while preserving the distinct and significant rustic western camp character and resources in the Tower-Roosevelt area. This plan does not increase the footprint of the developed area.

- **Lake Area Comprehensive Plan / EA (2012) -** This plan proposed moderate development in the Lake Area (includes Lake, Fishing Bridge, and Bridge Bay) to protect resource and enhance

visitor experience. The proposal included planning zones, prescriptions, design standards, and projects with a net gain of 120,600 square feet of building development and 277,600 square feet of pavement. The plan addressed existing planning, provided for changes in the lake administrative area, allowed infill of the existing footprint in the Fishing Bridge RV Park, consolidation of the Lake Lodge Cabins away from Lodge Creek, and adaptive use of historic structures. It also addressed circulation in front of the Lake Hotel. This plan replaced the 1988 Fishing Bridge development concept plan / environmental impact statement (DCP/EIS) and 1993 Lake DCP/EA.

- **Bechler Administrative Area Improvement Plan/EA (2013)-**Actions proposed in this EA would improve visitor experience and park operations by addressing day use and overnight parking, circulation, employee housing, utilities, and telecommunication functions. The EA evaluates three alternatives; alternative A - no action; alternative B – construction of single or multiple employee housing units to accommodate six park employees, and construction of a new visitor contact station; alternative C – construction of a single multiplex employee housing unit to accommodate six park employees and adaptive reuse of the existing visitor contact station.
- **Non-native Vegetation Management Plan (2013)** – This plan provides guidance to prevent, eradicate, and control the spread of non-native plants through the use of manual and herbicide methods.
- **Winter Use Supplemental Environmental Impact Statement (2013) -** This SEIS manages future motorized oversnow vehicle access by focusing on impacts to park resources, visitors, and staff members rather than focusing on snowmobile and snowcoach numbers. The winter of 2013/2014, snowmobile access would be managed the same way as 2012/2013, with up to 318 commercially guided BAT snowmobiles and 78 snowcoaches. Starting with the winter of 2014/2015, the park would begin managing access by "transportation events." The park would allow up to 110 "transportation events" a day, initially defined as either one snowcoach or a group of up to 10 snowmobiles, averaging no more than 7 snowmobiles. No more than 50 transportation events a day would be allocated for groups of snowmobiles. Furthermore, over the next few seasons the park would require snowmobiles to meet new, improved BAT standards and require snowcoaches to meet BAT standards for the first time. The preferred alternative would continue to allow motorized oversnow vehicle travel over Sylvan Pass.
- **Wild and Scenic Rivers EA (in progress)** - The National Park Service and U.S. Fish and Wildlife Service are developing a comprehensive river management plan for 99 miles of designated river segments within and along the boundary of Grand Teton and Yellowstone national parks, the John D. Rockefeller, Jr. Memorial Parkway, and the National Elk Refuge.
- **NEON (future):** The National Ecological Observatory Network (NEON) is a continental-scale monitoring platform for discovering and understanding impacts of climate change, land use change, and invasive species on ecology. NEON would gather long-term data on ecological responses of the biosphere to changes in land use and climate, and on feedbacks with the geosphere, hydrosphere, and atmosphere. It would consist of distributed sensor networks and experiments, linked by advanced cyber infrastructure to record and archive ecological data for at least 30 years. The Yellowstone Northern Range site has been selected by NEON, Inc. as one of 20 Core Wildland Sites throughout the country. Core NEON sites would require permanent scientific monitoring equipment. A full proposal would detail what types and where such infrastructure is needed. Any infrastructure proposals would follow the guidelines determined through this plan and additional compliance might be required.
- **Hazard Fuel Reduction in Developed Areas (ongoing)** – Many developed areas in Yellowstone have been evaluated and treated for hazard fuel reduction projects, and all of the developed areas must be monitored. Tree canopy density needs to be modified to stop crown fires, which may

initially take several years to accomplish through treatment. A quality fuel reduction project would make allowances for wind-throw, and over the course of a few years of conservative treatment, the final canopy spacing would be achieved. Accumulated dead and down fuels would be removed using chainsaws, chippers and possibly some small, minimal footprint types of machinery. Fuel that is not chipped and removed may be piled and burned when it is safe and appropriate to do so.

- **Right-of-Way Maintenance (ongoing)** – NorthWestern Energy maintains a 40 foot wide right-of-way (ROW) along existing utility line corridors. This ROW is maintained in a variety of fashions depending upon how heavily the corridor is re-vegetating. Vegetation under the power lines is removed be hand crews using chainsaws, or by rubber-tired front loaders with mounted fecon heads, or by metal tracked excavators with horizontal rotating slash grinding heads mounted where the bucket would be.

Project Locations

The locations of the seven substations located within the park, and the Buffalo Mountain repeater site are common to all action alternatives. An aerial view and a photo of each of these sites follow to show the existing condition of each.

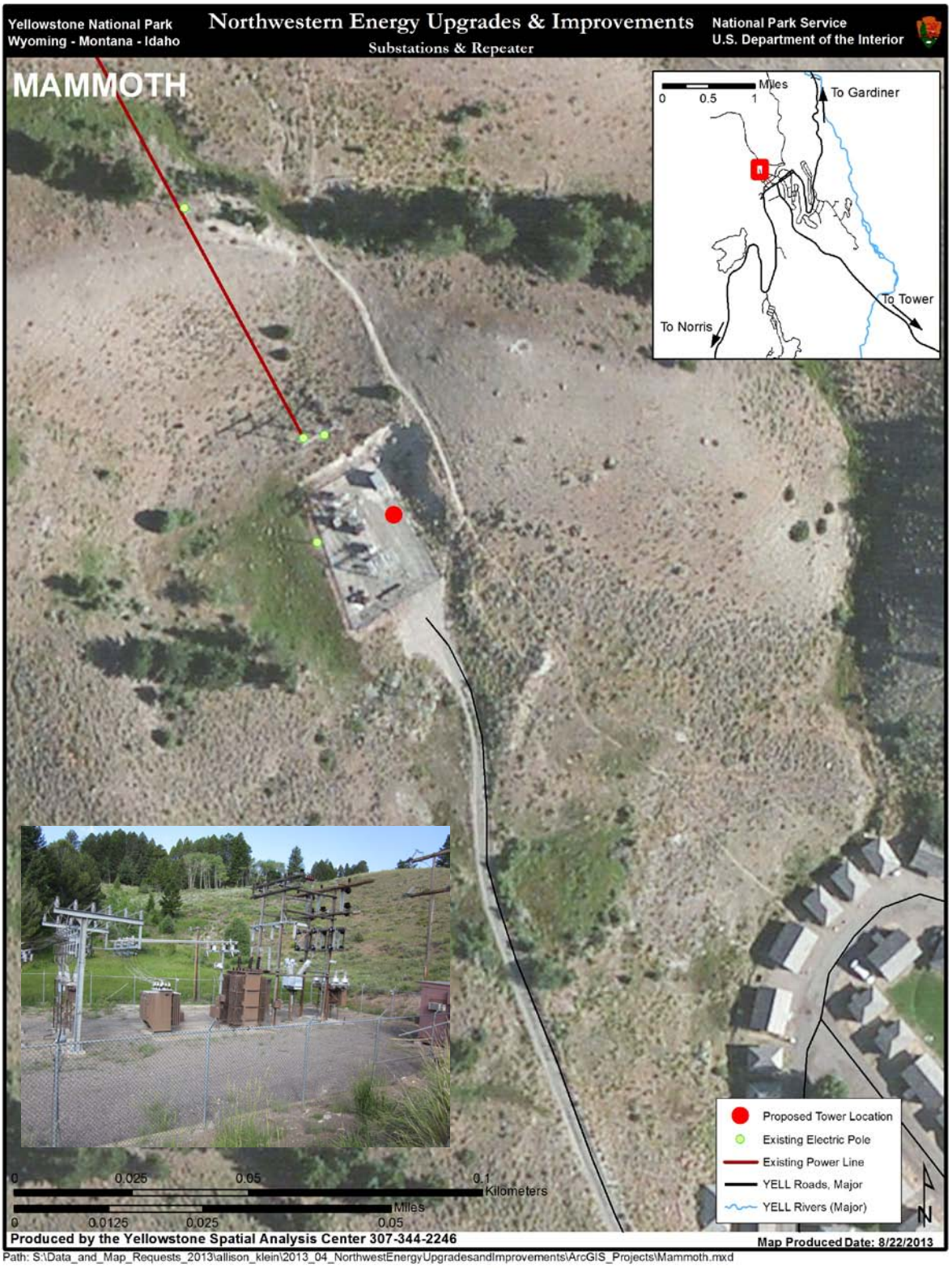


Figure 12 - Mammoth Substation Existing Conditions

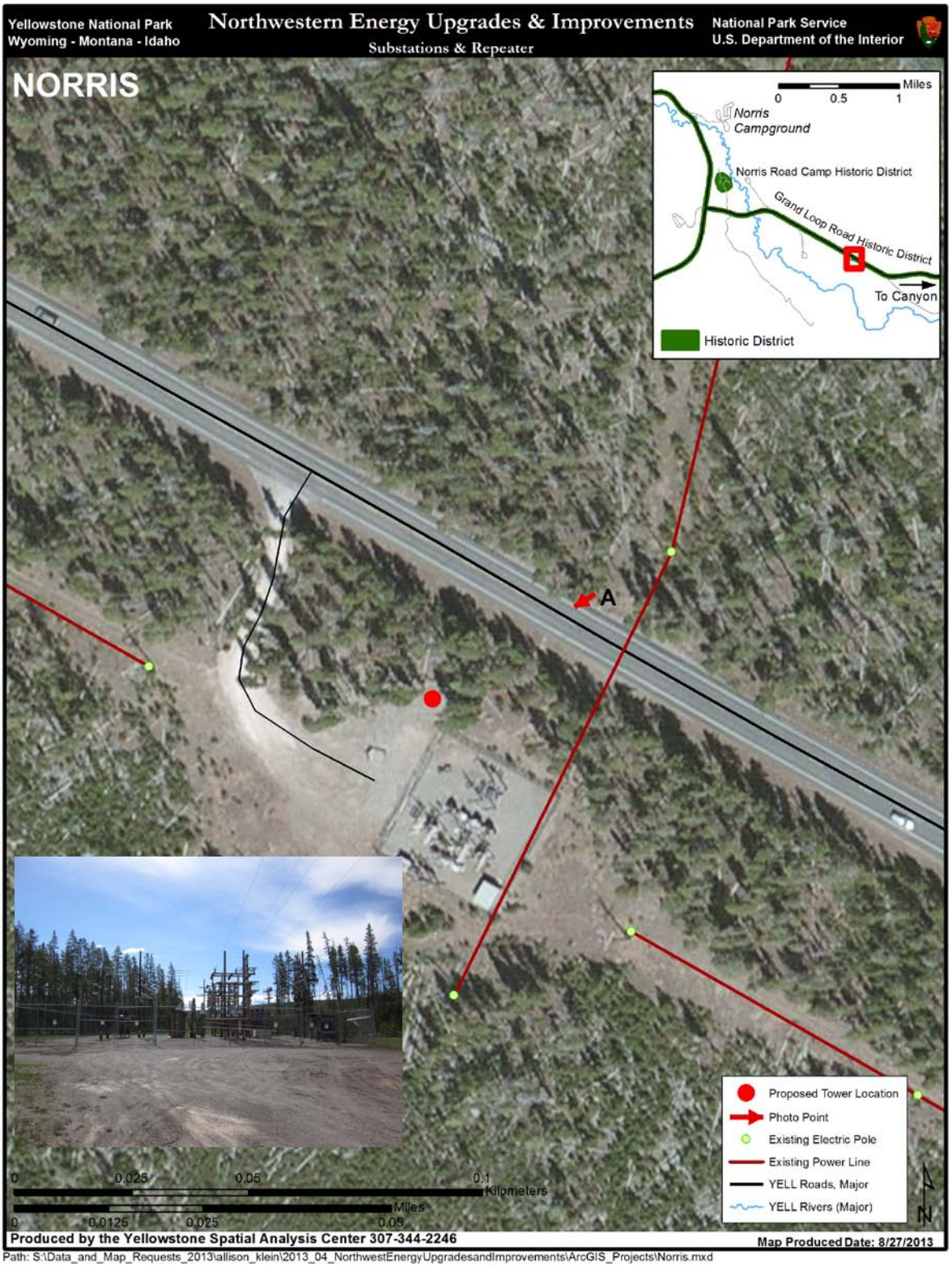


Figure 13 - Norris Substation Existing Conditions

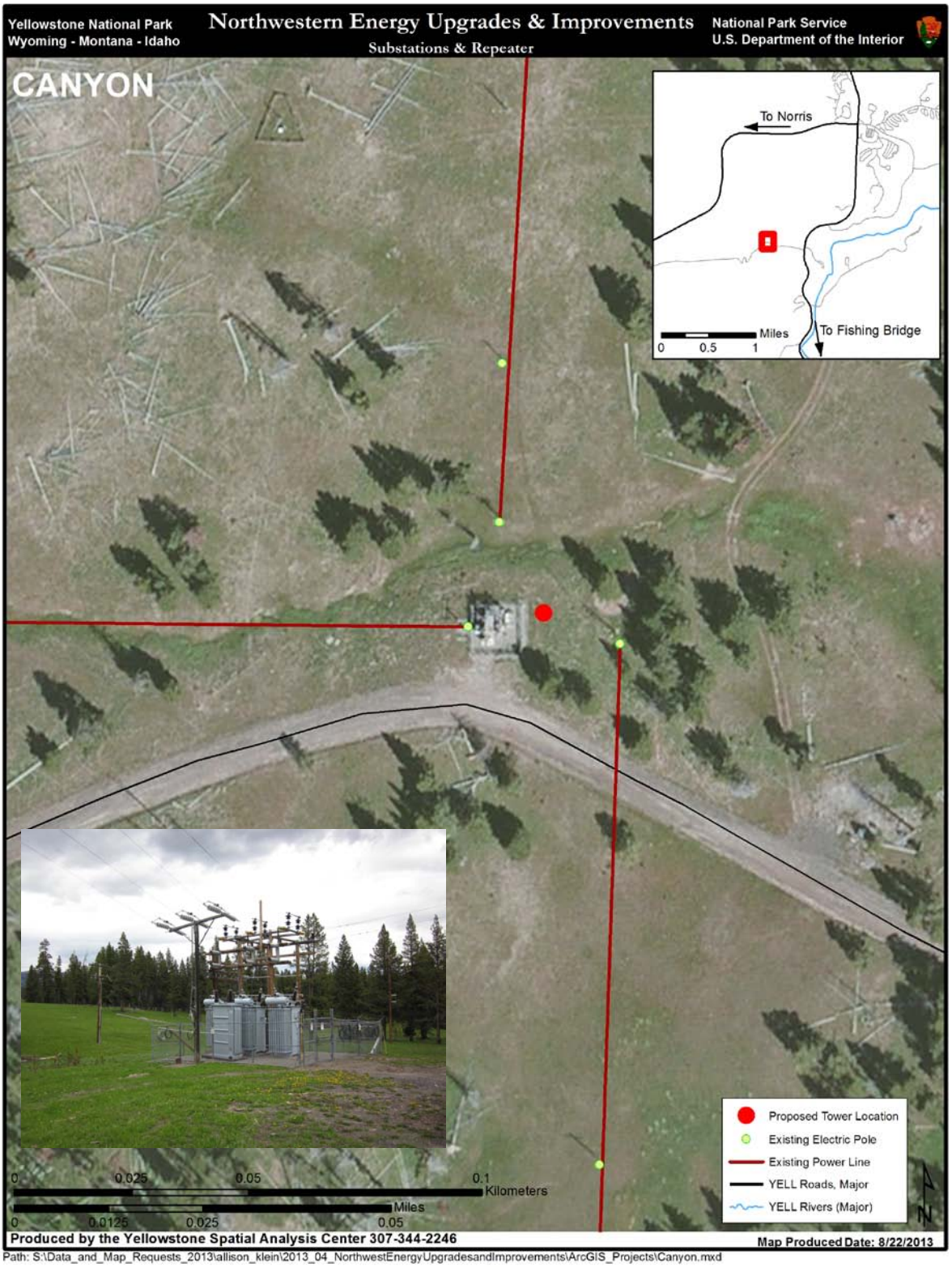


Figure 14 - Canyon Substation Existing Conditions

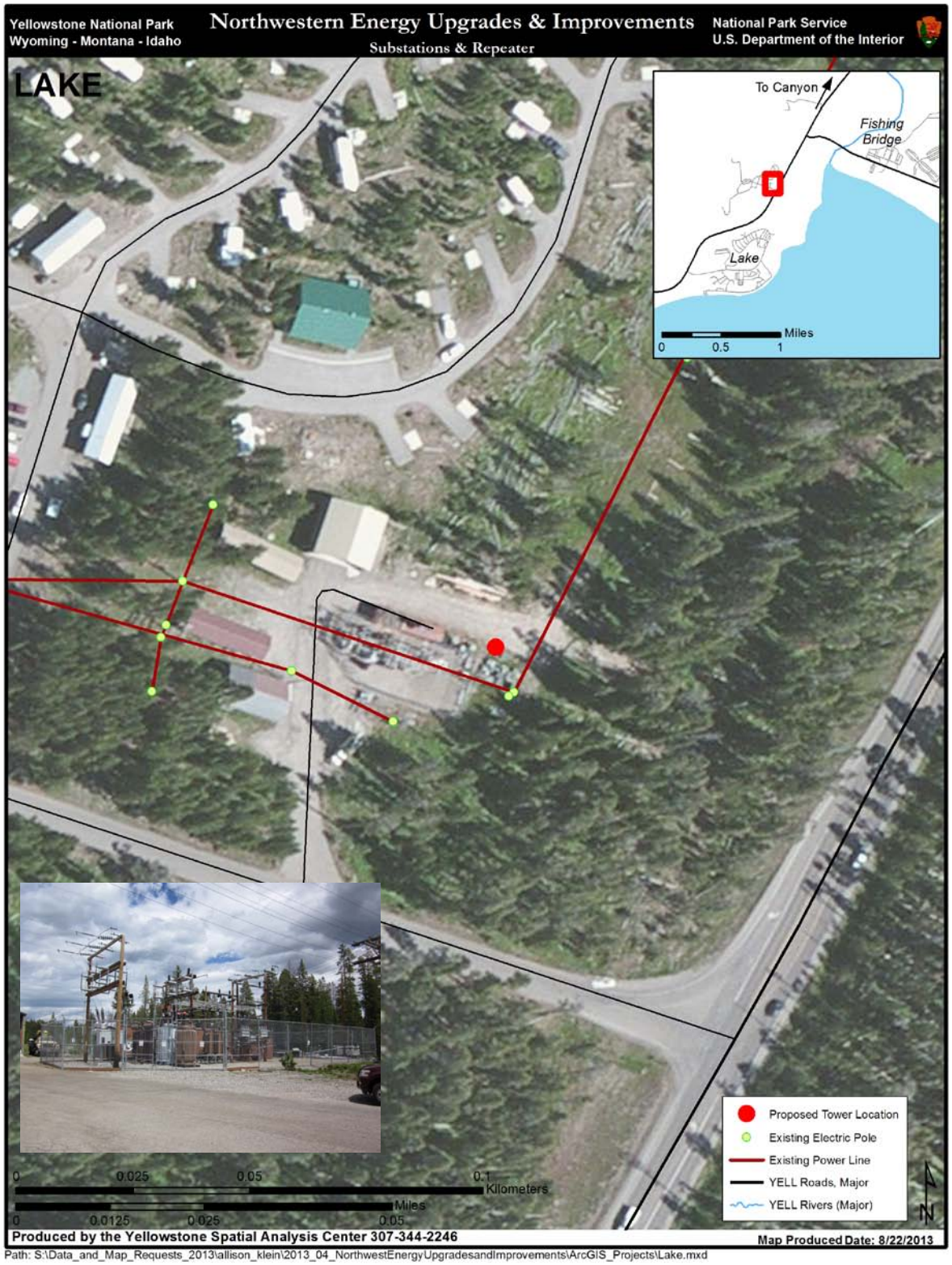


Figure 15 - Lake Substation Existing Conditions

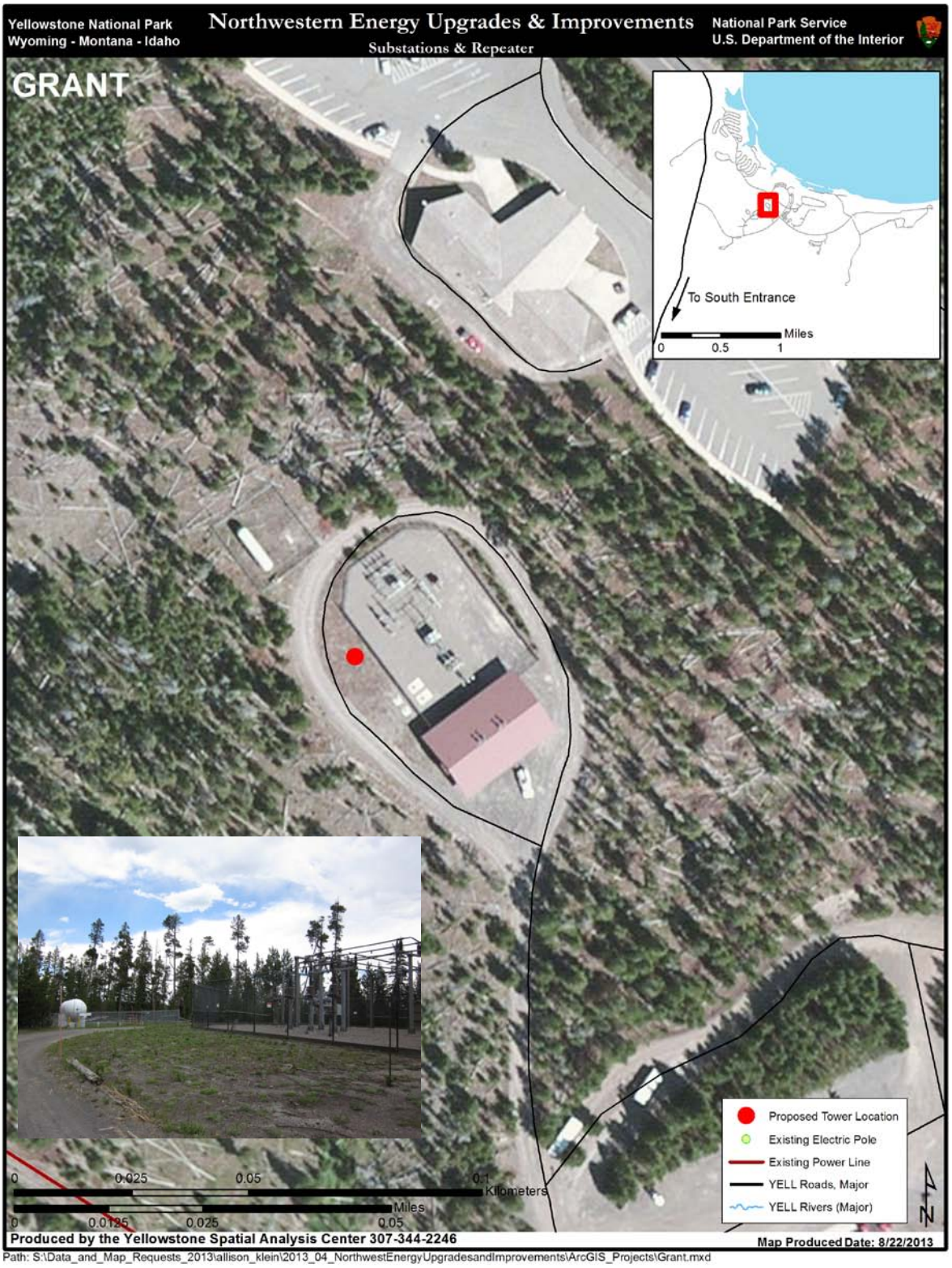


Figure 16 - Grant Village Substation Existing Conditions

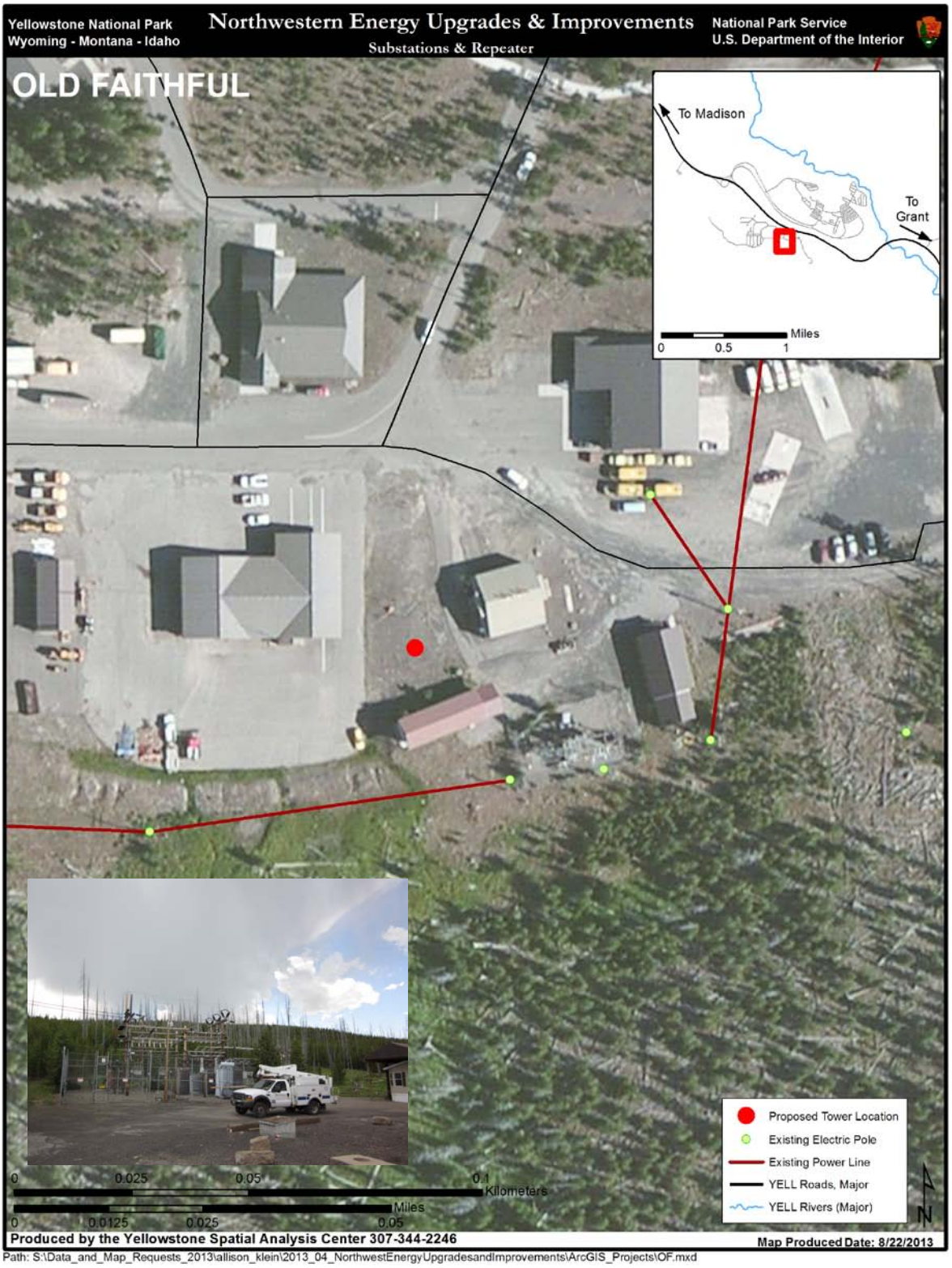


Figure 17 - Old Faithful Substation Existing Conditions

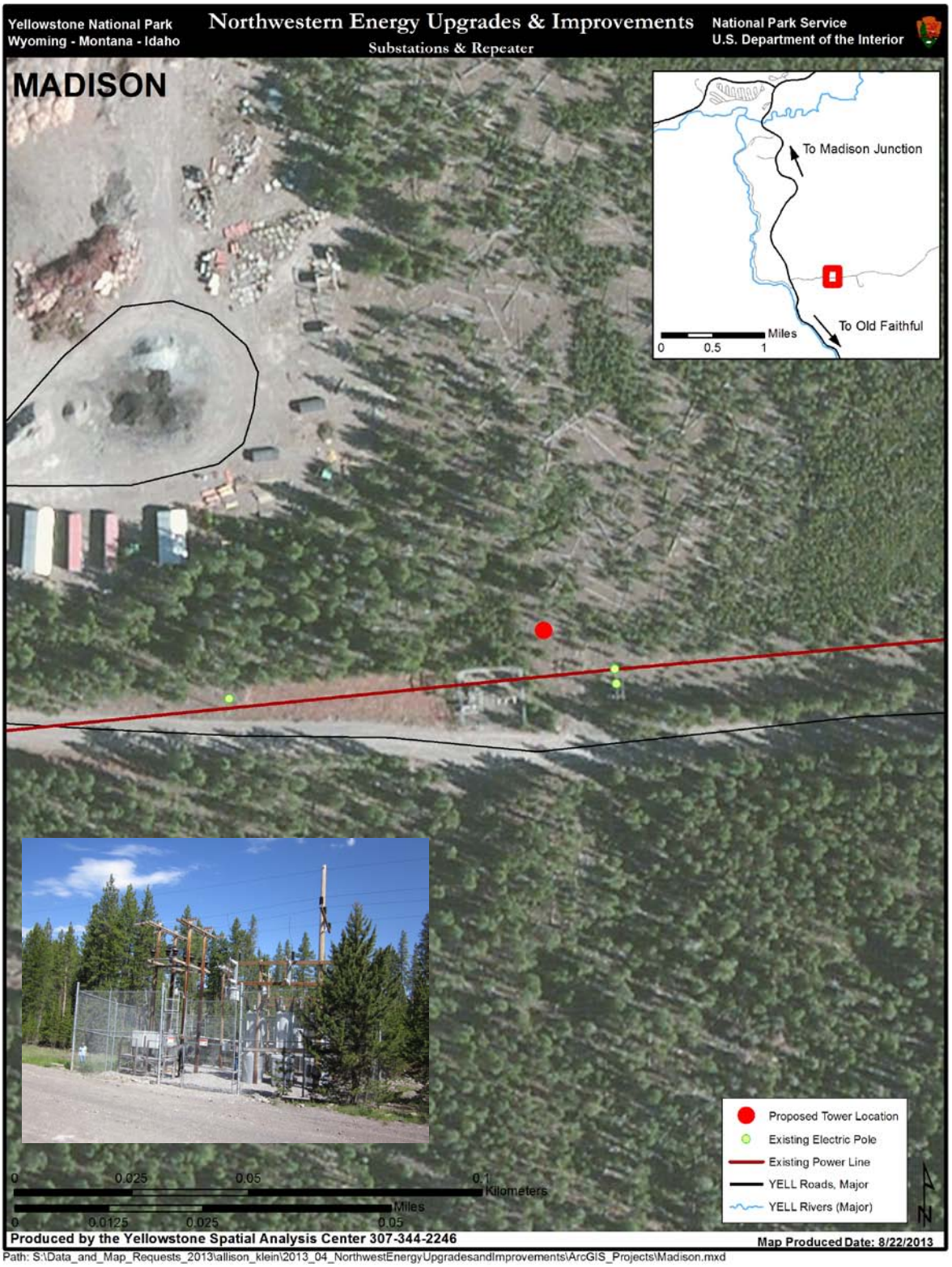


Figure 18 - Madison Substation Existing Conditions

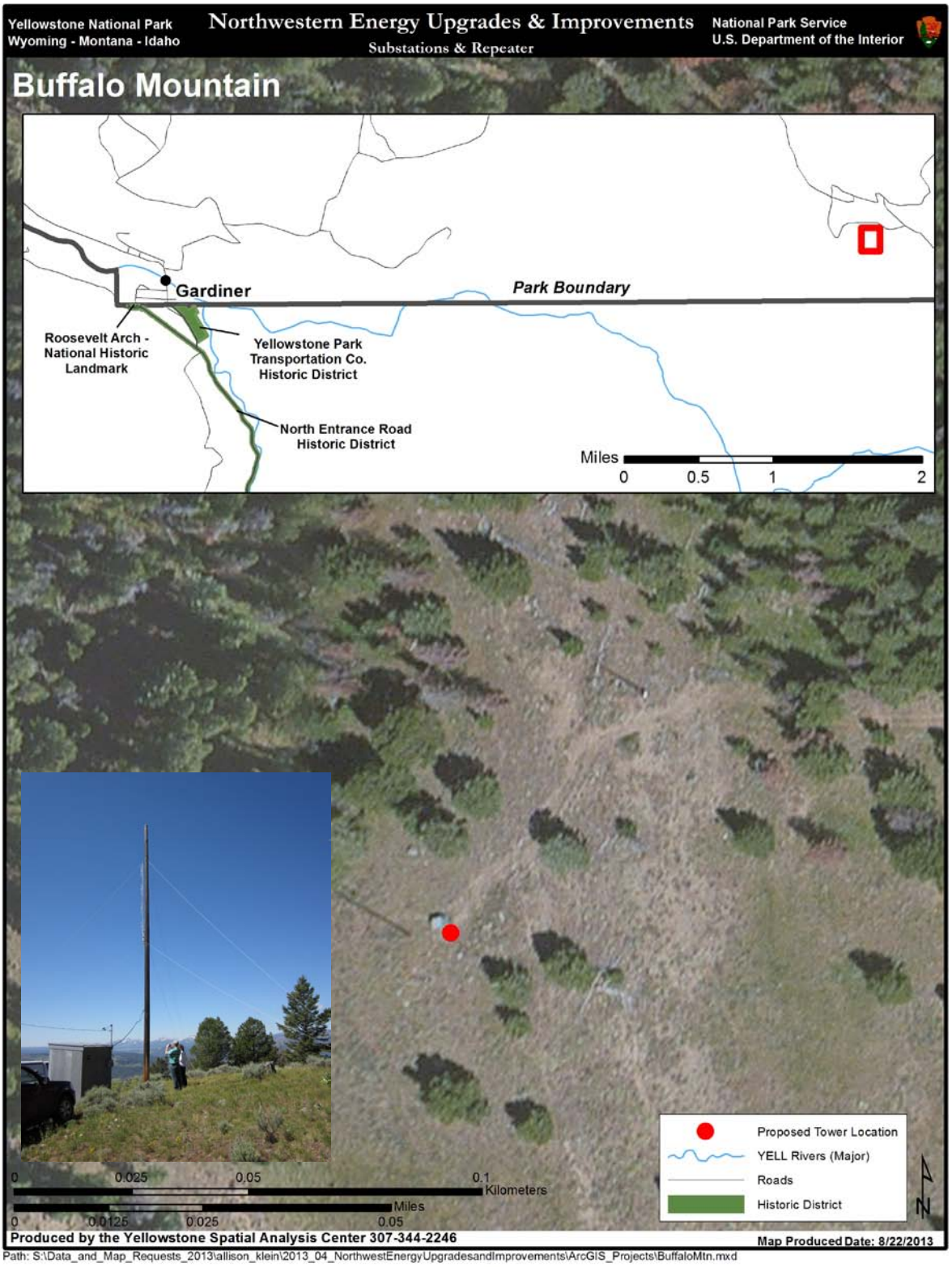


Figure 19 - Buffalo Mountain Substation Existing Conditions

Soil Resources

Affected Environment

Soils are an integral component of terrestrial ecosystems that form over time from interactions among source material, climate, topography, and biotic organisms. Soil is derived from four main parent materials in Yellowstone, primarily volcanic. The soils in the western and central plateau areas formed from parent materials derived from rhyolite lava flows and ash flow tuffs. Andesitic parent material from the Eocene Absaroka Volcanics is weathering into soil along the northwest, northeast, and eastern boundaries. Andesitic soils have better moisture-holding capacity and higher levels of nutrients than do rhyolitic soils. Climax lodgepole pine is generally associated with rhyolitic soils, while climax spruce and fir are typically associated with andesitic soils. Soils from loess, evolved from glacial episodes, are found in river floodplains. About 6% of the soil in the park is derived from the fourth parent material, sedimentary rocks consisting of limestones, sandstones, and shales.

More than 80 soil types and 6 soil orders found in the park have been described (Rodman et al. 1996). Most of these types fall into three soil orders: Inceptisols, Mollisols, and Alfisols. Inceptisols, which have weakly developed soil profiles, are the most common soil order in the park and dominate within the caldera in the central and southwestern parts of the park. Mollisols have thick, dark surface horizons and are rich in organic matter. They occur primarily in grasslands in the park, but also in forests across the north and east boundaries of the park. Alfisols have thin surface horizons and subsoil accumulations of clay. They occur throughout the forested north and east parts of the park and dominate in areas weathering from sedimentary rocks.

The soil for the project sites is comprised of 2 soil orders: Inceptisols and Mollisols. Madison, Norris and Grant Village consist of Inceptisols. Old Faithful and Lake consist of both. Canyon is classified as an Inceptisol and Mammoth and Buffalo Mountain a Mollisol. Mollisols have a distinctive dark surface (mollic epipedon) that is enriched with organic matter. These soils formed from nutrient-rich parent materials and are commonly in grasslands. They are naturally fertile and generally hold large amounts of water. Inceptisols are soils that exhibit minimal horizon development and lack the features that are characteristic of other soil orders. Inceptisols are widely distributed and occur across a wide range of ecological settings. They are often found on fairly steep slopes, young geomorphic surfaces, and on resistant parent materials. Land use varies considerably with Inceptisols. A sizable percentage of Inceptisols are found in mountainous and forested areas (NRCS Website). The dominant slopes have gradients of 5 to 20 percent. The soils are well drained and not subject to flooding after prolong high intensity storms. The landforms are moraines with parent material of glacial drift derived from granite (NRCS Soil Web Survey).

Methodology and Intensity Level Definitions

The methodology used for assessing impacts to soil resources was derived from *Soils of Yellowstone National Park*, park staff's observations and from the Natural Resources Conservation Web Soil Survey. The intensity level definitions for soil resources are as follows:

Intensity Level Definitions

The thresholds of change for the intensity of impacts to hydrothermal features are defined as follows:

Negligible: Soils would not be affected by compaction, trampling, erosion, removal, etc., or the effects to soils would be below or at the lower levels of detection. Any effects to soils would be slight with no measurable or perceptible changes.

Minor: Effects to soils due to compaction, trampling, erosion, removal, etc., would be detectable, small, and localized. Changes would not be expected to be outside the natural range of

variability and would be short term. Mitigation measures, if needed to offset adverse effects, would be simple and successful.

Moderate: Effects to soils due to compaction, trampling, erosion, removal, etc., would be readily apparent and result in a long-term change to the soils character, including erosion patterns in a localized area. Mitigation measures, if needed to offset adverse effects, could be extensive but would likely be successful.

Major: Effects on soils due to compaction, trampling, erosion, removal, etc., would be readily apparent, substantially change the character of the soils and erosion patterns over a large area, and likely would be permanent. Extensive mitigation measures would be needed to offset any adverse effects and their success could not be guaranteed.

Impacts of Alternative A – No Action

Under Alternative A, the existing substations would not be upgraded, an automation and communication system, fiber optic cable, and a satellite system would not be installed. No new disturbance to soils including excavating, grading, or trenching would occur. Soil conditions would remain the same as under current conditions. Routine maintenance would continue at the existing substations and along the 90-mile power line corridor. These routine maintenance activities have and would continue to have a negligible impact. Thus, implementation of Alternative A would result in negligible impacts to soil resources.

Cumulative Effects: Cumulative impacts on soils are based on the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions in YNP. The existing substations have all been impacted due to localized soil disturbance, erosion, and mixing that occurred during past construction activities. Ongoing administrative activities such as road reconstruction and maintenance, backcountry operations, facilities maintenance, and hazard fuels reduction projects would continue to have adverse effects on soil resources in the park. Trail maintenance would involve localized removal of soil. If the existing substations and power line corridor were to require extensive maintenance, there would be potential for greater erosion and/or ground disturbance, which would have a minor incremental effect on soils when combined with all of the other ground disturbing projects. The impacts of Alternative A in conjunction with the past, present, and reasonably foreseeable future actions are minor, short- and long-term adverse.

Impacts of Alternative B – Upgrade Existing Substations and Install Automation and Communication System

Approximately 0.1 acre of soil, in the immediate vicinity of the existing substations and within existing disturbed areas, would be disturbed by from this alternative during excavation, trenching, grading and construction to upgrade the existing substations and establishing a level surface for the base of the towers. All of the excavation would occur within the fenced area of the existing substation, or directly outside the fence in graveled areas used for circulation and parking. Operation related impacts could include compaction, soil removal, changes to soil physiochemical characteristics and soil erosion. The seven proposed sites within the park would occur within developed areas with previous soil disturbance. The Buffalo Mountain site entails an access road, power pole and small building all of which has contributed to previous soil impacts. Alternative B would have additional impacts soil on previously undisturbed soils at Buffalo Mountain. After construction is complete and if needed, the area around the existing substations and base of the towers would be graded to match the pre-construction conditions and seeded with native vegetation. No additional roads would be installed to access the existing substations and proposed tower locations. Under Alternative B, local, minor, short and long-term, adverse impacts on soils would occur.

Cumulative Effects: The impacts from past, present, and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative A. Alternative B, in conjunction with these past, present, and reasonably foreseeable projects would result in minor, short- and long-term adverse impacts to soil resources.

Impacts of Alternative C – Upgrade Existing Substations and Install Automation and Communication System Via Fiber and Microwave

Under Alternative C, soils would be disturbed as described in Alternative B. However, Alternative C would require additional trenching to install the fiber optic cable within the existing ROW for the electric transmission lines. Additional trenching for the fiber optic cable would disturb approximately 109 acres. This calculation is based on ground disturbance occurring within a 10 feet wide corridor running the length of the existing 90-mile power line. The cable would be buried in a narrow plowed trench, thus creating minimal erosion potential along the corridor. Impacts to soils would also occur at those sites where hand holes need to be installed or where a short trench or hole needs to be dug in order to avoid individual trees or to bore under a wetland. While the impacts from installing the hand holes would occur within the 109 acres already identified, the soil disturbance in these locations would be deeper, approximately 4-5 feet in depth using a backhoe. The topsoil would be salvaged, stockpiled, replaced, and reseeded after installation. No additional access roads would be installed. Access to the existing substations and power line corridor would be via what is presently permitted within NWE's current ROW permit. The frequency of visits to maintain the existing overhead power lines and the proposed fiber optic cable would increase and could cause further soil compaction as heavy equipment and vehicles would be utilized to complete this work. No trenching for fiber optic cable would occur at the Buffalo Mountain site.

Chemical changes to soils would result from mixing topsoil with subsoil during topsoil salvage activities and a reduction in the amount of organic matter in surface soil due to erosion during handling activities. Impacts on physical characteristics of soil during topsoil salvage, stockpiling, and redistribution include soil mixing, compaction, and pulverization from equipment and traffic. Soil compaction and pulverization would result in loss of soil structure and a subsequent decrease in permeability and water-holding capacity. However, these areas have been previously disturbed and further impacts are anticipated to be local, moderate, short- and long-term and adverse.

Cumulative Effects: The impacts from past, present, and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative B. Alternative C, in conjunction with these past, present, and reasonably foreseeable projects would result in moderate, short- and long-term, adverse impacts to soil resources due to the installation of fiber optic cable along the ROW corridor.

Impacts of Alternative D – Upgrade Existing Substations and Install Indication and Communication System Via Satellite

Alternative D would impact soils as described in Alternative B for upgrading existing substations. Excavation for a pad to support a satellite dish would require excavation of 18 inches or less. Under Alternative D, towers and fiber optic cable would not be installed for automation and communication. Instead an indication system and communication would be done through satellite. Under Alternative D, local, minor short-and long-term, adverse impacts on the soils in the immediate vicinity of the existing substations would occur.

Cumulative Effects: The impacts from past, present, and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative C. Alternative D, in conjunction with these past, present, and reasonably foreseeable projects would result in minor, short- and long-term, adverse impacts to soil resources.

Geothermal Resources

Affected Environment

Yellowstone contains the world's largest and most active geothermal areas, a principal reason for the establishment of the park. The park has more than 300 geysers and 10,000 thermal features, including hot springs, mud pots, and fumaroles. Groundwater heated by molten rock, fuels the thermal features. Geothermal resources are divided into two subsets: 1) hydrothermal, where geothermal heat influences water, and 2) dry hot rock. Yellowstone's features are hydrothermal in nature. Geothermal areas sustain unique and diverse life and support various microbial organisms, mosses, and grasses. These resources in turn support a range of animals from insects to large ungulates such as bison and elk.

The Yellowstone caldera, which lies entirely within the park, is approximately 55 km wide and 72 km long, with the last major eruption occurring about 640,000 years ago. The geothermal areas most accessible to park visitors include the Upper and Lower geyser basins near the Firehole River, Norris Geyser Basin near the Gibbon River, Mammoth Hot Springs, Mud Volcano, and the West Thumb Geyser Basin, which is the largest geyser basin on the shore of Yellowstone Lake.

Although thermal features may appear powerful, they are fragile systems that can be altered or destroyed if a component of their structure, such as heat, water supply, or the plumbing system, is altered. Nature itself can destroy geysers. Changes in a thermal feature's water or heat source may cause it to cease functioning. Thermal features may change or be destroyed if the seal that holds back the pressure is breeched during an eruption, seismic activity, or natural processes such as landslides.

The existing NWE Right-of-Way contains approximately 17.5 acres of geothermal area. This acreage is the intersection of the 40' ROW and 17 separate thermal areas that are crossed. Three of the thermal areas are located in the Gibbon Canyon, one in the Norris to Mammoth corridor, one in the Mammoth area, eight within the Firehole River drainage, and four within Hayden Valley. Geothermal areas found within the NWE ROW can be expected to have temperatures up to about 92 degrees Celsius, and pH levels of down to one or two.

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to hydrothermal features were derived from information on specific hydrothermal features (temperature, chemistry, flow rates, eruption intervals, photographs), information on hydrothermal basins, and park staff's past observations of the effects of both visitor use and construction activities on hydrothermal features.

Hydrothermal features in Yellowstone are divided into five categories:

- features that are culturally significant (e.g., Old Faithful Geyser, Morning Glory Pool, Steamboat Geyser),
- features that are found within developed/boardwalked areas (e.g., Biscuit Basin, West Thumb Geyser Basin, Upper Geyser Basin),
- features that are scientifically notable (e.g., superheated features or features important to microbial researchers),
- features that are found in undeveloped areas (e.g., backcountry hydrothermal features such those found in Shoshone Geyser Basin or Pocket Basin), and
- unnamed, low-flow, low-temperature thermal seeps (features with no defined vent but having slow, diffused movement of water through cracks or soil).

The first four categories are considered when evaluating the thresholds of change to hydrothermal features. The fifth category, thermal seeps, is not considered when evaluating the thresholds of change unless the seep's flow route and/or the water temperature is interconnected and integral to a larger nearby system and/or the impacts to the seep would affect nearby features that are in other categories.

Intensity Level Definitions

The thresholds of change for the intensity of impacts to hydrothermal features are defined as follows:

Negligible: Hydrothermal features would not be affected or the impact would cause insignificant physical disturbance (there would be no effect upon the temperature, periodicity of eruption, or volume of thermal water flow).

Minor: Effects to hydrothermal features would be slight but measurable. Eruption intervals, thermal water temperature, and/or thermal water flow may change slightly due to disturbance but would return to baseline values within one day. Mitigation measures proposed to offset adverse effects would include measures to ensure that the hydrothermal feature(s) is protected.

Moderate: Effects to hydrothermal features would be measurable and would last for more than one day. Eruption intervals, thermal water temperature, and/ or thermal water flow could change for a number of days but would be expected to return to baseline values. Mitigation measures proposed to offset adverse effects would be extensive.

Major: Effects are readily apparent for either a single thermal feature or a group of features (a thermal system) and are long-term. Eruption intervals, water temperature, and/or the volume of thermal water could increase or decrease, and/or new thermal features could be created at project areas. Mitigation measures proposed to offset adverse effects would be extensive and success would not be assured.

Impacts of Alternative A – No Action

The no-action alternative would not result in any new impacts to thermal areas from the existing substations continuing to operate and function in their present locations. Runoff from these substations is expected to be negligible due to a high infiltration rate in the graveled areas. Storm water runoff is not expected to impact any thermal area near the project locations. No excavation would occur, as no new buildings, towers, or equipment would be placed. Impacts of implementing Alternative A on geothermal resources would be negligible.

Cumulative Effects: Cumulative impacts on hydrothermal resources are based on the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions in the GYA. Hydrothermal features rely on a delicate balance of geology, thermal, and hydrologic conditions.

In the Old Faithful, Norris, and Mammoth area, past construction projects have had adverse effects on hydrothermal resources. The visibility of underground utility lines via thermal imagery indicates that heat and fluid flow is being artificially influenced.

Thermal areas would be not be impacted by existing substations, ongoing maintenance activities or access to the sites. Hot ground exists under the some parts of the Right-of-Way for the transmission lines, but no work would be done in these areas. Alternative A, in conjunction with past, present, and reasonably foreseeable projects would result in negligible, short- and long-term adverse impacts.

Impacts of Alternative B – Upgrade Existing Substations and Install Automation and Communication System (Preferred)

The preferred alternative proposes some additional development at the seven substations located within the park, and at Buffalo Mountain outside the park. This development includes excavation for new buildings at the substations at Mammoth, Norris, Canyon, Lake, Madison, and Buffalo Mountain. All seven substation sites and Buffalo Mountain would also need excavation for proposed towers and foundations for backup generators. Excavation for the buildings would be for a 6-inch thick concrete slab, and not expected to exceed 18 inches deep. The towers would require excavation just over 6 feet in depth for a poured concrete foundation 6'x6' square and 6 feet deep. Geothermal activity occurs near the Mammoth, Old Faithful and Norris substations, though not in the immediate vicinity. Excavation for proposed upgrades at these sites is not expected to encounter hot ground. Park geologists would be informed if any voids, gasses, hot water, or hot ground are encountered.

No geothermal areas are known to exist in the immediate vicinity of the substations or at Buffalo Mountain. Mitigation measures listed in Chapter 2 would be followed to alleviate concerns if any geothermal areas are encountered during excavation. Impacts from this alternative would be negligible to geothermal resources.

Cumulative Effects: Cumulative impacts on hydrothermal resources are based on the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions in the GYA. Hydrothermal features rely on a delicate balance of geology, thermal, and hydrologic conditions.

In the Old Faithful, Norris, and Mammoth area, past construction projects have had adverse effects on hydrothermal resources. The visibility of underground utility lines via thermal imagery indicates that heat and fluid flow is being artificially influenced.

Thermal areas would be not be impacted by existing substations, ongoing maintenance activities or access to the sites. Some excavation would occur for foundations for proposed buildings, tower foundations, and generator slabs. No known geothermal areas are known to exist in the areas of proposed excavation. If any hot ground, gases, or thermal water is encountered, work would be stopped until a park geologist could observe the findings and make recommendations to avoid and minimize impacts. Alternative B, in conjunction with past, present, and reasonably foreseeable projects would result in negligible, short- and long-term adverse impacts.

Impacts of Alternative C – Upgrade Existing Substations and Install Automation and Communication System Via Fiber and Microwave

This alternative would involve the placement of approximately 90 miles of underground fiber optic cable within the existing NWE Right-of-Way. Placement of the cable would likely be done using a metal tracked dozer with a vibratory plow attachment on the back of the dozer. The ground would be sliced to a depth of 24-36 inches as the cable is pulled forward through the soil. When this happens in geothermal areas, the continuity of the ground is disturbed. Sinter rock can be fractured, and temperature water flows are disrupted. When possible, the line chosen for the placement of the fiber optic cable would seek to avoid geothermal areas located within the ROW. Alternative C has the potential to directly impact 4.4 acres of geothermal area. This acreage was obtained by using a 10-feet wide corridor of impact (the width anticipated from a dozer plowing a fiber optic cable) along the length of the 17 geothermal areas that cross the power line ROW. The fiber optic cable would be placed 24-36 inches below the ground surface, impacts could include fracturing of rock above geothermal areas. While most of the geothermal areas are hot ground, changes in hydrothermal flow could occur along the plow line in the geothermal areas that have a water component, and some erosion of the surface could occur in these areas. While placement of cable can affect geothermal areas where it is placed, the high temperatures and low pH of the soil can also affect the cable and the signals it carries. Impacts to geothermal areas from this

alternative would be considered minor to moderate from those areas where a plow line of the fiber optic cable would pass through these areas.

Every effort would be made to avoid cutting into thermal areas or hot ground as this could change gas, heat, and water flow of the feature. The standard would always be to avoid geothermal areas whenever possible. Design of the proposed fiber optic cable placement would continue to involve and receive input from the park's geologist. The placement design would avoid, to the extent possible, areas of high thermal heat flow and where thermal features are located. Further investigations during design would pinpoint thermal sites to help develop avoidance or mitigation measures. Impacts from implementation of this alternative to geothermal resources would be moderate, short- and long-term, and adverse.

Cumulative Effects: There would be impacts associated with placement of fiber optic cable within the existing NWE Right-of-Way. Plowing the cable, and use of a backhoe to dig hand holes (for splicing cable) would result in an overall impact of this alternative being short-term, moderate and adverse. Long-term effects are anticipated from additional access to the corridor and compaction within portions of the geothermal areas from that increased access. Alternative C, in conjunction with past, present, and reasonably foreseeable projects would result in moderate, short- and long-term adverse impacts.

Impacts of Alternative D – Upgrade Existing Substations and Install Indication and Communication System Via Satellite

This alternative would require some excavation for concrete pads on which to place support structures for 4.5-foot satellite dishes, foundations for proposed equipment buildings, and backup generators. All excavation would occur within already disturbed areas of the existing substations, and at Buffalo Mountain. None of the excavations depths would be more than 18 inches deep. Impacts from this alternative on geothermal resources would be negligible.

Cumulative Effects: Cumulative impacts on geothermal resources are based on the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions in the GYA. Geothermal features rely on a delicate balance of geology, thermal, and hydrologic conditions.

In the Old Faithful, Norris, and Mammoth areas, past construction projects have had adverse effects on hydrothermal resources. The visibility of underground utility lines via thermal imagery indicates that heat and fluid flow is being artificially influenced.

In this alternative thermal areas would be not be impacted by existing substations, ongoing maintenance activities or access to the sites. Excavation would be required to install buildings, generators, and satellite dish structures. This excavation would have negligible, short-term, adverse impacts to the geothermal features. No construction is proposed within the NWE transmission line corridor. Alternative D, in conjunction with past, present, and reasonably foreseeable projects would result in negligible, short- and long-term adverse impacts.

Vegetation, Rare Plants & Wetlands

Affected Environment

Yellowstone National Park contains diverse vegetation as a result of the extreme topographic relief, differing soils, varied slope and aspect, and range of microclimates (Despain 1990). The vegetation communities of YNP include overlapping combinations of species typical of the Rocky Mountains as well as of the Great Plains to the east and the Intermountain region to the west.

The five major vegetation types in the park are montane forests, sagebrush-steppe, alpine, wetlands/riparian, and hydrothermal communities.

- **Montane Forests.** Approximately 80% of the park is covered by forests, most of which are dominated by lodgepole pine (*Pinus contorta*) in a variety of successional stages at elevations between 7,000 and 9,000 feet (NPS, 2011a), where they have adapted to fire-prone terrain. The lodgepole pine's serotinous cones require fire to provide the temperature of 113 to 140 degrees needed in the tree's crown to melt the resin bond that seals in their seeds (Utah State University, 2002). While some trees in Yellowstone are several hundred years old and show fire scars from a succession of low intensity ground fires, lodgepole and whitebark pine trees have very thin bark and can be killed by ground fires (NPS, 2010b).

  In the absence of fire or in rich and moist soils, subalpine fir (*Abies lasiocarpa*) and Englemann spruce (*Picea engelmannii*) replace lodgepole pine as the dominant species in the canopy (NPS 2011a). At elevations of 6,000 to 7,000 feet, Douglas-fir (*Pseudostuga menziesii*) and aspen (*Populus tremuloides*) (NPS, 2002) are common. At elevations above 8,400 feet, whitebark pine (*Pinus albicaulis*) becomes a significant component of the forest. The vegetation composition in the understory depends on precipitation regime, forest type, and substrate. In lodgepole pine forests, the understory is typically very sparse and composed mostly of elk sedge (Carex geyeri) or grouse whortleberry (*Vaccinium scoparium*). Pinegrass (*Calamagrostis rubescens*) is frequently found in Douglas-fir forests. In other area of the park, the understory vegetation is composed of species such as Utah honeysuckle (*Lonicera utahensis*), snowberry (*Symphoricarpos spp*.), and buffaloberry (*Shepherdia canadensis*) (NPS, 2011a). Montane forests seem to be at less risk of invasion by nonnative species than some of the park's other vegetation types. However, they have been invaded by Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), musk thistle (*Carduus nutans*), and old-man-in-the-spring (*Senecio vulgaris*) following wildfire, and Canada thistle, bull thistle, musk thistle, and houndstongue (*Cynoglossum officinale*) have become significant components of the understory vegetation in some places in the northern part of the park.

- **Sagebrush-Steppe.** Sagebrush-steppe vegetation is found primarily in the park's lower elevations on the northern range. It is dominated by big sagebrush (Artemisia spp.) and other shrubs. It provides crucial winter range habitat for ungulates and is essential for species such as Brewer's sparrow, sage thrasher, vesper sparrow, and sagebrush lizard—which are limited to sagebrush habitats year-round or during the breeding season. In winter, the evergreen foliage of sagebrush provides forage that has a higher protein level and greater digestibility than that of other shrubs and grasses. Pronghorn rely heavily on sagebrush during the winter. Sagebrush comprises a large portion of mule deer and elk diets, and provides cover for fawns and other animals.

  Idaho fescue (*Festuca idahoensis*), needle-and-thread (*Hesperostipa comata*), Sandberg bluegrass (*Poa secunda*), and bearded wheatgrass (*Elymus caninus*) are common, either mixed with the sagebrush or as open meadows. Numerous wildflowers and forbs can be found throughout (Despain, 1990; NPS, 2011a). These sagebrush-steppe communities contain a significant amount of nonnative annuals (cheatgrass, alyssum), as well as Dalmatian toadflax (*Linaria dalmatica*), spotted knapweed (*Centaurea stoebe*), and smooth brome (*Bromus inermis*).

- **Alpine.** This diverse group of high-elevation open areas includes alpine tundra above 10,000 feet. Some are dominated by a thick turf of alpine grasses and forbs while others are dry and rocky. Common species include sheep fescue (*Festuca spp*.), timberline bluegrass (*Poa glauca*), and lanceleaf stonecrop (*Sedum lanceolatum*). The park's alpine areas receive little human presence and have experienced the least amount of invasion from nonnative species of the park's vegetation types. The use of Bear Management Area Closures in the Gallatin Mountain Range and the Trident areas has helped protect many alpine vegetation communities from off-trail visitor use. However, timothy has been reported above 9,000 feet and nonnative dandelions as high as 9,800 feet.

- **Wetlands and Riparian Areas.** Wetlands cover 357 square miles of Yellowstone and include lakes, rivers, ponds, streams, seeps, marshes, fens, wet meadow, forested wetlands, and hydrothermal pools. Wetlands and riparian areas in Yellowstone provide essential habitat for rare plant species as well as reptiles, amphibians, and numerous insects, birds, mammals and fish in the park. Approximately 38% of the park's plant species are associated with wetlands, and 11% grow only in wetlands (NPS 2011a). The National Park Service uses a system created by the USFWS (Cowardin, Carter et al. 1979) to define, classify, and inventory wetlands. As part of the National Wetlands Inventory, in 1997 the USFWS published a map that identified 118,528 acres as palustrine wetlands; the total wetlands habitat in Yellowstone, including deepwater habitat such as lakes and rivers, was 228,766 acres (Elliott and Hektner 2000). Since then, wetland surveys and more precise mapping has been done by NPS staff in the Mammoth, Canyon, Old Faithful, and Lake developed areas, as well as along some road corridors.
- **Hydrothermal Communities.** Plant communities have developed in the expanses of thermally heated ground. Many of the species found in the geyser basins tolerate tremendously different conditions, and grow all over the western United States while others are typical of the central Rockies and a few are endemic to the region (NPS, 2011a). Geothermal areas, especially those with neutral acid systems, are fertile ground for invasions by nonnative species due to the extreme conditions (often high or low pH, little soil development, and high temperatures due to the thermal influence and lack of shade),

Other Vegetation in the Park

More than 1,300 native plant species and an additional 218 non-native plant species can be found in Yellowstone. Yellowstone is home to three endemic species: Ross's bentgrass (*Agrostis rossiae*), Yellowstone sand verbena (*Abronia ammophila*), and Yellowstone sulfur wild buckwheat (*Eriogonum umbellatum var. cladophorum*). There are also 97 rare plant species within the park. Yellowstone's 97 rare plant species (vascular plant species, subspecies, and varieties) reflect the park's complex geologic substrate, thermal influence, diverse topography, and wide elevation range found in the park. They also include species on state heritage lists and sensitive plant species designated by park staff. No federally listed threatened or endangered plants have been documented in Yellowstone National Park. In June 2011, the USFWS determined that the whitebark pine warrants protection under the ESA but adding the species to the federal list was precluded by the need to address higher priority listing actions. Whitebark pine is discussed in the *Special Status Species* section of this EA. This species is currently a candidate species eligible for ESA protection and its status reviewed annually.

Nonnative plant species are prioritized according to the threat they pose to park resources and the prospects for successful treatment. Some infestations can be eradicated if the species is treated when the outbreak is still small; other species such as spotted knapweed are so common that stopping them from spreading is the primary goal. This strategy has helped prevent high priority invasive species from moving into areas where control is more difficult.

The vegetative classification for the Buffalo Mountain site is a Douglas-fir (*Pseudotsuga menziesii*)/Idaho fescue (*Festuca idahoensis*). The understory is sticky germanium (*Geranium viscosissimum*), bearded wheatgrass (*Elymus caninus*), timber oatgrass (*Danthonia intermedia*), twinflower (*Linnaea borealis*), common snowberry (*Symphoricarpos albus*), elk sedge (*Carex geyeri*), and heartleaf arnica (*Arnica cordifolia*).

The access roads to the substations, parking spots, areas adjacent to, and within the security fencing of the substations have graveled surfaces and are devoid of vegetation.

Methodology and Intensity Level Definitions

The methodology used for assessing impacts to vegetation, rare plants and wetlands is based on results of surveys, knowledge of park resource specialists and current literature.

Intensity Level Definitions

The thresholds of change for the intensity of impacts to vegetation, rare plants and wetlands are defined as follows:

Negligible: No native vegetation would be affected or some individual native plants could be affected as a result of the alternative, but there would be no effect on native species populations. The effects would be on a small scale and no special status species would be affected. Operations would affect less than 0.1 acre and would not alter wetland functions and values. Reclamation would not be necessary.

Minor: The alternative would affect some individual native plants and would also affect a relatively minor portion of that species' populations. Mitigation to offset adverse effects, including special measures to avoid affecting rare plants, could be required and would be effective. Impacts could result in a change to wetland functions and values, but the change would be of little consequence.

Moderate: The alternative would affect some individual native plants and would also affect a sizeable segment of the species' population and over a relatively large area. Mitigation to offset adverse effects could be extensive, but would likely be successful. Some rare plants could also be affected. Impacts could result in a change to wetland functions and values; the change would be measurable and consequential. Mitigation measures, if needed to offset adverse effects, could be extensive, but would likely be successful.

Major: The alternative would have a considerable effect on native plant populations, including rare plants, and affect a relatively large area in and out of the park. Mitigation measures to offset the adverse effects would be required, extensive, and success of the mitigation measures would not be guaranteed. Impacts would result in a noticeable change to wetland functions and values; the change would result in a severely adverse or substantially beneficial impact. Extensive mitigation measures would be needed to offset any adverse effects, and their success would not be guaranteed.

Impacts of Alternative A – No Action

Under Alternative A, the existing substations would not be upgraded, an automation and communication system, fiber optic cable, and a satellite system would not be installed. Continued operation of existing substations would require maintenance activities, including use of trucks and equipment. The existing substations are located within previously developed areas including maintenance yards and facility stations and devoid of native vegetation. Non-native vegetation is present at many of the locations surrounding the existing substations. Therefore, the risk of infestation or spread of non-native vegetation would remain the same as under current conditions. The existing substations would not contribute to any adverse impacts on wetlands or rare plants.

The existing 90-mile power line corridor would also require maintenance activities, including use of trucks and equipment. Maintenance activities along this corridor entails removing underbrush, downfall and some trees beyond the right-of-way limits that pose a danger of falling into the power line corridor and damaging transmission lines. These projects are completed on an annual basis to improve safety, access and reliability for these transmission lines and access routes. Spread of non-native vegetation and impacts to wetlands along this corridor is a concern. To mitigate for these concerns all equipment would be required to be cleaned before entering the park. Any wetlands or wet areas would be avoided if

possible. If not possible, protective planking would be placed over the area prior to driving across them. Areas with rare plant concerns would be flagged and avoided.

The required maintenance activities described above have and would continue to impact vegetation including wetlands and rare plants that are negligible to minor, short-and long-term and adverse.

Cumulative Effects: Cumulative impacts on vegetation, rare plants and wetlands are based on the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions in YNP. Ongoing administrative activities such as road reconstruction and maintenance, backcountry operations, facilities maintenance, and hazard fuels reduction projects would continue to have adverse effects on vegetation, rare plants and wetlands in the park. Road maintenance and construction activities would require disturbance and removal of soils and vegetation by heavy equipment operation. Backcountry operations include horse and foot patrol and trail maintenance. Trail maintenance involves localized disturbance of soil and vegetation and overnight use of campsites and cabins lead to some vegetation trampling and development of social trails. Most facilities maintenance activities occur in developed areas where minimal impacts to vegetation would occur. However, adverse impacts to vegetation may become necessary because some plant material may be cleared and removed for general operation practices. Additionally, Yellowstone's hazard fuels reduction projects require the removal of excess fuel (trees) from developed areas. Impacts to vegetation can be reduced by ensuring trails are maintained, including the use of barriers to prevent development of social trails and by monitoring construction and maintenance activities. The Norris to Golden Gate road reconstruction would impact 2.7 acres of wetlands with mitigation consisting of restoring previously impacted wetlands. Lake trout removal has resulted in minor, adverse impacts to wetlands around Yellowstone Lake. Past and ongoing recreational use such as angling, camping, and hiking would continue park wide. These activities alter vegetation, rare plants and wetland and result in minor, short- and long-term adverse impacts.

Impacts of Alternative B – Upgrade Existing Substations and Install Automation and Communication System

Approximately 5,000 square feet of ground would be disturbed during excavation, trenching, grading and construction to upgrade the existing substations and establishing a level surface for the base of the towers. Although these locations occur in previously disturbed areas the presence of disturbance creates conditions conducive to establishment and spread on non-native vegetation. Implementation of mitigation measures would occur as described in the *Mitigation Measures* section. After construction is complete and if needed, the area around the existing substations and base of the towers would be graded to match the pre-construction conditions and seeded with native vegetation. No additional roads would be installed to access the existing substations and proposed tower locations.

The existing 90-mile power line corridor would also require maintenance activities, including use of trucks and equipment. Maintenance activities along this corridor entails removing underbrush, downfall and some trees beyond the right-of-way limits that pose a danger of falling into the power line corridor and damaging transmission lines. These projects are completed on an annual basis to improve safety, access and reliability for these transmission lines and access routes. Spread of non-native vegetation and impacts to wetlands along this corridor is a concern. To mitigate for these concerns all equipment would be required to be cleaned before entering the park. Wetlands or wet areas would be avoided if possible. If not possible, protective planking would be placed over the area prior to driving across them. Areas with rare plant concerns would be flagged and avoided.

Under Alternative B negligible to minor, short-and long-term, adverse impacts on vegetation, rare plants and wetlands in the immediate vicinity of the existing substations and proposed tower locations would occur.

Cumulative Effects: The impacts from past, present, and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative A. Alternative B, in conjunction with these

past, present, and reasonably foreseeable projects would result in minor, short- and long-term adverse impacts.

Impacts of Alternative C – Upgrade Existing Substations and Install Automation and Communication System Via Fiber and Microwave

Under Alternative C, vegetation, rare plant and wetlands may be impacted as described in Alternative B. No construction activities would occur at Buffalo Mountain therefore, no vegetation would be impacted. Alternative C would require more trenching to install the fiber optic cable. Additional trenching for the fiber optic cable would disturb 109 acres. This calculation is based on the assumption that ground disturbance would occur within a 10 feet wide corridor running the length of the existing 90-mile power line. The cable would be buried in a narrow plowed trench, thus creating minimal disturbance along the corridor. The topsoil would be salvaged, replaced after installation and reseeded. Impacts to vegetation, rare plants and wetlands would also occur at those sites where hand holes need to be installed or where a short trench or hole needs to be dug in order to avoid individual trees or to bore under a wetland.

No additional roads would be installed to access the existing substations, proposed tower locations, or along the existing power line corridor. The frequency of visits to maintain the existing overhead power lines and the proposed fiber optic cable would increase and could cause further impacts to vegetation, rare plants and wetlands as heavy equipment and vehicles would be utilized to complete this work. These impacts could include soil impaction, root damage, erosion and the introduction and spread of non-native plant species. Although these impacts may result in a permanent loss of vegetation, the overall impact would not fragment the existing natural plant communities, reduce species diversity, or reduce the overall quality of the vegetation community.

According to the National Wetland Inventory data and surveys completed by park personnel documented wetlands are present along this corridor. This data indicates 197 wetland crossing that equate to 17 acres occur within the 10 foot construction corridor. Limited surveys have been completed for rare plants along this construction corridor. This Alternative would also cross 108 creek and river crossings. These temporary impacts would occur from equipment driving over wetlands in the process of installing fiber optic cable. Before the fiber optic cable would be installed a comprehensive survey of wetlands and rare plants would be completed along the existing corridor. Installation of the fiber optic cable would likely take place under provisions of a U.S. Army Corps of Engineers Nationwide Permit #12, which allows for "Activities required for the construction, maintenance, repair, and removal of utility lines and associated facilities in waters of the United States, provided the activity does not result in the loss of greater than 1/2 acre of waters of the United States." Nationwide permits are a type of general permit designed to authorize certain activities that have minimal adverse effects on the aquatic environment. Under the terms of the nationwide permit there can be no change in pre-construction contours. If any of the following criteria are met, notification in the form of a pre-construction notification is required: (1) the activity involves mechanized land clearing in a forested wetland for the utility line right-of-way; (2) a Section 10 permit is required; (3) the utility line in waters of the United States, excluding overhead lines, exceeds 500 feet; (4) the utility line is placed within a jurisdictional area (i.e., water of the United States), and it runs parallel to a streambed that is within that jurisdictional area; (5) discharges that result in the loss of greater than 1/10-acre of waters of the United States; (6) permanent access roads are constructed above grade in waters of the United States for a distance of more than 500 feet; or (7) permanent access roads are constructed in waters of the United States with impervious materials. If the impacts are above 1/10 of an acre a pre-construction notification would be submitted and the appropriate section 404 general permit would be sought and the appropriate mitigation completed.

Alternative C is the only action alternative that impact wetlands outside of the powerline corridor due to placement of the fiber optic cable. This could result in minor to moderate, short-and long-term, adverse impacts on vegetation, rare plants and wetlands in the immediate vicinity of the existing substations, the proposed tower locations and along the power line corridor.

Cumulative Effects: The impacts from past, present, and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative B. Alternative C, in conjunction with these past, present, and reasonably foreseeable projects would result in minor to moderate, short- and long-term adverse impacts.

Impacts of Alternative D – Upgrade Existing Substations and Install Indication and Communication System Via Satellite

Alternative D would not impact vegetation, rare plants and wetlands as described in Alternative B for upgrading existing substations. Under Alternative D, towers and fiber optic cable would not be installed for automation and communication. Instead automation and communication would be done through satellite. Installation of satellite at the existing substations would not contribute additional impacts to vegetation, rare plants and wetlands. Under Alternative D, local, negligible, short-and long-term, adverse impacts on the vegetation in the immediate vicinity of the existing substations would occur.

Cumulative Effects: The impacts from past, present, and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative C. Alternative D, in conjunction with these past, present, and reasonably foreseeable projects would result in minor, short- and long-term, adverse impacts.

Wildlife

Affected Environment

Yellowstone National Park is home to a wide variety of wildlife. At least 300 species of birds, 60 species of mammals, 4 species of amphibians, 6 species of reptiles, and 12 species of native fish have been documented within the park. The distribution, abundance, and diversity of species within the park vary by season, elevation, and variety of habitats present.

Mammals

The park is home to the largest concentration of mammals in the lower 48 states with 67 different mammals living within the park (NPS, 2011b). Yellowstone mammals include the black bear (*Ursus americanus*), coyote (*Canis latrans*), fox (*Vulpes vulpes*), bobcat (*Lynx rufus*), marten (*Martes americana*), striped skunk (*Mephitis mephitis*), mule deer (*Odocoileus hemionus*), bighorn sheep (*Ovis canadensis*), moose (*Odocoieus hemionus*), white-tailed deer (*Odocoileus virginianus*), bison (*Bison bison*), elk (*Cervus canadensis*), beaver (*Castor canadensis*), river otter (*Lontra canadensis*), deer mouse (*Peromyscus maniculatus*), red squirrel (*Sciurus vulgaris*), meadow voles (*Microtus pennsylvanicus*), porcupine (*Erethizon dorsatum*), and the snowshoe hare (*Lepus americanus*). There are also eight species of bats that may be present in the park including the little brown bat (*Myotis lucifugus*), the big brown bat (*Eptesicus fuscus*), and the silver-haired bat (*Lasionycteris noctivagans*) (NPS, 2011c).

Birds

Records of bird sightings have been kept in Yellowstone since its establishment in 1872. These records document 330 species of birds to date, including raptors, songbirds, shorebirds, and waterfowl. Approximately 150 species nest in the park. The variation in elevation and habitat types found within Yellowstone contribute to the relatively high diversity. Many of the birds are migratory. The YNP bird program monitors a small portion of its breeding bird species to gather information like reproduction, abundance, and habitat use, on multiple species from a wide variety of taxonomic groups; and maintain data from 20 or more years for several species. Long-term monitoring efforts help inform park staff of potential shifts in ecosystem function (e.g., climate change effects) for Yellowstone's bird community and guide future management decisions.

Fish

Yellowstone's native fish have underpinned natural food webs, had great local economic significance, and provided exceptional visitor experiences. Native cutthroat trout are thought to be among the most ecologically important fish of the Greater Yellowstone Ecosystem and highly regarded by anglers. Several factors, nonnative species and disease among them, are threatening the persistence of native fish. The ranges and densities of Yellowstone's native trout and grayling were substantially altered during the 1900s due to exploitation and introduction of nonnative species. Nonnative species in the park include brook trout, brown trout, lake chub, lake trout, and rainbow trout. YNP's goal is to restore the ecological role of native species, including fluvial Arctic grayling, westslope cutthroat trout, and Yellowstone cutthroat trout, while ensuring sustainable native fish angling and viewing opportunities for visitors.

Despite changes in species composition and distribution, large-scale habitat degradation has not occurred. Water diversions, water pollution, and other such impacts on aquatic ecosystems have rarely occurred in Yellowstone. Consequently, fish and other aquatic inhabitants continue to provide important food for grizzly and black bears, river otters, mink, ospreys, bald eagles, pelicans, and many other birds and other species.

Aquatic nuisance species disrupt ecological processes because they are not indigenous to the ecosystem. Invasive organisms can cause species extinction, with the highest extinction rates occurring in freshwater environments. Aquatic nonnative species that are having a significant detrimental effect on the park's aquatic ecology include lake trout in Yellowstone Lake; brook, brown, and rainbow trout in the park's streams and rivers; and the parasite that causes whirling disease. Though there are other aquatic nonnative species in the park, their effects are less dramatic.

Methodology

Impact analyses of fish and wildlife were based on recent studies and previous projects conducted within the park. Park resource specialists have the information to assess the impacts to federal and state listed species. The U.S. Fish and Wildlife Service will be consulted on the impacts analysis completed by the park. State wildlife agencies were made aware of the project during scoping and no concerns were raised.

Intensity Level Definitions

The thresholds of change for the intensity of impacts to wildlife are defined as follows:

Negligible: Neither wildlife nor fish would be affected, changes would be either non-detectable or, if detected, would have effects that would be considered slight and short-term.

Minor: Temporary displacement of a few localized individuals or groups of animals or fish; mortality of individuals that would not impact population trends; mitigation measures, if needed to offset adverse effects, would be simple and successful.

Moderate: Effects to wildlife would be readily detectable, long-term and localized, with consequences affecting the population level(s) of specie(s). Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.

Major: Effects to wildlife would be obvious, long-term, and would have substantial consequences to wildlife populations in the region; mortality of a number of individuals that subsequently jeopardizes the viability of the resident population; extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.

Impacts of Alternative A – No Action

Under the no action alternative operations and maintenance of existing substations would continue. Maintenance of the utility infrastructure disturbs and displaces wildlife temporarily when crews access these sites. There would be no construction of towers and/or installation of automation equipment. Impacts to wildlife from routine maintenance would be minor, long-term and adverse.

Cumulative Effects: Cumulative impacts on wildlife are based on the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions in YNP. Construction projects in YNP would continue to occur. Ongoing administrative activities such as hazing, wildlife monitoring, road construction, and facilities maintenance would continue to affect some wildlife resources. Hazing efforts are carried out by park personnel to discourage wildlife (e.g. bears, wolves, and coyotes) from using developed areas and to move bison back into the park during winter months. Some wildlife would be permanently removed from the population if they become habituated to human food and pose a threat to human safety. Wildlife monitoring practices are used to document various demographics of wildlife populations in the park and may cause adverse impacts ranging from generalized disturbance to sedation and handling of the animals. Noise from road construction and facilities maintenance could disturb wildlife in localized areas. Impacts from these disturbances could range from no impact to movement away from the immediate area. Park visitation is expected to increase each year as a result of population growth in nearby communities and elsewhere. Past and ongoing recreational uses such as boating, angling, camping, and hiking would continue park wide. Fishing occurs park wide during the summer months and could contribute to generalized disturbance of all wildlife species that occur near streams and lakes. Camping and hiking occur throughout the park and could lead to generalized disturbance which could affect feeding and resting behavior. Camping activities risk habituation of bears and other carnivores to human foods which could lead to some individual animals being euthanized. Both ongoing administration activities and increased visitor use could lead to impacts to wildlife populations throughout the park at both short- and long-term negligible to minor level.

Vegetation removal would occur in Northwestern Energy right-of-ways, and development outside of the park as well as for the 1992 Parkwide Road Improvement Plan. While wildlife mortality would not be expected from these projects, wildlife would be displaced. Invasive plant species could be introduced into the park during these projects, reducing the amount of native plants found within the park boundaries which provide food and habitat for fish and wildlife. The Vegetation Management Guidelines for Construction Disturbance in Yellowstone National Park, the Non-native Vegetation Management Plan, and the Whitebark Pine Strategy plan would be followed to minimize adverse effects on wildlife species and habitat.

Erosion and sedimentation of surface water from construction during development of these projects could have adverse effects on surface water, and thus fish and aquatic habitat. Additional impacts could occur from erosion of hiking trails, runoff from the roads, and accidental fuel spills. There are also impacts on individual fish from the heavy recreational fishing; however, the fisheries are managed so as not to adversely affect overall fish populations.

Cumulative effects to fish and wildlife from such actions would be minor and both adverse and beneficial. While some individuals and groups would be displaced, overall wildlife populations would not be jeopardized. Alternative A would contribute minor, adverse cumulative impacts on fish and wildlife. Beneficial effects are also anticipated because vegetation would be managed to reduce fuel within the park, lowering the chance of a large scale, severe fire. Combined with known past, current and future projects and actions, there would be minor, adverse and beneficial cumulative impacts on fish and wildlife.

Impacts of Alternative B – Upgrade Existing Substations and Install Automation and Communication System

Alternative B would have minor impacts to wildlife and wildlife habitat. With the exception of Buffalo Mountain, construction would take place in developed areas. Numerous wildlife species inhabit the seven sites proposed for construction, with presence varying on a seasonal basis. Those that are most common in the forests and meadows adjacent to developed areas during the summer months when visitation is highest would generally be species that are tolerant of, if not habituated to, human presence and activity. For example, ravens, magpies, chipmunks, squirrels, and jays are attracted to food sources provided by the human activity around the park. Wildlife present within the immediate vicinity of most of the proposed activities are habituated to human activity and adverse effects on these animals as a result of the activities proposed under Alternative B are generally expected to be negligible. The species that use this area could be temporarily displaced by construction activity and equipment, but they would be expected to return following completion of the project.

The construction of towers could have a minor effect on migratory birds. The impacts on birds from tall towers have been well documented, however impacts from shorter monopole designs has received less attention (Manville, 2005). A recent study in Rock Creek Park on a 100-foot and 130-foot tower concluded that short, unlit, unguyed towers did not pose a significant threat to migratory birds and bats (Dickey et al, 2012).

Where previously undisturbed ground was developed, such as Buffalo Mountain, a permanent loss of habitat would occur. Under this alternative, no tree cutting activities are proposed and no nesting birds should be affected. The potential impacts from construction activities are expected to be short-term (temporary) and confined to the immediate project areas. As with all Yellowstone construction projects, the NPS would direct contractors to manage food and garbage so that they are not available to grizzly or black bears. Contractor staff would have to attend bear/food management orientation sessions and abide by the normal bear management guidelines. Under Alternative B, minor, short- and long-term adverse impacts to wildlife would be expected to occur.

Cumulative Effects: The impacts from past, present and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative A. Alternative B, in conjunction with these past, present, and reasonably foreseeable projects would result in minor, short- and long-term adverse impacts to wildlife.

Impacts of Alternative C– Upgrade Existing Substations and Install Automation and Communication System Via Fiber and Microwave

Impacts to wildlife under Alternative C would be similar to Alternative B. Alternative C would have minor to moderate impacts to wildlife and wildlife habitat. The building and tower construction would take place in developed areas and the installation of 90 miles of underground fiber optic cable would occur along existing utility corridors. Numerous wildlife species inhabit the seven sites proposed for building and tower construction, with presence varying on a seasonal basis. Those that are most common in the forests and meadows adjacent to developed areas during the summer months when visitation is highest would generally be species that are tolerant of, if not habituated to, human presence and activity. For example, ravens, magpies, chipmunks, squirrels, and jays are attracted to food sources provided by the human activity around the park. Wildlife present within the immediate vicinity of most of the proposed activities are habituated to human activity and adverse effects on these animals as a result of the activities proposed under Alternative C are expected to be short-term. The species that use this area could be temporarily displaced by construction activity and equipment, but they would be expected to return following completion of the project. Construction activities along the utility corridors would temporarily displace wildlife during construction. Under this alternative, no tree cutting activities are proposed and no nesting birds should be affected. The potential impacts from construction activities are expected to be short-term (temporary) and confined to the immediate project areas. As with all Yellowstone

construction projects, the NPS would direct contractors to manage food and garbage so that they are not available to grizzly or black bears. Contractor staff would have to attend bear/food management orientation sessions and abide by the normal bear management guidelines. Under Alternative C, minor, short- and long-term adverse impacts to wildlife would be expected to occur.

Cumulative Effects: The impacts from past, present and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative A. Alternative C, in conjunction with these past, present, and reasonably foreseeable projects would result in minor, short- and long-term adverse impacts to wildlife.

Impacts of Alternative D – Upgrade Existing Substations and Install Indication and Communication System Via Satellite

Impacts to wildlife under Alternative D would be similar to Alternative B. Construction and installation of the seven VSAT terminals in the existing electrical substations would have negligible impacts to wildlife and wildlife habitat. This alternative would take place in developed areas. Numerous wildlife species inhabit the seven sites proposed for construction, with presence varying on a seasonal basis. Those that are most common in the forests and meadows adjacent to developed areas during the summer months when visitation is highest would generally be species that are tolerant of, if not habituated to, human presence and activity. For example, ravens, magpies, chipmunks, squirrels, and jays are attracted to food sources provided by the human activity around the park. Wildlife present within the immediate vicinity of most of the proposed activities are habituated to human activity and adverse effects on these animals as a result of the activities proposed under Alternative D are generally expected to be minor. The species that use this area could be temporarily displaced by construction activity and equipment, but they would be expected to return following completion of the project. Construction activities along the road corridor would temporarily displace various bird species. Under this alternative, no tree cutting activities are proposed and no nesting birds should be affected. The potential impacts from construction activities are expected to be short-term (temporary) and confined to the immediate project areas. As with all Yellowstone construction projects, the NPS would direct contractors to manage food and garbage so that they are not available to grizzly or black bears. Contractor staff would have to attend bear/food management orientation sessions and abide by the normal bear management guidelines. Under Alternative D, minor, short- and long-term adverse impacts to wildlife would be expected to occur.

Cumulative Effects: The impacts from past, present and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative A. Alternative D, in conjunction with these past, present, and reasonably foreseeable projects would result in minor, short- and long-term adverse impacts to wildlife.

Special Status Species

Affected Environment

The species listed below are either federally listed as endangered, threatened, proposed, or candidate species or are listed by the park as a species of management concern. Only species that exist or have the potential to exist in the project area are listed. The evaluation of effects included direct, indirect, interrelated, interdependent, and cumulative impacts as defined by the Endangered Species Act (ESA). Mitigation proposed by the park for impacts on threatened or endangered species could include avoidance, minimization, and conservation measures as agreed upon by the USFWS.

Boreal toad (*Bufo boreas*): typically breeds in park areas with water chemistry characteristics that include a pH >8.0, high conductivity, and high acid-neutralization capacity; many of the sites have a geothermal influence (Koch and Peterson 1995). Boreal toad breeding areas are common in the upper Geyser Basin and have been documented in the Swan Lake Flats area. Boreal toads can also be found in

riparian and riverine areas where they feed if adequate cover is available. Although declining throughout much of their range, boreal toads remain widespread throughout the park.

Bald Eagle (*Haliaeetus leucocephalus*): USFWS removed the bald eagle from the list of endangered and threatened wildlife on August 8, 2007. Current data indicate populations of bald eagles have recovered in the lower 48 states, with an estimated minimum of 9,789 breeding pairs now compared to 417 active nests in 1963 (USFWS 2006). Nesting and fledgling bald eagles in Yellowstone increased incrementally from 1987 to 2005 (McEneaney 2006). Resident and migrating bald eagles are now found throughout the park, with nesting sites located primarily along the margins of lakes and shorelines of larger rivers. The bald eagle management plan for the Greater Yellowstone Ecosystem achieved the goals set for establishing a stable bald eagle population in the park, with a total of 26 eaglets fledged from 34 active nests during 2007 (McEneaney 2006). This is the most fledged eaglets ever recorded Yellowstone and the increasing population trend indicates habitat is not presently limiting the growth of the population.

American peregrine falcon (*Falco peregrines anatum*): The American peregrine falcon was removed from the list of endangered and threatened wildlife on August 25, 1999 due to its recovery following restrictions on organochlorine pesticides in the United States and Canada, and implementation of various management actions, including the release of approximately 6,000 captive-reared falcons (64 FR 46541). USFWS has implemented a post-delisting monitoring plan pursuant to the Endangered Species Act that requires monitoring peregrine falcons at three-year intervals that began in 2003 and would end in 2015. Monitoring estimates from 2003 indicate territory occupancy, nest success, and productivity were above target values set in the monitoring plan and that the peregrine falcon population is secure and viable (71 FR 60563). Peregrine falcons reside in Yellowstone from April through October, nesting on large cliffs. The number of nesting pairs and fledglings in the park has steadily increased from zero in 1983 to 32 pairs and 47 fledglings in 2007 (Baril et al. 2010).

Trumpeter swan (*Cygnus buccinator*): Trumpeter swans were nearly extinct by 1900, but a small group survived by remaining year round in the Greater Yellowstone Area. In 2010 there were approximately 46,000 trumpeter swans in North America (USFWS 2010). Yellowstone supports resident, non-migratory trumpeter swans through the year, and its areas of ice-free water that diminish as winter progresses provide limited, temporary habitat for migrants from the region, Canada, and elsewhere during the winter. The NPS is committed to the conservation of resident trumpeter swans and preserving habitat for winter migrants in Yellowstone because swans are part of the natural biota and a species with considerable historical significance. However, counts of resident, adult trumpeter swans in the park decreased from a high of 69 in 1961 to 6 in 2009. Causes of this decline are unknown, but may include decreased immigration, competition with migrants, and the effects of sustained drought, human disturbance, and predation on productivity (McEneaney 2006). The Rocky Mountain trumpeter swan population operates at a scale larger than Yellowstone, and the dynamics of resident swans in Yellowstone appear to be influenced by larger sub-populations and management actions in the Greater Yellowstone Area and elsewhere.

White Pelican (*Pelecanus erythrorhynchos*): American white pelicans were identified as a Species of Management Concern because nesting attempts decreased from >400 during the mid-1990s to 128 during 1999, and Yellowstone has the only nesting colony of white pelicans in the national park system (McEneaney 2002). Pelican control in the 1920s followed by human disturbances in the 1940s and 1950s kept the population at low levels. Since then, pelican numbers have increased but the number of nesting attempts and fledged juveniles fluctuates greatly from year to year. Flooding occasionally takes its toll on production, as does disturbance from humans or predators (McEneaney 2002). YCT is the main food for white pelicans in Yellowstone. In 2006, a total of 427 pelicans fledged 362 young. The 2009 data indicate that only 54 chicks fledged. Lower numbers than normal could be the result of nest inundation by above average June rains, or the declining YCT population may be partially responsible for reduced fledging and nest success.

Yellowstone Cutthroat Trout (*Oncorhynchus clarkii bouvieri*): A range-wide status review estimated that the conservation population (>90% genetic purity) of YCT occupy over 6,300 km within their native range in Idaho, Montana, Nevada, Utah, and Wyoming. Yellowstone Lake, at over 84,000 surface acres, is home to the largest population of YCT in existence (Varley and Schullery 1998) and is an important food source for many animal species in the park. In Yellowstone Lake, recent threats such as LKT introduction, drought, and whirling disease have severely diminished the ecological role of this fish.

Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*): Numerous stressors, including stocking of non-native fish, habitat degradation and fragmentation from land use activities, have reduced the distribution and abundance of WCT. The subspecies currently occupies only 19% to 27% of its historical range east and west of the Continental Divide in Montana and about 36% of its historical range in Idaho. Even some of the historically most secure populations in Glacier National Park and the Flathead Basin of Montana are in serious decline. In the upper Missouri river drainage, WCT now occupy less than 5% of their historical range. The remaining population persists as small-stream residents occupying isolated habitats ranging from several hundred meters to a few kilometers in extent. As a result, these populations face a high risk of extinction. In Yellowstone, WCT are present in approximately 3 km of a small tributary to Grayling Creek, as a restored population in East Fork Specimen Creek, and as a population stocked in Geode Creek in the 1920s.

Arctic Grayling (*Thymallus arcticus*): Arctic grayling are listed as a Species of Special Management Concern by the NPS and the USFWS. Fluvial (stream-dwelling) GRY were once widespread in the Missouri River drainage, but wild grayling persist only in the Big Hole River, representing approximately 4% of their native range in Montana. In Yellowstone, fluvial GRY historically occupied waters of the Madison and Gallatin River drainages on the park's west side. Introduced populations of adfluvial (lake-dwelling) GRY exist in Wolf and Grebe lakes, which form the headwaters to the Gibbon River. A 2005–2006 study indicated that the small number of GRY in the Gibbon and Madison rivers are likely emigrants from Wolf and Grebe lakes and that the native fluvial GRY population has most likely been extirpated from the park.

Whitebark Pine (*Pinus albicaulis*): Status - Candidate Species Species for T&E: Whitebark pine is a major component of the forest community in areas above 8,400 feet and a major understory component of lodgepole-dominated forests from 7,000 to 8,400 feet. Seeds of the whitebark pine are important food for grizzly bears and a variety of other wildlife species. Whitebark pine populations in Yellowstone have been declining due to native mountain pine beetles (*Dendroctonus ponderosae*) and non-native blister rust, which is caused by a fungus, *Cronartium ribicola* (Schwandt 2006). In July 2011, the USFWS determined that whitebark pine warrants protection under the ESA, but that adding the species to the Federal List of Endangered and Threatened Wildlife and Plants is precluded by the need to address other listing actions of a higher priority. This species is now added to the list of candidate species eligible for ESA protection and its status reviewed annually. Whitebark pine exist both as an overstory and understory component within the forest communities in many regions of the park.

Yellowstone Sand Verbena (*Abronia ammophila*): Yellowstone Lake's shore is the only place in the world where Yellowstone sand verbena grows. The presence of a sand verbena at 7,700 feet elevation in the northern Rockies is unexpected, as most members of this North American genus occur in the Southwest or along the Pacific Coast. Warmth provided by the geothermal activity in the area may be helping this species tolerate the long, cold winters followed by a brief summer in which they bloom and reproduce. The taxonomic relationship of this sand verbena population to others is a matter of debate. It may be distinct at the subspecific level, and is certainly reproductively isolated from the closest sand verbena populations, which are in the Bighorn Basin of Wyoming. Yellowstone sand verbena is restricted to the shoreline of Yellowstone Lake and the location of nearly all of the plants on the lake's north shore places the species at risk of extinction due to random events affecting the population.

Ross' bentgrass (*Agrostis rossiae*): Ross's bentgrass is restricted to Yellowstone National Park occurring in the Lower Geyser Basin, Midway Geyser Basin, Upper Geyser Basin and Shoshone Geyser Basin on geothermally influenced warm ground sites. This Yellowstone endemic is globally rare and was considered for possible listing under the Endangered Species Act, though in June 2011 the U.S. Fish and Wildlife Service determined that listing was not warranted at this time since they determined that existing National Park Service regulatory mechanisms are adequate to protect the species.

Yellowstone Sulfur Wild Buckwheat (*Eriogonum umbellatum* var.*cladophorum*): Yellowstone sulfur wild buckwheat occurs only from the vicinity of Madison Junction through the Lower and Midway geyser basins to the Upper Geyser Basin. This conspicuous wildflower blooms from late June to August. It is primarily present on glacial till deposits with some geothermal influence, such as the sagebrush-steppe community near the Old Faithful interchange. Yellowstone sulfur wild buckwheat has demonstrated its ability to recolonize after construction disturbance by its presence on the road prism around the Old Fait

North American pronghorn (*Antilocapra americana*): Yellowstone's pronghorn population was one of only a few not exterminated or decimated by early in the 20th century and, as a result, was the source for re-establishing or supplementing populations throughout much of its range (Lee et al. 1994). These pronghorn express much of the genetic variation that was formerly widespread in the species, but is no longer present elsewhere (Reat et al. 1999). This population also sustains one of only two long-distance pronghorn migrations that persist in the greater Yellowstone region (White et al. 2007). There are serious concerns about its viability because low abundance (~200) and apparent isolation have increased its susceptibility to random, naturally occurring catastrophes (NPS 2010; National Research Council 2002).

Bison (*Bison bison*): Plains bison at Yellowstone have been petitioned for listing as an endangered species twice in the past 15 years and both times the U.S. Fish and Wildlife Service has declined to list the species. The Yellowstone bison population has been identified as a distinct population by USFWS definition. The population is comprised of plains bison that historically occupied about 20,000 square kilometers (km2) in the headwaters of the Yellowstone and Madison rivers of the western United States. While nearly extirpated in the early 20th century, Yellowstone National Park provides sanctuary to the only wild and free-ranging bison population to continuously occupy historic range. Intensive husbandry, protection, and relocation were used to bring back the population, and in summer 2011 there were about 3,700 bison in the park (1300 on the central range that includes the Lake development area). Yellowstone bison are managed as a single population having two distinct breeding areas with individuals that move across an extensive landscape (220,000 acres). These bison are subject to natural selection factors such as competition for food and mates, predation, and survival under substantial environmental variability. Thus, they have retained the adaptive capabilities of plains bison. Yellowstone bison contribute a unique genetic lineage to plains bison that is not represented elsewhere within populations managed by the Department of Interior. They have high genetic diversity compared to other populations of plains bison, and are one of a few bison populations with no evidence or suggestion of potential cattle ancestry.

The central herd occupies the central plateau of Yellowstone National Park, extending from the Pelican and Hayden valleys in the east to the lower elevation and thermally influenced Madison headwaters area in the west. Central herd bison congregate in the Hayden Valley for breeding. Most bison move between the Madison, Firehole, Hayden, and Pelican valleys during the rest of the year. Some of these bison are likely to migrate north to the Gardiner Basin during the winter months and return to the Hayden Valley to breed. Emigration has been observed with more bison emigrating north from the central range than vice versa. The northern herd occupies the area commonly referred to as the northern range, extending from the high elevations along the east boundary from Cook City south to the Needle (a small number of males summer in the upper Lamar Valley to Saddle Mountain) westward to include the Mirror Plateau, Specimen Ridge and Upper Slough Creek all the way to the lower reaches of the Gardiner Basin at Yankee Jim Canyon. This sub-population breeds at the eastward end of their range and slowly moves down in elevation as the fall and winter months pass. By late winter and early spring the majority of the

northern range group is located west of Tower and follows the chronology of spring green up conditions back to the high country for the July/August breeding period.

Bison tend to be observed in open grassland or shrub steppe habitats but due to the juxtaposition of these habitats in Yellowstone there are many travel corridors along rivers and over high elevation passes that provide connections to all of the major watersheds throughout the park. The bison population is more commonly found in the northern 2/3 of the park but small numbers (mostly males) move in to the Thoroughfare and portions of the Caldera between Lewis Lake and West Thumb. As late as the 1970's there was a remnant group of bison that used the Pitchstone Plateau and portions of the Bechler Valley. That area has not been routinely monitored but use of meadows in this portion of the park would not be unexpected. A recent evaluation of potential habitat identifies the southern 1/3 of Yellowstone as suitable but not extensively occupied at this time.

Gray Wolf (*Canis lupus*): Gray wolves were native to the Greater Yellowstone Area when the park was established in 1872. Historically hunted for their hides and as predators, they were eliminated from the ecosystem by the 1930s. The USFWS released an EIS on wolf reintroduction in May 1994. In 1995 and 1996, 31 gray wolves from Canada were released in the park. A total of 14 wolves were released in the winter of 1994-1995; 17 additional wolves were released in 1996 (Phillips and Smith 1996). On May 5, 2011, the USFWS removed gray wolves in a portion of the Northern Rocky Mountain Distinct Population Segment (DPS) encompassing Idaho, Montana, and parts of Oregon, Washington, and Utah from the Federal List of Endangered and Threatened Wildlife. Gray wolves in Wyoming remain on the List of Endangered and Threatened Wildlife and continue to be subject to the provisions of our experimental population regulations codified at 50 CFR 17.84(i) and (n). Wolves reintroduced into YNP and central Idaho were classified ―nonessential experimental‖ according to section 10(j) of the ESA of 1973, as amended (16 U.S.C. 1531). In national parks and wildlife refuges, nonessential experimental populations are treated as threatened species, and all provisions of Section 7 of the ESA apply (50 CFR 17.83(b)). The gray wolf was removed from the federal list of endangered and threatened wildlife and from Wyoming's wolf population's status as an experimental population effective September 30, 2012. The USFWS, NPS, and states plan to monitor wolf populations in the Northern Rocky Mountain DPS and gather population data for at least five years. At the end of 2012, at least 83 wolves in 10 packs (6 breeding pairs) occupied YNP. This is roughly a 15% decline from the recent three years where the population had stabilized around 100 wolves. Breeding pairs declined slightly from eight the previous year. The wolf population has declined by about 50% since 2007 mostly because of a smaller elk population, the main food of northern range wolves. At the end of 2012, there were approximately 463 adult wolves in the GYA. At least one member of most packs is radio-collared, allowing NPS and USFWS personnel to monitor the movements of most packs.

Wolverine (*Gulo gulo*); **Status - Proposed for Threatened under ESA**: The wolverine is a wide-ranging mustelid that naturally exists at low densities throughout much of northern and western North America (Beauvais and Johnson 2004). Wolverines are highly adapted to extreme cold and life in environments that have snow on the ground all or most of the year (Aubry et al. 2007). In the contiguous United States, these habitats are highly mountainous and occur at elevations above 8,000 feet (Copeland et al. 2007).

Overexploitation through hunting and trapping, as well as predator poisoning programs, likely caused wolverine populations to contract along the southern portion of their historical range in North America since the early 1900s (Banci 1994). However, recent surveys indicate wolverines are widely distributed in remote, montane regions of Idaho, Montana, Washington, and parts of Wyoming (68 FR 60113).

Wolverines have been detected in the Greater Yellowstone Ecosystem including the eastern, northern, and southern portions of the park (Beauvais and Johnson 2004; Copeland et al. 2007). Wolverines have protected status in Washington, Oregon, California, Colorado, Idaho, and Wyoming (Banci 1994). In Montana, wolverines are classed as furbearers and trapper harvests are managed through a quota system

that limits the number of animals that can be taken. On February 4th, 2013, the USFWS proposed for the wolverine to be listed as threatened, moving it from candidate species category in the contiguous United States, with pending designation as threatened anticipated in late 2013. It has protected status under state regulation in Washington, Oregon, California, Colorado, Idaho, and Wyoming (Banci 1994); in Montana trapper harvests are managed through a quota system, but with recent proposed listing trapping may be eliminated in 2013.

Threatened and Endangered Species: *The species listed below are either federally listed as endangered or threatened, or proposed for listing. Candidate species are included above.*

Canada Lynx (*Lynx canadensis*); **Status Threatened:** The USFWS listed the Canada lynx as a threatened species in 2000. Lynx are considered rare in the Greater Yellowstone Area and are believed to use boreal or montane forests. Evidence of lynx in Yellowstone National Park comes from about 216 winter tracking surveys (conducted during winters of 2001-2004 and covering 1,043 total miles); from 118 lynx hair-snare transects deployed parkwide during the summers of 2001-2004, and from historic sightings. Park wide, only four lynx sightings have been reported by visitors in the last 10 years. Surveys have documented one possible, two probable, and two definite cases of lynx presence, including a female accompanied by a kitten. Population numbers are unknown. Lynx prefer upper elevation coniferous forests in cool, moist vegetation types, particularly those that support abundant snowshoe hares, the primary food source for lynx. The best evidence of lynx presence is along the east shore of Yellowstone Lake. Critical habitat for lynx has also been designated for YNP and overlaps with Lynx Analyses Units through the park created in 2009.

The Fish and Wildlife Service designated critical habitat for lynx on February 27, 2009. Five lynx critical habitat units were selected in the United States that provide adequate habitat elements for lynx. Unit #5 falls within the Greater Yellowstone Area (GYA) and is slightly over 6 million acres. Approximately 927,000 acres fall within Yellowstone National Park.

Grizzly Bear (*Ursus arctos horribilis*); **Status - Threatened:** The park is responsible for protecting grizzly bear populations and habitat as mandated by the Yellowstone Park Act (1872) creating the park, the National Park Service Organic Act (1916), the National Environmental Policy Act (1969), the Endangered Species Act (1973) (ESA), and the National Parks Omnibus Management Act (1998). National Park Service policy mandates that the park perpetuate native animal populations as part of the natural ecosystem and protect native animal populations against destruction, removal, harassment, or harm through human actions (NPS 1998, 1991). A recovery plan for grizzly bear populations in the lower forty-eight contiguous United States was implemented because grizzly bears were listed in 1975 under the Endangered Species Act (USFWS 1982). The plan was developed to provide direction for the conservation of grizzly bears and their habitat to federal agencies responsible for managing land within the recovery zone. That same year, YNP completed an Environmental Impact Statement (EIS) for a grizzly bear management program specifically designed to recover the subpopulation of grizzly bears inhabiting the park (NPS 1982). Management of grizzly bears in YNP has been successful in enabling grizzly bear recovery and reducing bear-human conflicts (e.g., property damage, incidents of bears obtaining human food, bear-inflicted human injuries) and human-caused bear mortalities in the park (Gunther 1994, Gunther and Hoekstra 1998, Gunther et al. 2000, Gunther et al. in press). The U.S. Fish and Wildlife Service removed grizzly bears in the Greater Yellowstone Ecosystem from the Federal List of Threatened and Endangered Wildlife on April 30, 2007. In 2009, a U.S. District Court returned the grizzly to the federal threatened species list, saying the Conservation Strategy was not enforceable and insufficiently considered the impact of climate change on grizzly food sources. The USFWS and the Department of Justice appealed. In 2012, a ruling was made to keep the grizzly bear on the federal threatened species list. The grizzly bear population in the GYA was estimated to range between 549 and 672 in 2012.

Methodology

Impacts to USFWS Threatened and Endangered Species and Yellowstone Species of Management Concern are analyzed in this impact topic based on the knowledge of park resource specialists, current literature, and consultation with USFWS. Park biologists have made effect calls for threatened and endangered species for the preferred alternative to be used during Section 7 consultation with the USFWS.

Intensity Level Definitions

The thresholds of change for the intensity of special status species impacts to wildlife are defined as follows:

Negligible: Adverse or beneficial impacts to individuals or population of threatened and endangered species or species of concern or to the species habitat that is not measurable or perceptible and would be unlikely to occur

Minor: Adverse or beneficial impacts to individuals or population of threatened and endangered species or species of concern or to the species habitat that are measurable, small, and localized may occur. Short- or long-term disturbances to individuals or population and/or a small amount of habitat could be permanently modified or removed. Impacts would not measurably affect the migration patterns, or other demographic characteristic of the population (i.e., age/sex structure, recruitment rates, survival rates, movement rates, population sizes, population rates of change).

Moderate: Adverse or beneficial impacts to individuals or population of threatened and endangered species or species of concern or to the species habitat that are measurable, localized, and of consequence would affect a moderate portion of the species/range in the park. Short- or long-term disturbances could measurably affect the migration patterns or other demographic characteristics of a population (i.e., age/sex structure, recruitment rates, survival rates, movement rates, population sizes, population rates of change). Impacts would not significantly increase the susceptibility of populations(s) in or near the park to environmental or demographic uncertainties (e.g., severe winters, droughts, disease epidemics, and skewed age or sex ratios).

Major: Adverse or beneficial impacts to individuals or population of threatened and endangered species or species of concern or to the species habitats that are measurable, large, long-term, and cause a widespread change across the region. The susceptibility of populations(s) throughout the region to environmental or demographic uncertainty would significantly increase.

Impacts of Alternative A – No Action

Under Alternative A, the existing substations would not be upgraded and towers would not be erected for an automation and communication system. Therefore, there would be no new impacts to special status species. Routine maintenance activities would continue to have a short-term, minor adverse effect.

Cumulative Effects: Cumulative impacts on special status species are based on the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions in the Greater Yellowstone Area. Cumulative impacts on threatened and endangered species are those effects of future State or private activities, not involving Federal activities that are reasonably certain to occur within the action area. Continuing construction projects in the developed areas of the park and the GYA would occur, but moderate or major impacts on special status species must be mitigated. Ongoing administrative activities such as road reconstruction and maintenance, backcountry operations, hazing

activities, and facilities maintenance would continue to have adverse effects on special status species in the park. Most facilities maintenance would take place in developed areas where minimal impacts to special status species would occur. However, adverse impacts to some species may occur because they are disturbed by noise and people associated with maintenance activities. These would cause temporary displacement of special status species from generalized disturbance; feeding and resting behavior of wildlife species may be interrupted and some special status plant species may be adversely impacted from equipment working in construction areas.

Park visitation remains one of the major factors affecting the grizzly bear in the action area. In 2010, YNP recorded a record 3.6 million visitors. Average annual recreational visitation has increased each decade from an average of 7,378 visitors/year during the late 1890s to 3,300,000 visitors/year in the 2000s. The decade 2000-2009 was the first in history of the park that visitation did not increase from the previous decade. Average annual backcountry user nights have remained fairly static since the 1970s, ranging from 39,280 to 45,615 user nights. In addition to the potential increase in human-wildlife interactions, vehicle traffic may impact special status species directly (injury or death) or indirectly by altering behavior (displacement and avoidance). Use of trails and backcountry campsites and cabins could also temporarily displace or disrupt special status species. Effects from these activities would be direct, short-term, and negligible because of the limited duration of the activity. Hazing activities usually take place near developed areas where wildlife has become habituated to the presence of humans. The grizzly bear and wolf are the two species most likely affected by hazing activities.

Past and ongoing recreational use such as fishing, camping, and hiking would continue park wide. These activities could lead to negligible to minor adverse impacts because special status species can become disturbed from human activity. Outside of the park, recent hunting regulations for gray wolves would have an adverse effect on the population, but compliance with the individual state's wolf management plan would ensure genetic viability and survival of the species. Oil and gas drilling operations in the surrounding states would have an adverse impact on the three listed species.

Ongoing actions in YNP include the eradication of Lake trout. The resulting reduction in Lake trout would likely result in an increase in the Cutthroat trout population. Any increase in the Cutthroat trout population would benefit the Grizzly bear, allowing use of historical spawning streams for foraging.

The impacts from past, present, and reasonably foreseeable action have had a minor, short- and long-term adverse impact on special status species. Alternative A does not impact special status species and therefore would not incrementally add to an overall cumulative effect to special status species.

Impacts of Alternative B – Upgrade Existing Substations and Install Automation and Communication System

Seventeen special-status species exist in YNP, fourteen animals and three plant species. Construction would create noise disturbance and expose potential special status species habitat to an increase in human presence. However, once construction is over, species may return and resume use of these sites. To minimize the on-site construction time the buildings would be pre-fabricated off-site in Butte, MT.

Under the proposed action no special status plant species would be affected. Construction at the eight sites would not require removal of any trees and Yellowstone sand verbena, Ross' bentgrass, and Yellowstone sulfur buckwheat are not present at any of the sites. The proposed construction sites are not located near wetlands or streams and would have no effect on arctic grayling, westslope cutthroat trout, Yellowstone cutthroat trout, white pelicans, or the trumpeter swan. Bald eagles and American peregrine falcon are not known to nest or inhabit any of the proposed project areas and the proposed action would not affect these two species. Boreal toads are not known to inhabit any of the proposed project sites.

The effects on the federally listed and candidate species (i.e., Canada lynx, grizzly bear, and whitebark pine) are evaluated below. We do not address the wolverine further, given that the action areas do not occur in areas where wolverines are believed to be present.

Canada Lynx: Buffalo Mountain is the only site that falls within an area defined as lynx critical habitat. The effects of this individual project would be negligible on lynx. Areas outside critical habitat typically support no lynx and provide little or no foraging opportunity for major lynx prey such as snowshoe hares and red squirrels. The only potential effects to lynx would be during construction, which could cause displacement of the animals if they were in the local area. All of the construction would take place within previously disturbed areas with existing infrastructure and would not remove lynx habitat. The proposed action would not impact a measurable amount of the critical habitat in Unit #5, nor affect the function of the critical habitat unit and the Primary Constituent Elements (i.e., snowshoe hare and denning habitats, and matrix conditions). The proposed project activities would have **"No Effect"** on Designated Critical Habitat for the Canada Lynx.

Disturbance of resident lynx and their natal dens at any location would be highly unlikely because the duration of construction would be short (< 3months), because lynx occur in very low numbers in the park, and because their distribution is largely restricted to the Absaroka Range and the Central Plateau (Murphy et al. 2006). Although lynx reproduction is documented in Yellowstone, no natal den sites are documented.

Transport of towers, pre-fabricated buildings, and construction-related equipment along park roads would pose very little (i.e., discountable) risk of vehicle-strike mortality because few lynx are present. No vehicle-strike mortalities of lynx are documented in the Yellowstone Ecosystem.

Effects from the proposed action on Canada lynx are expected to be negligible, short-term adverse. The preferred alternative **"May affect, but would not likely adversely affect"** Canada Lynx

Grizzly Bear: Potential effects to grizzly bears from the proposed action are: (1) temporary changes in the quality of habitat and availability of food; and (2) displacement from habitat.

In accordance with the revised Grizzly Bear Recovery Plan, the percent of secure habitat within the Bear Management Units would not be affected. The only potential effects to grizzly bears that could occur would be during construction, which could cause displacement of the animals if they were in the local area. All of the construction would take place within previously disturbed areas with existing infrastructure and would not remove grizzly habitat. Prior to construction, workers would be educated in the park's food and garbage storage rules as well as proper disposal procedures. With implementation of this conservation measure the potential for a grizzly-human conflict is reduced.

In conclusion, we have determined that the proposed action would have negligible, short-term adverse impacts to the grizzly bear. This conclusion is due to the presence of humans in grizzly bear habitat during construction. The preferred alternative **"May affect, but would not likely adversely affect"** grizzly bear.

Whitebark Pine: As stated above no trees, including whitebark pine would be removed as part of the proposed action. Trampling of seedlings is always a possibility, but since the projects are in previously disturbed areas, the likelihood is minimal. Under alternative B, impacts to whitebark pine are expected to be negligible, short- and long-term adverse.

Cumulative Effects: The impacts from past, present and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative A. Alternative B, in conjunction with these past, present, and reasonably foreseeable projects would result in minor, short- and long-term adverse impacts to special status species.

Impacts of Alternative C– Upgrade Existing Substations and Install Automation and Communication System Via Fiber and Microwave

Seventeen special-status species exist in YNP, fourteen animals and three plant species. Construction would create noise disturbance and expose potential special status species habitat to an increase in human

presence. However, once construction is over, species may return and resume use of these sites. To minimize the on-site construction time the buildings would be pre-fabricated off-site in Butte, MT.

Under the proposed action no special status plant species would be affected. Construction at the eight sites would not require removal of any trees and Yellowstone sand verbena, Ross' bentgrass, and Yellowstone sulfur buckwheat are not present at any of the sites. Installation of the fiber optic cable would require approximately 108 stream or river crossings. The cable would be installed above or below the stream or river, depending on the width. Installation of the cable across these stretches of water would have no effect on water quality and would not affect arctic grayling, westslope cutthroat trout, and Yellowstone cutthroat trout. White pelicans and trumpeter swans prefer slow-moving rivers and quiet lakes. The cable installation may displace either of these species if they were in the local area, however the utility line corridor is not adjacent, nor does it traverse typical pelican or swan habitat. If a Bald eagles or American peregrine falcon nest site was identified along the proposed route it would be temporarily closed to construction activities. Boreal toads are not known to inhabit any of the proposed project sites. Throughout construction there is always the chance the any of these species could be affected, mainly through disturbance and displacement. If disturbance occurred, it would be temporary and a minor effect on the species.

The effects on the federally listed and candidate species (i.e., Canada lynx, grizzly bear, and whitebark pine) are evaluated below. We do not address the wolverine further, given that the action areas do not occur in areas where wolverines are believed to be present.

Canada Lynx: Power lines cross through lynx critical habitat at one location, west of canyon junction. The effects of this individual project would be negligible on lynx. Areas outside critical habitat typically support no lynx and provide little or no foraging opportunity for major lynx prey such as snowshoe hares and red squirrels. The only potential effects to lynx would be during construction, which could cause displacement of the animals if they were in the local area. All of the construction would take place within previously disturbed areas with existing infrastructure and would not remove lynx habitat. The proposed action would not impact a measurable amount of the critical habitat in Unit #5, nor affect the function of the critical habitat unit and the Primary Constituent Elements (i.e., snowshoe hare and denning habitats, and matrix conditions).

Disturbance of resident lynx and their natal dens at any location would be highly unlikely because the duration of construction would be short (< 3months), because lynx occur in very low numbers in the park, and because their distribution is largely restricted to the Absaroka Range and the Central Plateau (Murphy et al. 2006). Although lynx reproduction is documented in Yellowstone, no natal den sites are documented.

Transport of towers, pre-fabricated buildings, and construction-related equipment along park roads would pose very little (i.e., discountable) risk of vehicle-strike mortality because few lynx are present. No vehicle-strike mortalities of lynx are documented in the Yellowstone Ecosystem.

Effects from the proposed action on Canada lynx are expected to be negligible, short-term adverse.

Grizzly Bear: Potential effects to grizzly bears from the proposed action are: (1) temporary changes in the quality of habitat and availability of food; and (2) displacement from habitat.

In accordance with the revised Grizzly Bear Recovery Plan, the percent of secure habitat within the Bear Management Units would not be affected. A power-line corridor transects the Firehole Bear Management Area. This corridor is maintained to 40 feet wide. Grizzly bears have been observed using power line corridors and radio collars have been found within the corridor as well. The only potential effects to grizzly bears that could occur would be during construction, which could cause displacement of the animals if they were in the local area. All of the construction would take place within previously disturbed areas with existing infrastructure and would not remove grizzly habitat. Prior to construction, workers would be educated in the park's food and garbage storage rules as well as proper disposal

procedures. With implementation of this conservation measure the potential for a grizzly-human conflict is reduced.

The proposed action would have minor, short-term adverse impacts to the grizzly bear. This conclusion is due to the presence of humans in grizzly bear habitat during construction.

Whitebark Pine: As stated above no trees, including whitebark pine would be removed as part of the proposed action. Trampling of seedlings is always a possibility, but since the projects are in previously disturbed areas, the likelihood is minimal. Under alternative C, impacts to whitebark pine are expected to be negligible, short- and long-term adverse.

Cumulative Effects: The impacts from past, present and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative A. Alternative C, in conjunction with these past, present, and reasonably foreseeable projects would result in minor, short- and long-term adverse impacts to special status species.

Impacts of Alternative D – Upgrade Existing Substations and Install Indication and Communication System Via Satellite

Seventeen special-status species exist in YNP, fourteen animals and three plant species. Construction would create noise disturbance and expose potential special status species habitat to an increase in human presence. However, once construction is over, species may return and resume use of these sites. To minimize the on-site construction time the buildings would be pre-fabricated off-site in Butte, MT.

Under the proposed action no special status plant species would be affected. Construction at the eight sites would not require removal of any trees and Yellowstone sand verbena, Ross' bentgrass, and Yellowstone sulfur buckwheat are not present at any of the sites. The proposed construction sites are not located near wetlands or streams and would have no effect on arctic grayling, westslope cutthroat trout, Yellowstone cutthroat trout, white pelicans, or the trumpeter swan. Bald eagles and American peregrine falcon are not known to nest or inhabit any of the proposed project areas and the proposed action would not affect these two species. Boreal toads are not known to inhabit any of the proposed project sites.

The effects on the federally listed and candidate species (i.e., Canada lynx, grizzly bear, and whitebark pine) are evaluated below. We do not address the wolverine further, given that the action areas do not occur in areas where wolverines are believed to be present.

Canada Lynx: No site under Alternative D falls within lynx critical habitat. The effects of this individual project would be negligible on lynx. Areas outside critical habitat typically support no lynx and provide little or no foraging opportunity for major lynx prey such as snowshoe hares and red squirrels. The only potential effects to lynx would be during construction, which could cause displacement of the animals if they were in the local area. All of the construction would take place within previously disturbed areas with existing infrastructure and would not remove lynx habitat. The proposed action would not impact a measurable amount of the critical habitat in Unit #5, nor affect the function of the critical habitat unit and the Primary Constituent Elements (i.e., snowshoe hare and denning habitats, and matrix conditions).

Disturbance of resident lynx and their natal dens at any location would be highly unlikely because the duration of construction would be short (< 3months), because lynx occur in very low numbers in the park, and because their distribution is largely restricted to the Absaroka Range and the Central Plateau (Murphy et al. 2006). Although lynx reproduction is documented in Yellowstone, no natal den sites are documented.

Transport of towers, pre-fabricated buildings, and construction-related equipment along park roads would pose very little (i.e., discountable) risk of vehicle-strike mortality because few lynx are present. No vehicle-strike mortalities of lynx are documented in the Yellowstone Ecosystem.

Effects from the proposed action on Canada lynx are expected to be negligible, short-term adverse.

Grizzly Bear: Potential effects to grizzly bears from the proposed action are: (1) temporary changes in the quality of habitat and availability of food; and (2) displacement from habitat.

In accordance with the revised Grizzly Bear Recovery Plan, the percent of secure habitat within the Bear Management Units would not be affected. The only potential effects to grizzly bears that could occur would be during construction, which could cause displacement of the animals if they were in the local area. All of the construction would take place within previously disturbed areas with existing infrastructure and would not remove grizzly habitat. Prior to construction, workers would be educated in the park's food and garbage storage rules as well as proper disposal procedures. With implementation of this conservation measure the potential for a grizzly-human conflict is reduced.

In conclusion, we have determined that the proposed action would have negligible, short-term adverse impacts to the grizzly bear. This conclusion is due to the presence of humans in grizzly bear habitat during construction.

Whitebark Pine: As stated above no trees, including whitebark pine would be removed as part of the proposed action. Trampling of seedlings is always a possibility, but since the projects are in previously disturbed areas, the likelihood is minimal. Under alternative D, impacts to whitebark pine are expected to be negligible, short- and long-term adverse.

Cumulative Effects: The impacts from past, present and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative A. Alternative D, in conjunction with these past, present, and reasonably foreseeable projects would result in minor, short- and long-term adverse impacts to special status species.

Scenic Resources

Affected Environment

Scenery has always been an integral part of the fundamental resources and values of national parks. Yellowstone's enabling legislation from 1872 reserves the park as a "pleasuring-ground for the benefit and enjoyment of the people." Historian Ethan Carr explains that "in the context of the 19th century landscape park, the preservation of unimpaired scenery could be identified with civic virtue." The 1916 Organic Act that created the National Park Service sought to "conserve the scenery ... and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." Thomas Moran's paintings and William Henry Jackson's photographs of Yellowstone scenery were instrumental in convincing the Congress to set this area aside and "preserve it from injury or spoliation."

Outstanding scenic character has always distinguished national parks from other areas, including national forests. Yellowstone National Park abounds with impressive viewsheds of the highest quality. Despite being one of the oldest units in the park system, the majority of its landscapes appears untouched by humans and retains their primeval characteristics. The park's developed areas and facilities are predominantly grouped along the figure-eight Grand Loop Road system leaving substantial acreage in its natural condition.

Part of the allure and expectations associated with Yellowstone involve the reality and the impression that the park is predominantly in its natural condition. Because the primary viewsheds are natural, built structures often stand out in stark contrast to the scenery and thereby degrade part of the fundamental resource. In Yellowstone, staff have gone to great efforts to ensure that facilities are screened or invisible to park visitors.

Yellowstone strives to preserve its naturally dark nighttime skies, a valuable park resource. In developed areas, there is a delicate balance between providing the appropriate amount and level of human-generated

light for the safety of visitors and staff and the protection of the dark night skies. Human vision is least effective when extreme lighting contrasts are presented (for example, when very bright areas transition to very dark areas), and these situations are avoided/corrected in developed areas.

A variety of installations relating to utilities currently exist in YNP. They range from water treatment and wastewater plants; water, sewer, and phone, and electric lines; towers to mount antennas for radio, research, safety functions are just a few. Buildings, roads, bridges, and signs are also found in abundance. Their locations vary from the middle of developed areas to remote research monitoring units in the backcountry. Given the multiple locations and types of equipment, there are varying degrees of visibility and visual intrusion.

The existing electric substations within the park are located adjacent to, or within existing developments of the park, or are located off service roads behind locked gates. For the most part they are hidden, or at least mostly un-noticed with some exceptions. The Mammoth Substation is partially within view of several areas within the Mammoth developed area. The Norris Substation is in view from the Norris to Canyon Road, but is mostly hidden behind of screen of existing trees adjacent to the road. It is only when viewed in close proximity and at 90 degrees to the road that it is visible for a few seconds to the passing motorist. The Old Faithful Substation is visible only partially from the Grand Loop Road and only for a very short time (seconds) when traveling the Grand Loop Road adjacent to the Administrative area. The Lake Substation is only visible when one drives into the Lake Administrative area and is well screened from the Grand Loop Road about a mile south of Fishing Bridge Junction. The rest: Canyon, Madison, Grant, and Buffalo Mountain are not visible from the publicly traveled roads or developed areas.

Methodology

Analyses of the potential intensity of impacts to scenic resources were derived from available information regarding desired views in the action areas and park staff records and past observations of the effects to those desired views (visual quality) from development, visitor use, and area operations, including construction activities.

Intensity Level Definitions

The thresholds of change for the intensity of impacts to scenic resources are defined as follows:

Negligible: Changes to the visual quality of the landscape, including nighttime quality, would be barely detectable or changes would be short-term, small and localized.

Minor: Changes to the visual quality of the landscape, including nighttime quality would be short-term or long-term small and localized to an area in the park. The change is noticeable but does not negatively affect the character of the site or its relationship to or dominance in the surrounding natural setting.

Moderate: Changes to the visual quality of the landscape (including nighttime quality) would be long term and obvious in many areas of the park. There could be an effect of an area to other areas. Effects would noticeably change the impression of the immediate site and the character of the overall setting.

Major: Changes to the visual quality of the landscape) including nighttime quality, would be significant and occur park wide. Changes would be long term) considerable, and widespread, with negative changes considered obtrusive at the park wide level. Obvious differences would change the character and overall impression of the area, its association with and dominance within the surrounding natural setting.

Impacts of Alternative A – No Action

Alternative A would result in no additional impacts to the scenic resources at YNP. No additional towers, buildings, propane tanks would be installed. A negligible, long-term, adverse effect would continue from the presence of the existing substations that have some limited visibility presently.

Cumulative Effects: Cumulative impacts on scenic resources are based on the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions in Yellowstone National Park. Important views in the park include Yellowstone Lake, the Grand Canyon of the Yellowstone River, the Mammoth Terraces, multiple geyser basins, and many river and mountain vistas, among others. The No-Action alternative would not introduce any new elements into the landscape that would have negative effects on visual resources of the park.

Construction projects included in the cumulative effects scenario would continue to occur and could have minor impacts to scenic resources. The NPS fully recognizes the importance of preserving Yellowstone's scenic views and dark nighttime skies. Current visitor support operations have a minor effect on the visual quality of the park; continued operation of visitor facilities and support utilities would be expected to have a similar, minor cumulative effect. The impacts from past, present, and reasonably foreseeable action have had a minor, short- and long-term adverse impact on scenic resources. Alternative A would not impact scenic resources and therefore would not incrementally add to an overall cumulative effect to scenic resources.

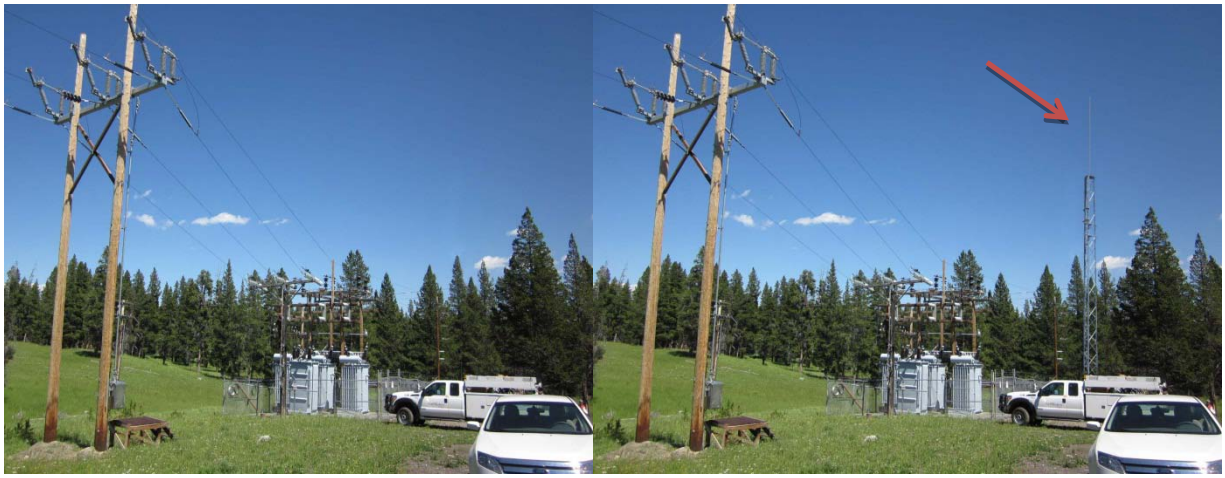
Impacts of Alternative B – Upgrade Existing Substations and Install Automation and Communication System (preferred)

Construction of the preferred alternative would create a short- and long-term adverse impact to scenic resources. The short-term visual effects would include disturbed land, construction equipment, and development activities. Contractors would be required to maintain an organized construction site and to minimize adverse visual impacts on park visitors and residents. Construction would cause visual disruptions around the project sites but would be temporary. In the long-term, the 60-foot tall lattice towers would be visible from some areas within developments or along roads. Most of the towers proposed in this alternative would not be seen from public areas of the park. The proposed tower at Mammoth would be 30-foot tall, and would be shorter than the many of the existing poles located within the substation. Much of the substation equipment at Mammoth is visible, but not noticed by most visitors as it is in the far background from most views. The addition of a 30-foot tower, equipment building, and generator building would have a negligible to minor long-term impact on the visual resources of the Mammoth Area. The proposed building at the Norris substation would be painted a dark brown color to blend in the shadowed area beneath the trees. These same trees would act as a natural screen for the proposed 60-foot tower from motorists passing on the Grand Loop Road between Norris and Canyon (see images and photo simulations later in this section). The proposed tower at Old Faithful would be visible only briefly from three locations along the Grand Loop and Old Faithful access roads. Presently, other radio repeater towers, buildings, substation equipment, housing units, and maintenance buildings exist and are visible in the administrative area proposed for the Old Faithful upgrades. Much of the existing infrastructure also has some limited visibility from these same roads. The proposed project components would have minor, long-term adverse impacts on visual resources at Old Faithful. The views associated with historic structures are analyzed in the Cultural Resources section.

The left image above shows the existing substation at Mammoth (center to right of street lamp), the right photo simulation shows a 30’ tower used for communication equipment control and automation, and communication for NWE employees.

The left image above shows the existing substation at Norris, the right photo simulation shows a 60’ lattice tower with a 20’ omni-directional antenna mounted atop it.

The left image above shows the existing substation at Norris as seen from the Grand Loop Road, the visual simulation at the right shows what would be visible of a 60' metal lattice tower with a 20' omni-directional antenna atop it. Note: Just to the right of the red arrow is the antenna, the tower below is is mostly screened by existing trees.



The left image above shows the existing substation at Canyon. The substation is approximately ½ mile from the Grand Loop Road behind a locked gate on a service road. The substation is not visible from roads or trails in the area. The visual simulation at the right shows a proposed 60' metal lattice tower with a 20' omni-directional antenna atop it.

The left image above shows the existing substation at Lake. The brown building houses an existing generator used to backfeed areas during power outages. The substation is located directly behind this building. The trees visible are approximately 85 feet in height, the swath of trees continues for 200 feet back into the photo, where the Grand Loop Road is located beyond the trees. The photo simulation on the right shows a 60' tower just outside the substation fence.

The left image above shows the existing Service Station at Grant Village, the existing substation lies beyond the trees visible behind the Service Station. The photo simulation on the right shows the top of the proposed tower and the omni-directional antenna.

The left image above shows the top of an existing building in the Old Faithful Administrative Area. The image was taken with the 4x zoom on all the way. The photo simulation on the right shows the top of the proposed tower and the omni-directional antenna (to the right of the red arrow).

The left image above shows the existing substation at Madison. The substation is located 2,200 feet on a service road beyond a locked gate. The photo simulation on the right shows the proposed tower and the omni-directional antenna (to the right of the red arrow). The proposed tower would not be visible from the Grand Loop Road, or trails in the area.

The left image above shows the existing communication station at Buffalo Mountain. This station is located on USDA Forest Service property just north of Yellowstone National Park. The photo simulation on the right shows the proposed tower and the omni-directional antenna (to the right of the red arrow).

Impacts of Alternative C– Upgrade Existing Substations and Install Automation and Communication System Via Fiber and Microwave

Alternative C includes towers as described in Alternative B, that would be used for a land/mobile radio system for NWE employees. Equipment buildings, backup generators, and propane tanks are also as described in Alternative B. An additional component of this alternative would be burying approximately 90-miles of fiber optic cable within the existing transmission line corridor. Visual impacts of this

construction would occur from equipment placing the cable and exposed soil, denuded from vegetation in the areas that cable splices would be made along the corridor. The visual impacts from plowing the cable and digging the hand holes would be temporary and short-term. They would last until the area has time to revegetate with grasses and forbs (likely one to two years). Visual impacts on the park's scenic resources from implementation of this alternative would be minor, long-term, and adverse.

Cumulative Effects: When taken into account past, present, and envisioned future projects from the cumulative impacts scenario, implementation of Alternative C would have minor, long-term adverse impact on visual resources of the park.

Impacts of Alternative D – Upgrade Existing Substations and Install Indication and Communication System Via Satellite

Alternative D would contain all project components described in Alternative B, but would not build towers for SCADA and communication. Rather, this alternative would use shorter satellite dishes to provide a system that would enable a notification system for problems occurring within the system. Latency issues prevent SCADA control. The dishes, 4.5 foot diameter would not be seen as they would be screened by existing substation equipment. Satellite phones would be used for communications, so no new towers would be constructed. Visual impacts of this alternative would come from the addition of buildings for upgraded equipment within the substations. These impacts would be negligible, long-term, and adverse.

Cumulative Effects: When taken into account past, present, and envisioned future projects from the cumulative impacts scenario, implementation of Alternative D would have negligible to minor, long-term adverse impact on visual resources of the park.

Cultural Resources

Affected Environment

Yellowstone National Park has been a focus of human activity for thousands of years. Natural resources such as forests, meadows, streams, lakes, and abundant fish and wildlife offered desirable conditions for human use and, later, tourism. As a result, this area is rich in cultural resources including archeological resources, historic structures, and cultural landscapes.

The area of potential effect (APE) includes the nine substations (Mammoth, Norris, Canyon, Lake, Grant Village, Madison, Old Faithful, and Buffalo Mountain (located on US Forest Service land just north of the park) and the primary NorthWestern Energy (NWE) right-of-way corridor connecting these substations within the park (see Table 8 below). Historic properties adjacent to the substation from where the improvements are potentially visible are also included. Cultural resources found within the APE have been evaluated and documented (or are in the process) in consultation with the Wyoming and Montana State Historic Preservation Offices (SHPO) and the Advisory Council on Historic Preservation. Three cultural landscape inventories and one cultural landscape report are also underway to document the eligibility of those landscape resources.

Table 8 - Cultural Resources within the Area of Potential Effect (APE)

	Title/Name	Status/Comments
1.	Archeological sites	No sites within build footprint
2.	Fishing Bridge HD	Eligible; *
3.	Fishing Bridge Museum NHL	Listed
4.	Fort Yellowstone NHL District	Listed
5.	Grand Loop Road HD	Listed
6.	Lake HD	Eligible; *

7.	Mammoth Hot Springs HD	Listed *
8.	North Entrance Cultural Landscape	Eligible
9.	North Entrance Road HD	Listed
10.	Old Faithful Cultural Landscape	Eligible
11.	Old Faithful HD	Listed
12.	Roosevelt Arch NHL	Listed; discontiguous resource within Fort Yellowstone NHL
13.	South Entrance Road HD	Eligible
14.	Yellowstone Park Transportation Company HD	Eligible; *
15.	Structures within Gallatin National Forest	Unevaluated

*Cultural Landscape Inventory(CLI) or Cultural Landscape Report (CLR)

Archeological Resources

Humans have occupied the GYA for more than 11,000 years. Currently archeological evidence indicates the majority of the use of the Park occurred during non-winter months, and was less intense during the recent Little Ice Age (A.D. 1400-1860) than in the previous millennia. At least 12,000 years before present, during what is now known as the Paleoindian Period, small, highly mobile human groups were present in the Yellowstone region. These groups crafted stone weapons and tools to pursue and utilize large game. Left behind are Clovis, Folsom, and Cody Complex sites. These sites consist of remains of camps, quarries and sites where animals were killed.

The Archaic Period in Yellowstone was characterized by mobile groups who utilized a greater variety of plant foods and small game. The Park area was most heavily used by these groups during the Late Archaic, from 1000 B.C. to A.D. 200. Later sites in the Park may be related to small groups who resided in lower valleys outside the Park but who sent parties into the area to hunt game and gather plant materials and other subsistence items. The Obsidian Cliff Plateau, an extruded lava flow that is approximately 180,000 years old, was of special importance to prehistoric peoples. Obsidian obtained from this site was widely used in not only the region, but was traded as far as Ohio and Canada.

More than 1,800 prehistoric and historic sites have been documented in Yellowstone, although less than five percent of Yellowstone's 2.2 million acres have been intensively inventoried for archeological resources. Included within the historic archeological sites are those of Euro-American origin such as solider stations, hotels, and can dumps. Approximately one-third of the archeological sites have been evaluated for eligibility to the National Register of Historic Places. Obsidian Cliff, a prehistoric obsidian quarry, has been named a National Historic Landmark. Approximately 100 sites are added each year to the NPS Archeological Sites Management Information System database, and Determinations of Eligibility are completed when needed or when time permits.

Historic Structures and Cultural Landscapes

A prehistoric or historic structure is a constructed work, usually immovable by nature or design, consciously created to serve human activity. The project area includes individually national register-eligible historic structures as well as historic districts consisting of multiple buildings, structures, landscape features, and other associated elements.

Cultural landscapes consist of a geographic area (including both cultural and natural resources) associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values. They provide a living record of an area's past and a visual chronicle of its history. The character-defining features and patterns of a cultural landscape may include, as appropriate: natural systems and features, spatial organization, topography and landforms, vegetation, circulation systems and features, land use, buildings and structures, building cluster arrangement, water features, small-scale features, archeological sites, and views and vistas.

The Park's historic properties relate to European-American exploration and occupation, military administration, National Park Service administration, and early concessions operations. These resources include buildings, roads, bridges, backcountry cabins, museums, entrance stations, residences, and hotels. There are 12 historic properties within the APE including seven historic districts, one National Historic Landmark district, two National Historic Landmarks, and two cultural landscapes:

Fishing Bridge Historic District – The Fishing Bridge Historic District was determined eligible in 1981 and is significant at the state level under National Register Criteria A and C. The period of significance is 1924–1942. The district in part derives its significance from a linear concentration of commercial buildings designed in the rustic style and located east of the rustic Fishing Bridge. The district also derives significance from the Fishing Bridge Museum, a National Historic Landmark. The district is also significant for a long heritage of offering recreational opportunities for visitors that ranged from fishing, boating, and camping to picnicking and hiking.

Fishing Bridge Museum National Historic Landmark – The Fishing Bridge Museum was listed as a National Historic Landmark in 1987 along with two other surviving museums designed by architect Herbert Maier for the park as part of a "trail-side museum" program developed throughout the park. The Fishing Bridge, Norris, and Madison museums were considered significant for their rustic architecture and as the work of a master. The Fishing Bridge Museum has been noted as one of the most important architectural expression of rustic style architecture developed during the period, and is known to have inspired national and state park architecture.

Fort Yellowstone National Historic Landmark District – Fort Yellowstone was designated a National Historic Landmark on July 31, 2003. The 47.6-acre landmark district includes six discontiguous areas in three states. Two of the components are in the Mammoth developed area: the 45-acre Fort Yellowstone headquarters area in Upper Mammoth and the 0.2-acre Fort Yellowstone powerhouse in Lower Mammoth. Two components are outside of the Mammoth developed area: Fort Yellowstone Cemetery (0.5 miles south of Mammoth) and the North Entrance Arch (Roosevelt Arch) (5 miles north of Mammoth). The other components are elsewhere in the park: Buffalo Lake Snowshoe Cabin, Norris Soldier Station, and the Bechler River Soldier Station. Fort Yellowstone is nationally significant under Theme VII, "Transforming the Environment," and Criterion 1 in the areas of conservation, military, and politics/government. The landmark district is significant for its association with the military administration of Yellowstone National Park and for the impact the principles and policies developed during the military administration of Yellowstone had on the emerging conservation and national park movements in the United States in the late nineteenth and early twentieth centuries. The period of significance for the landmark district extends from 1888, the date of the earliest extant resource associated with the military period to 1918, the permanent departure of U.S. Army troops. Within the Fort Yellowstone Historic Landmark District are fifty-one resources, including forty-six buildings, two structures, two sites, and one object; seven of these resources are noncontributing. The former parade ground is identified as a contributing site.

Grand Loop Road Historic District – The Grand Loop Road system was a 150-mile circuit system designed to connect the park's most popular attractions. It was listed on the National Register of Historic Places as nationally significant under Criterion A as one of the first, large-scale designed road systems planned by the federal government, and Criterion B, for U.S. Army Corps of Engineering Officer Hiram Martin Chittenden for his vital and innovative role in the development of Yellowstone's road system, his role in the very early recognition of Yellowstone's place in history in the United States, his important historical contributions to the literature of the American West, and his role toward the development of the design philosophy which the NPS later adopted for its roads and building programs. Under Criterion C, the Grand Loop Road is significant on a state level for the continuing design philosophy of the Army Corps of Engineers of blending with nature and lying lightly on the land.

Mammoth Hot Springs Historic District – The Fort Yellowstone resources in the Upper Mammoth and Lower Mammoth areas are also part of the larger Mammoth Hot Springs Historic District, which was listed in the National Register on March 20, 2002. The boundaries of the irregularly-shaped 157.8-acre historic district include government and concession facilities that surround the open parade ground in the Upper Mammoth area. The historic district also includes portions of the Lower Mammoth area, including the Fort Yellowstone powerhouse, the original section of the employee housing area, and the Mammoth campground. The Mammoth Hot Springs Historic District is significant under National Register Criterion A in the areas of conservation, entertainment/recreation, and military and under Criterion C in the area of architecture. The period of significance is 1891-1948.

North Entrance Road Historic District – The North Entrance Road Historic District was listed on the National Register of Historic Places in May, 2002 as nationally significant under Criterion A, being an integral part of one of the first federally planned road systems in the nation, and for possessing state significance under Criterion C for blending with nature and adherence to the park‘s design philosophy of lying lightly on the land. The road was nominated under the multiple property documentation for Yellowstone‘s roads and its associated historic context, The History of the Construction of the Road System in Yellowstone National Park, 1872-1966. The period of significance for the North Entrance Road HD is 1883-1950. The historic district is a 5.23-mile road that extends through the Gardner River valley from the park’s north boundary at Gardiner, Montana, to the east end of the esplanade at Mammoth and the district‘s boundary is 33-feet from the road centerline.

North Entrance Cultural Landscape – The North cultural landscape was determined eligible to the National Register of Historic Places under Criterion A and C through consensus determination with the Montana State Historic Preservation Office in March, 2013. The North Entrance Cultural Landscape is significant at the national and statewide levels under Criteria A and C for its association with early road design and transportation associated with development of Yellowstone National Park, for the architecture of the Roosevelt Arch, and for the landscape architecture of the road design and the siting of the arch as a grand gateway constructed to celebrate entrance into the park. The cultural landscape is an important early example of rustic design crafted by the U.S. Army Corps of Engineers under the supervision of Maj. Hiram Chittenden in the early twentieth century to enhance the scenic, picturesque setting of the northern entrance that served as the park’s primary point of access during the period of significance. It derives its significance in the areas of Architecture, Landscape Architecture, and Transportation during the period 1883–1948. The North Entrance Cultural Landscape contributes to the character and setting of the North Entrance Road Historic District. Numerous historic resources survive within the North Entrance Cultural Landscape to convey these historic associations, including the Roosevelt Arch, the North Entrance Road corridor, the Gardiner Flats and its edge conditions, including the iron fence and the boundary marker; and the expansive views across the plateau to the surrounding mountains.

Old Faithful Historic District – The Old Faithful Historic District was listed on the National Register in 1982, encompasses 160 acres and is dominated by the Old Faithful Inn National Historic Landmark. The 1981 nomination form lists the Old Faithful district as nationally significant in the areas of architecture and Park development. Under Criteria A, the district is significant for its association with the concessions development in the early 1900s that was necessary to accommodate the visitors flocking to view the Old Faithful Geyser, one of the most recognized resources of the National Park System. Under Criteria C the district is significant for its representation of rustic style architecture. The sensitivity of the architecture within the Old Faithful district to its natural surroundings served as a model for facility development within the NPS. The Old Faithful Historic District boundary includes the historic structures north of the present alignment of the Grand Loop Road and includes the Old Faithful Geyser area.

Old Faithful Cultural Landscape – The Old Faithful cultural landscape was determined eligible to the National Register of Historic Places under Criterion A and C through consensus determination with the Wyoming State Historic Preservation Office in September, 2009. It extends beyond the historic district and contains landscape features, trails system, and historic buildings, as well as the setting provided by

the Old Faithful Geyser and many other thermal features. Views to the Old Faithful Geyser and the Old Faithful Inn remain key contributing features of the cultural landscape.

Roosevelt Arch National Historic Landmark as part of the Fort Yellowstone NHL – Constructed in 1903 the Fort Yellowstone National Historic Landmark was listed on the National Register of Historic Places in July 2003, with the Roosevelt Arch as a non-contiguous contributing structure in that HD. The arch is significant as the monumental entrance gate that welcomes visitors arriving at the North Entrance to the park. The concrete plaque above the arched roadway proclaims ―for the benefit and enjoyment of the people‖. The Arch is constructed of native, lightly dressed basalt. The period of significance for the Fort Yellowstone National Historic Landmark is 1888-1918 during the military administration of the park and the NHL boundary is the perimeter of the arch and retaining wall plus 20-feet on each side of the arch and wall.

South Entrance Road Historic District – The South Entrance Road Historic district (HD) was determined eligible by the Wyoming State Historic Preservation Office, It is an integral part of one of the first federally planned road systems in the nation, and for possessing state significance under Criterion C for blending with nature and adherence to the park's design philosophy of lying lightly on the land.

Yellowstone Park Transportation Company Historic District –Adjacent to the north entrance of the park, this area is assigned to the parks concessionaire for maintenance of their services in Mammoth and throughout the park. The buildings are mainly Park Service Rustic or Park Service Moderne in architectural style. The 1906 bunk and mess house is an early example of the Rustic Style. The 1920s buildings have strong elements of the Craftsman style and several were designed by noted architect, Robert Reamer. The 30,000-square-feet, two-story, commissary warehouse, designed by Bozeman architect Fred F. Willson and constructed of poured-in-place concrete is an example of the Park Service Moderne structures within the district. The Yellowstone Park Transportation Historic District was documented in 2001 and the Montana State Historic Preservation Office concurred with the district's eligibility at the state level. The boundary of this historic district is adjacent to the north side of the service road but does not include the road.

Sites within Gallatin National Forest – Within a half-mile diameter of the proposed Buffalo Mountain tower, and located on the Gallatin National Forest outside the park, are 4 historic mining sites on the west slope of Crevice mountain. The sites are: 24PA357, 24PA361, 24PA362, and 24PA363. They are all structures related to historic period mining activities. None of these sites have been evaluated for eligibility for listing on the NRHP.

Guiding Regulations and Policies

Federal land managing agencies are required to consider the effects of their proposed actions on properties listed in, or eligible for inclusion in, the National Register of Historic Places, and allow the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment as per the National Historic Preservation Act, as amended and its implementing regulations found at 36 CFR Part 800. Agencies are required to consult with Federal, state, local, and tribal governments/organizations, identify historic properties, assess adverse effects to historic properties, and negate, minimize, or mitigate adverse effects to historic properties while engaged in any federal or federally assisted undertaking (36 CFR Part 800). Section 106 (§106) consultation (as described in the NHPA of 1966, as amended) with the State Historic Preservation Office (SHPO) would occur for a proposed project. The ACHP is invited to participate if a proposed project is considered a major undertaking.

Federal law and NPS management policies require full consideration of historical and architectural values whenever a project may affect historic properties. Additionally, the NPS "must to the maximum extent possible, undertake such planning and action as may be necessary to minimize harm to any National Historic Landmark that may be directly and adversely affected by an undertaking" (36 CFR 800.10).

Under the Advisory Council's regulations, a determination of either adverse effect or no adverse effect must be made for affected historic properties and cultural landscapes that are eligible for or listed on the National Register of Historic Places. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that would qualify it for inclusion in the National Register (e.g., diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects caused by the Preferred Alternative that would occur later in time, be farther removed in distance, or be cumulative (36 CFR Part 800.5, Assessment of Adverse Effects). A determination of no adverse effect means there would be an effect, but the effect would not diminish the characteristics of the cultural resource that qualify it for inclusion in the National Register of Historic Places. The CEQ regulations and the National Park Service's Conservation Planning, Environmental Impact Analysis and Decision-Making (Director's Order 12, NPS 1992) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact (e.g., reducing the intensity of an impact from major to moderate or minor). Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by §106 is similarly reduced. Although adverse effects under §106 may be mitigated, the effect remains adverse. It is important to note the definition for adverse impacts per the National Environmental Protection Act (NEPA) is not strictly correlated with the definition of adverse effects in the National Historic Preservation Act. Therefore, it is possible to have adverse impacts for the purposes of NEPA review that do not rise to the level of adverse effect per 36 CFR Part 800.

Methodology

In accordance with the Advisory Council on Historic Preservation's regulations implementing §106 of the NHPA (36 CFR Part 800, Protection of Historic Properties), impacts to historic properties including cultural landscapes for this project were identified and evaluated by (1) determining the area of potential effect (APE); (2) identifying cultural resources present in the area of potential effect that were either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the National Register; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

A historic site, structure, or building is eligible for the National Register of Historic Places if it meets one or more of the following criteria A through D:

a) It is associated with events that have made a significant contribution to the broad patterns of our history;

b) It is associated with the lives of persons significant in our past;

c) It embodies the distinctive characteristics of a type, period, or method of construction; or represents the work of a master; or possesses high artistic value; or represents a significant and distinguishable entity whose components may lack individual distinction;

d) It has yielded, or may be likely to yield, information important in prehistory or history.

A historic building or structure must also possess integrity of location, design, setting, materials, workmanship, feeling, and association.

The methodology used for assessing impacts to cultural resources was derived from available information and park staff. For purposes of analyzing potential impacts to cultural resources, the intensity of impacts is defined as follows:

Intensity Level Definitions (Archeological Resources)

The thresholds of change for the intensity of impacts to archeological resources are defined as follows:

Negligible: Impact(s) is at the lowest levels of detection with neither adverse nor beneficial consequences. The determination of effect for §106 would be *no adverse effect*.

Minor: Disturbance of a site(s) results in little, if any, loss of integrity. The determination of effect for §106 would be *no adverse effect*.

Moderate: Disturbance of a site(s) results in loss of integrity. The determination of effect for §106 would be *adverse effect*. A memorandum of agreement (MOA) is executed among the National Park Service and applicable state historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.

Major: Disturbance of a site(s) results in loss of integrity. The determination of effect for §106 would be *adverse effect*. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the National Park Service and applicable state historic preservation officer and/or Advisory Council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).

Intensity Level Definitions (Historic Structures and Cultural Landscapes)

The thresholds of change for the intensity of impacts to archeological resources are defined as follows:

Negligible: Impact(s) is at the lowest levels of detection with neither adverse nor beneficial consequences. The determination of effect for §106 would be *no adverse effect*.

Minor: Impact results in little, if any, loss of integrity. The determination of effect for §106 would be *no adverse effect*.

Moderate: Impact results in loss of integrity. The determination of effect for §106 would be *adverse effect*. A memorandum of agreement (MOA) is executed among the National Park Service and applicable state historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.

Major: Impact results in loss of integrity. The determination of effect for §106 would be *adverse effect*. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the National Park Service and applicable state historic preservation officer and/or Advisory Council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).

Impacts of Alternative A – No Action

Alternative A would not impact historic properties and therefore would not incrementally add to an overall cumulative effect to cultural resources. Under Alternative A, *no historic properties would be affected*.

Cumulative Effects: Cumulative impacts on historic resources are based on the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions in the Greater Yellowstone Area. Impacts to historic and prehistoric resources associated with human activities in the Park include exposure of buried sites, changes in artifact condition, destruction of artifacts or structures,

loss of context of artifacts, site covering, and contamination of sites. Some looting and vandalism of cultural sites have occurred. Other actions that affect cultural resources are visitor use (e.g. hiking, camping), construction projects, addition of new buildings and other elements to historic districts, and maintenance and repairs to roads, trails, and other facilities. All of these activities are conducted under the same general guidelines for identifying and protecting cultural resources so long-term adverse impacts are avoided to the greatest extent practicable. Wildland fires also contribute to cumulative losses of cultural resources available for scientific study and visitor enjoyment. Additionally, natural erosion, and exposure over time contribute to cumulative effects on cultural resources. Existing utilities have a negligible to minor impact on views from and within historic properties. The impacts from past, present, and reasonably foreseeable action have had minor, short- and long-term, direct/indirect adverse impacts on historic properties. While Alternative A does not add to the cumulative impact, when taken in conjunction with these past, present, and reasonably foreseeable projects would result in Minor, long-term impacts to historic resources. This would be considered a *no historic properties affected* determination under §106.

Impacts of Alternative B – Upgrade Existing Substations and Install Automation and Communication System

Under Alternative B, no archeological resources would be affected.

An analysis of the visibility of proposed substation communication towers is contained in a report (Appendix A) titled "Visibility of Proposed NorthWestern Energy Electrical System Improvements from Adjacent Historic Districts (September, 2013)." This report describes where the proposed towers would be visible and compares existing photos to photo simulations of the proposed communication tower to determine the relative visual effect on adjacent historic districts. Based on this analysis, it is anticipated that the proposed tower at three of the nine substations (Mammoth, Norris, and Old Faithful) would be either barely visible or slightly visible in the distant background from the following historic districts: Mammoth Hot Springs Historic District, Fort Yellowstone National Historic Landmark District, and Grand Loop Road Historic District. The other proposed towers would not be seen from other historic districts or properties, since they are located away from public view or are in existing administrative and utility areas (see Appendix A).

Given that the historic properties within the Gallatin National Forest all lie on the opposite side of the hill on which the proposed Buffalo Mountain tower is sited, the proposed tower would not be visible from those properties. Thus, the proposed tower would not cause alteration to the characteristics of properties qualifying them for inclusion in or eligibility for the National Register of Historic Properties.

The proposed tower at the Mammoth substation (30-foot tall) would be shorter than existing utility poles within the existing substation. Much of the existing substation equipment at Mammoth is visible, but generally not noticed by most visitors as it is in the background from most views and set against a backdrop of vegetated hills. Based on the analysis contained in the report, the addition of a 30-foot tower, equipment building, and generator building would have a minor, long-term, and indirect impact, or *no adverse effect*, on the setting of the adjacent Mammoth Hot Springs Historic District, the Fort Yellowstone NHL Historic District, and the Grand Loop Road Historic District.

The proposed 16-foot by 24-foot equipment building at the existing Norris substation would be painted a dark brown color to blend among the shadows beneath the trees that would screen it and the proposed 60-foot tower from the Grand Loop Road Historic District between Norris and Canyon. The proposed tower would be barely visible to passing motorists and only if they happened to look perpendicular from the travel direction at the right moment to catch the view between trees. Therefore, the addition of a 60-foot tower and equipment building at the Norris substation would have a negligible, long-term, and indirect impact, or *no adverse effect*, on the setting of the Grand Loop Road Historic District.

The proposed tower at the existing Old Faithful substation would be visible only briefly from two or three locations along the Grand Loop Road Historic District. Other radio repeater towers, buildings, substation equipment, housing units, and maintenance buildings already exist and have some limited visibility from the Grand Loop Road. Therefore, the proposed project components would have a minor, long-term, and indirect adverse impact, or *no adverse effect*, on the setting of the Grand Loop Road Historic District.

Cumulative Effects: A negligible impact would remain from the presence of the existing substations. The impacts from past, present and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative A. Alternative B, in conjunction with these past, present, and reasonably foreseeable projects would result in minor, short- and long-term indirect adverse impacts, or *no adverse effect*, to cultural resources. Under Alternative B, no archeological resources would be affected. Based on photo simulations in the visual analysis report, a minor, long-term, indirect adverse impact is anticipated on historic structures and cultural landscapes, resulting in a *no adverse effect* under §106.

Impacts of Alternative C – Upgrade Existing Substations and Install Automation and Communication System Via Fiber and Microwave

Under Alternative C, archeological impacts that could result from the trenching alternative have been modeled using data from existing archeological inventories of powerline corridors within YNP for other projects. Approximately 30 of 98 miles of powerlines have had archeological inventory. Within those 30 miles, 81 sites were discovered, or about 2.7 sites per mile. Given that the trenching alternative involves approximately 90 miles of powerline corridor, we can reasonably project that over 240 archeological sites could be impacted by ground disturbing activities associated with this alternative. Trenching in the corridors would result in adverse effects to many sites already documented as eligible or listed on the NRHP. Therefore, it is assumed there would be a moderate, long-term, direct, and indirect impact to archeological resources. Under §106, this would be considered an *adverse effect* requiring mitigation (data recovery).

Alternative C includes towers, as in Alternative B, which would be used for a land/mobile radio system for NWE employees. Equipment buildings, backup generators, and propane tanks are also proposed as in Alternative B. Therefore, Alternative C would have the same impacts as described in the impacts to Historic Structures and Cultural Landscapes section for Alternative B. An additional component of this alternative would be burying approximately 90-miles of fiber optic cable within the existing transmission line corridor between substations. Temporary visual impacts of this construction would occur from equipment placing the cable and exposed soil, denuded from vegetation in the areas that cable splices would be made along the corridor. The visual impacts from plowing the cable and digging the hand holes would be temporary and short-term. They would last until the area has time to revegetate with grasses and forbs (likely one to two years).

Cumulative Impacts: A negligible impact would remain from the presence of the existing substations. The impacts from past, present and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative A. Alternative C, in conjunction with these past, present, and reasonably foreseeable projects would result in moderate, short- and long-term, indirect and direct adverse impacts to cultural resources. Under Alternative C, there would be a moderate, long-term, direct, and moderate impact to archeological resources. Under §106, this would be considered an *adverse effect* requiring mitigation (data recovery). Alternative C would have minor, long- and short-term, indirect adverse impacts on historic structures and cultural landscapes, resulting in a *no adverse effect* under §106.

Impacts of Alternative D – Upgrade Existing Substations and Install Automation and Communication System Via Satellite

Alternative D would contain all project components described in Alternative B, but would not build towers for SCADA and communication. Rather, this alternative would use shorter 4.5-foot diameter

satellite dishes to provide a system that would enable a notification system for problems occurring within the system, using satellite phones. The dishes would not be visible as they would be at most 10.5-feet in height (using a 6-foot pedestal) and screened by existing substation equipment and trees. Potential visual impacts to adjacent historic districts would come from the addition of small equipment buildings, similar to Alternatives B and C. These would be barely visible over a small topographical rise at the Mammoth substation and from behind a screen of trees at the Norris substation. Please see Appendix A for a photo simulation of this building.

Cumulative Effects: A negligible impact would remain from the presence of the existing substations. The impacts from past, present and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative A. Alternative D, in conjunction with these past, present, and reasonably foreseeable projects would result in minor, long-term, indirect adverse impacts to cultural resources. This would be considered *no adverse effect* determination under §106.

Human Health and Safety

Affected Environment

The NPS is committed to providing appropriate, high-quality opportunities for visitors and employees to enjoy the parks in a safe and healthful environment. Further, the NPS strives to protect human life and provide for injury-free visits. Employee and volunteer safety within the workplace for the park and concessioners is a high priority. The park recognizes existing utility provider operations have resulted in concerns with human health and safety during outages to visitors, employees, NWE personnel in accessing and making repairs to the electric system, and in an inadequate communications system.

As stated previously, NWE has had a land mobile radio system within the park that they were able to use until January 1, 2013 when the Federal Communication Commission (FCC) *VHF/UNHF Narrowing Bandwidth Mandate* went into effect. As of that date, all public safety and business industrial land mobile radio systems operating in the 150-512 MHz radio bands had to cease operating using 25 kHz efficiency technology, and begin operating using at least 12.5 kHz efficiency technology. The FCC mandate was enacted to ensure more efficient use of the spectrum and greater spectrum access for public safety and non-public safety users.

NWE does not have a narrowband radio system within the park and cell phone coverage is limited. NWE is currently using a few satellite phones though coverage is not reliable and seems to be hit and miss. Adding to the concern regarding communications is when outside crews (from Bozeman or external to the park) contract crews go into the park. When this occurs the crews are without communication thus causing a safety concern. NWE's policies state that all clearances (when someone opens or closes a switch so they can work on a selection of line) must occur through their radio system so dispatch and other NWE employees know where work is occurring. This prevents someone from "closing in" or energizing a section of line that someone may be working on.

Guiding Regulations and Policies

The National Park Service is concerned about the safety for visitors and employees and strives to enhance visitor and employee safety (NPS 2006).

The *NPS Management Policies 2006* state that the NPS is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks. The policies also state, "While recognizing that there are limitations on its capability to totally eliminate all hazards, the National Park Service and its concessioners, contractors, and cooperators would seek to provide a safe and healthful environment for visitors and employees" (sec. 8.2.5.1). Further, the NPS would strive to protect human life and provide for injury-free visits (sec. 8.2.5).

Methodology and Intensity Level Definitions

The intensity of impacts to human health and safety are as follows:

Intensity Level Definitions

The thresholds of change for the intensity of impacts to health and safety are defined as follows:

Negligible: The impact to visitor, park and NWE staff safety would not be measurable or perceptible.

Minor: The impact to visitor, park and NWE staff safety would be measurable and perceptible and would involve a large number of individuals in a localized area of the park.

Moderate: The impact to visitor, park and NWE staff safety would be measurable and perceptible and would involve a large number of individuals in many areas of the park.

Major: The impact to visitor, park and NWE staff safety would be substantial and park wide in occurrence. Accident rates in areas usually limited to low accident potential would be expected to substantially increase in the short and long-term and impacts to the safety of individuals would be readily apparent throughout the park.

Impacts of Alternative A – No Action

Alternative A would continue the adverse impacts on human health and safety, particularly the hazards to NWE personnel. Personnel working on the electrical system in the field are presently very limited when communicating with headquarters and colleagues. Communication is critical for the safe operation of the electrical system.

NWE does not currently have a narrowband radio system within the park and cell phone coverage is limited. NWE is currently using a few satellite phones though coverage is not reliable and seems to be hit and miss. Adding to the concern regarding communications is when outside crews (NWE employees from Bozeman or external) contract crews go into the park. Then they don't have a system available to them. NWE's policies state that all clearances (when someone opens or closes a switch so they can work on a selection of line) must be taken through NWE's radio system so their dispatch and other NWE employees hear what section of line a crew is working on. This is a critical safety procedure that prevents someone from "closing in" or energizing a section of line that someone could be working on.

Extended outages have affected the visitor experience and caused public safety concerns by delaying services such as charging or operating medical equipment, lack of lighting, and lack of communications. Under this alternative these effects would continue and would result in a minor, short- and long-term adverse impact to human health and safety.

Cumulative Effects: Cumulative impacts on human health and safety are based on the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions in Yellowstone National Park. Throughout YNP there are areas of increased risk to health and human safety from on-going park maintenance and construction activities in areas of visitor use. In addition, Yellowstone National Park is a wilderness park with a portion of the mission dedicated to providing enjoyment value to visitors. There are many inherent health and safety challenges for humans that pursue their recreational interests, especially in backcountry locations. Every year geothermal features scald a few people that get too close and contact the extremely hot water. The weather can turn cold, creating conditions for hypothermia and frostbite, and the high elevation can cause dehydration for those who fail to consume enough fluids. Some wildlife species can bite, gore, and trample people that approach too closely within the comfort zone of individual animals. While these same risks are present for employees, orientation to and familiarity with safety risks generally make employees more aware and cautious about health and safety needs. The cumulative impacts to health and human safety would be minor and adverse.

3.4.2 Impacts of Alternative B – Upgrade Existing Substations and Install Automation and Communication System

Alternative B would not only provide improved reliability to YNP, it would also provide the backbone system for a mobile radio communication system that allows for safe operation of the electrical system. Alternative B would install a land/mobile radio system that would provide good coverage along the entire NWE powerline corridor. As of January 1st, 2013 the Federal Communication Commission implemented the *FCC VHF/UNHF Narrowing Bandwidth Mandate*. This mandated Northwest Energy to abandon the previously used radio system, which is the only method of communication for Northwest Energy personnel since the cell phone coverage is limited. Communication is critical for the safe operation of the electrical system.

During construction, there is potential for construction-related accidents, as during any construction project. A health and safety program would be implemented by the construction contractors, based on industry standards for accident prevention. At a minimum, the construction health and safety program would comply with federal and local health and safety regulations. Elements of the safety program would include:

- Responsibilities of construction workers and subcontractors
- Job site rules and regulations
- Emergency response procedures
- Safety inspections and audits
- Location of medical services and first aid
- Safety meetings, employee training, and hazard communications
- Personal protective equipment
- Standard construction procedures
- Accident investigation and reporting.

Because a health and safety program would be implemented for construction activities and the public would be excluded from entering construction areas, potential construction impacts on public health and safety would not result in any greater safety risk. Therefore, impacts to public health and safety related to construction activities would be negligible. The overall effect of Alternative B would be minor, short- and long-term beneficial.

Cumulative Effects: The impacts from past, present and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative A. Alternative B, in conjunction with these past, present, and reasonably foreseeable projects would result in minor, short- and long-term adverse impacts to human health and safety.

Impacts of Alternative C– Upgrade Existing Substations and Install Automation and Communication System Via Fiber and Microwave

Alternative C would have the same adverse and beneficial effects to human health and safety as Alternative B. Alternative C would provide a communications system for NWE personnel while they are working in the park and also reduce outage time. As stated in Alternative B, a health and safety program would be implemented by the construction contractors, based on industry standards for accident prevention. The same radio system, as described in Alternative B, for use by NWE employees would be installed giving good radio coverage along the powerline corridor. The effects from Alternative C would be minor, short- and long-term beneficial.

Cumulative Effects: The impacts from past, present and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative A. Alternative C, in conjunction with these

past, present, and reasonably foreseeable projects would result in minor, short- and long-term adverse impacts to human health and safety.

Impacts of Alternative D – Upgrade Existing Substations and Install Indication and Communication System Via Satellite

Alternative D would continue the adverse impacts on human health and safety, particularly the hazards to NWE personnel. Installation of the satellite system would allow monitoring of the system but would not allow SCADA control. Satellite phones would continue to be used as a communication system and the unreliability of these phones would continue to be an issue when NWE personnel use them to talk to each other while working on the system. As stated in Alternative B, a health and safety program would be implemented by the construction contractors, based on industry standards for accident prevention. The impacts to human health and safety from Alternative D would be minor, short- and long-term adverse.

Cumulative Effects: The impacts from past, present and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative A. Alternative C, in conjunction with these past, present, and reasonably foreseeable projects would result in minor, short- and long-term adverse impacts to human health and safety.

Visitor Use and Experience

Affected Environment

Recreational visitation to YNP has increased in the last 15 years, from 2,889,513 in 1997 to 3,447,729 in 2012 (NPS, 2012c). The summer months (June, July, and August) are the primary visitation season in Yellowstone, although the spring and fall have grown in popularity. Approximately 64 percent of visitation occurs in the peak seasons during these three months. During the peak season, facilities such as campgrounds, lodges, visitor centers, restaurants, service stations, and shops are used at or beyond capacity.

More than 75 percent of visitor use within the park is concentrated in the major developed areas. The primary recreational activities that visitors participate in include viewing wildlife, photography, walking, and exploring visitor centers. Other activities include fishing, camping, hiking, horseback riding, and boating.

Yellowstone National Park, in its Long-Range Interpretive Plan (NPS 2000), established a number of visitor experience goals that the park would like to be available to visitors. These, in part, include:

- To experience the essence of the park's wild nature;
- To behave in ways that do not hurt themselves or park resources;
- To successfully plan their visits and orient themselves to facilities, attractions, features and experiences;
- To experience programs, media, and facilities that enhance their educational experiences;
- To understand the park's significance; and
- To enjoy themselves, have memorable experiences, and leave feeling enriched.

People from around the world come to YNP each year to experience its wonders. Visitation is highly seasonal. June, July, and August are the months of highest use, with 68% of the park's annual visitors arriving during this time. The shoulder-season months of September through November account for about 20% of park visitation; April and May account for 9%, with December through March (the winter season of oversnow visitation) accounting for only 3%. Park visitation between 1993 and 2006 ranged from 2.8 to 3.1 million visitors. In 2007, the park received 3,151,342 recreational visits, an all-time high. Prior to 2007, 1992 had the highest level of park visitation with 3,144,405 visitors. While there are no day use quotas in Yellowstone during the peak summer season, overnight use is limited to the 14,341 visitors the

park accommodates per night in hotels and lodges (7,498 "pillows") and campgrounds (2,281 total campsites with a capacity of 6,843 people).

A 2006 survey showed that 89% of park visitors came from outside the surrounding states of Idaho, Montana, and Wyoming; 94% came from outside the "local area" (defined as within 150 miles of Yellowstone). Ten percent of park visitors are international, with about 25% of them coming from Canada. About half of the people coming through Yellowstone's entrances are first-time visitors (Manni et al. 2006).

The most common site visited in the park is Old Faithful (90%), followed by Mammoth Hot Springs (69%), Canyon Village (64%), Fishing Bridge/Lake/Bridge Bay (45%), West Thumb/Grant Village (49%), Madison (47%), and Tower-Roosevelt (45%). Seventy percent of visitors were in groups of two, three, or four; 25% were in groups of five or more. Of the visitor groups that spent less than 24 hours in the park, 82% spent five or more hours and 18% spent up to four hours. Of the visitor groups that that spent more than 24 hours in the park, 53% spent two to three days and 44% spent four or more days (Manni et al. 2006).

A high percentage of park visitors (93%) are satisfied with facilities, services, and recreational opportunities in Yellowstone. Visitors were especially satisfied with ranger programs (100%), visitor centers (96%), opportunities for learning about nature, history, or culture (94%), assistance from park employees (94%), exhibits (93%), and opportunities for outdoor recreation (93%) (NPS 2007).

Greater than 95% of visitors to Yellowstone stay on park roads and within developed areas, the area the 1991 Yellowstone *Statement for Management* defines as the "Park Development Zone." Lands within this zone (10% of the park) are managed to provide and maintain developments that serve park management and visitor needs, although natural conditions are maintained to the greatest extent possible (NPS 1991).

Within the Park Development Zone, concessioners provide food and lodging services (2,225 guest rooms, 28 food and beverage operations, 21 gift shops, 11 grocery stores, five campgrounds) at Old Faithful, Mammoth Hot Springs, Madison, Tower-Roosevelt, Canyon, Fishing Bridge, Lake, Bridge Bay, and Grant Village; 3 medical clinics; 7 vehicle service stations; 1 marina; 3 livery operations (Canyon, Mammoth, and Tower-Roosevelt); and 4 public showers and laundry facilities. Yellowstone's interpretive rangers manage and staff the park's five primary visitor centers (Canyon, Fishing Bridge, Grant Village, Mammoth, and Old Faithful) and four information stations (the Madison Museum, Museum of the National Park Ranger, Norris Geyser Basin, and West Entrance contact stations). Approximately 2.1 million visitors, or 70% of all park visitors, used Yellowstone's visitor centers in 2002. The NPS operates seven campgrounds (Mammoth, Norris, Tower, Pebble Creek, Slough Creek, Indian Creek, and Lewis Lake), 52 picnic areas, and seven outdoor amphitheaters and maintains 466 miles of road (NPS 2003).

The 2006 Visitor Study, conducted during July 23–29, 2006, and distributed to 1,302 visitor groups within this Park Development Zone, described the primary reasons that visitors cited for visiting the park as (a) sightseeing/taking a scenic drive (59%); (b) viewing wildlife or birdwatching (16%); and (c) visiting a boardwalk/geyser basin (9%).

According to *Management Policies 2006*, the enjoyment of park resources and values by people is part of the fundamental purpose of all park units (NPS 2006). The NPS is committed to providing appropriate, high quality opportunities for visitors to enjoy the parks, and maintain within the parks an atmosphere that is open, inviting, and accessible to every segment of society. Further, NPS would provide opportunities for forms of enjoyment that are uniquely suited and appropriate to the superlative natural and cultural resources found in the parks. The NPS *Management Policies 2006* also state that scenic views and visual resources are considered highly valued associated characteristics that NPS should strive to protect (NPS 2006).

Because of the remote area and the lack of a quality communication system, there is not supervisory control of the electric system in the park. The lack of SCADA control has caused the outages to be longer than if there was supervisory control of the system, like the rest of the transmission systems throughout the territory.

The Buffalo Mountain site is situated on a private road and located in an area where visitors do not access.

Methodology
The methodology used for assessing impacts to visitor use and experience was derived from available information and park staff.

Intensity Level Definitions

The thresholds of change for the intensity of impacts to visitor use and experience are defined as follows:

Negligible: Management actions would result in impacts that would be barely detectable, or would occasionally affect the experience of few visitors in the applicable setting.

Minor: Management actions would result in impacts that would be slight but detectable; could be perceived as negative by visitors or would inhibit visitor experience. Impacts would negatively affect the experience of some visitors in the applicable setting.

Moderate: Management actions would result in impacts that would be readily apparent and perceived as somewhat negative. Impacts would negatively affect the experience of many visitors in the applicable setting.

Major: Management actions would result in impacts that would be highly negative, affecting the experience of a majority of visitors in the applicable setting.

Impacts of Alternative A – No Action

Under Alternative A, a continuation of disruptions to the electrical system would continue to cause inconveniences to visitors through the loss of electrical power in public use areas. Additionally, prolonged disruptions may cause closure of concession facilities including hotels if backup generation is not sufficient enough to handle the demand. Also, noise from generator running could be disruptive to the natural experience of some park visitors. These impacts are expected to be short-term and minor as the effects would only be experienced by visitors before a repair is made. However, since repeated are expected if the system is not upgraded, the impacts can be considered long-term and adverse in duration.

Trails, campgrounds and other visitor use areas are within certain sections of the existing power line corridor and may be impacted either by short-term closures or by visual obtrusion during routine maintenance work. These impacts would be negligible, short-term and adverse.

Cumulative Effects: Facilities and development that have been established in the past within Yellowstone have had beneficial effects on the visitor experience as they have provided access to the park and allowed visitors to enjoy amenities while in the backcountry. There are several ongoing projects taking place in and around the park. Projects that could potentially impact visitor use and experience include road and housing construction, as well as actions to protect developed areas from fires through hazard fuel removal. Although several construction and maintenance projects are planned over the next 20 plus years, the major emphasis of these projects is to replace, repair, and rehabilitate existing facilities that are approaching the end of their service life. Where new facilities are proposed, they would be concentrated in, and adjacent to existing developed areas to minimize the creation of new, isolated developments. Because there are no future development actions planned for these project sites, negligible cumulative

effects to visitor use and experience would be anticipated. Combined with known past, current and future projects and actions, there would be minor, adverse and moderate beneficial cumulative impacts on visitor use and experience.

Impacts of Alternative B – Upgrade Existing Substations and Install Automation and Communication System

Under Alternative B, routine maintenance would continue to occur as described in Alternative A. Alternative B would also include upgrading the existing substations. These upgrades would not occur within high visitor use areas. However, they would occur in areas that have been developed and where visitors would expect to see signs of human activity and park infrastructure.

There would be minor, long-term, adverse impacts to visitor use and experience due to visual impacts from the proposed towers. These impacts are described in greater detail in the *Scenic Resources* Section. There would be a moderate, long-term, beneficial impact to visitors by reducing the number of power outages and increasing the safety and reliability of the power system.

During construction noise from heavy equipment and vehicles associated with the project could be disruptive to some park visitors, including hikers and campers. This could result in minor, short-term, adverse impacts.

Cumulative Effects: The impacts from past, present, and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative A. Alternative B, in conjunction with these past, present, and reasonably foreseeable projects would result in minor, short- and long-term, adverse and moderate, short-and long-term beneficial impacts.

Impacts of Alternative C – Upgrade Existing Substations and Install Automation and Communication System Via Fiber and Microwave

Under Alternative C, routine maintenance would continue to occur as described in Alternative A. Upgrades to existing substations and installation of towers would occur as described in Alternative B. However, Alternative C would also include the installation of fiber optic cable. Placement of the fiber optic cable could impact visitors short-term during installation where areas are within view. Because the fiber optic cable would occur within the existing power line corridor, it would not result in long-term changes to existing land use and may affect some trails or campgrounds in the short-term. Users could expect to encounter equipment, construction personnel and materials at those locations where the work is being done. However, once the conduit has been buried and the personnel and equipment have moved along the route, there would not be a long-term effect for a given location.

Cumulative Effects: The impacts from past, present, and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative B. Alternative C, in conjunction with these past, present, and reasonably foreseeable projects would result in minor, short- and long-term, adverse and moderate, short-and long-term beneficial impacts.

Impacts of Alternative D –Upgrade Existing Substation and Install Indication and Communication System Via Satellite

Alternative D would upgrade the existing substations to improve disruptions to the electrical system that cause inconveniences to visitors through the loss of electric power in public use areas. An automation and communication system via satellite would be implemented therefore eliminating the need for towers. Alternative D would have a moderate, long-term, beneficial impact to visitors.

Cumulative Effects: The impacts from past, present, and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative C. Alternative D, in conjunction with these past, present, and reasonably foreseeable projects would result in minor, short- and long-term, beneficial impacts.

Park Operations

Affected Environment

Park operations consist of NPS, concessioner, and contractor operations which encompass protection of natural resources; maintaining facilities including: roads, trails, buildings and other structures in a safe and aesthetically pleasing condition; preventing deterioration that would render them unsightly, unsafe, or beyond repair and providing educational, dining, shopping, and lodging opportunities to park visitors.

National Park Service Operations

The NPS provides operations and support for administrative services, resource management, cultural and natural resources, visitor facilities, visitor protection, and emergency services throughout the park. NPS employee housing and administrative offices are located at developed areas including Mammoth Hot Springs, Norris, Canyon, Tower, Northeast Entrance, Lake, Grant, Madison, South, Old Faithful, and West Yellowstone. Park wide operations include maintenance of museums, ranger stations, housing, campgrounds, warming huts, vault toilets, water and sewage systems, housing and other buildings, road maintenance, garbage collection, and maintaining the NPS vehicle fleet (snowmachines, snowcoaches, boats, cars, trucks and heavy equipment). In addition, NPS personnel maintain hundreds of miles of trails throughout the park. Resource and visitor protection operations in YNP include the backcountry office, communication center, corral operations, and law enforcement rangers. The backcountry office provides technical support for backcountry activities undertaken by both park visitors and park employees. The communication center is the central dispatch for all park communications. Corral operations provide support for backcountry trips. Law enforcement rangers regularly patrol frontcountry and backcountry areas and are responsible for visitor and resource protection, emergency services, and structural fire response to the park's developed areas.

Concession Operations

Xanterra Parks and Resorts operate lodging, gift shops, and dining and camping facilities in the park's developed areas. They also operate year-round bus tours during summer months and offer oversnow vehicle use in the winter. Delaware North operates stores that sell gifts and souvenirs, groceries camping supplies, Yellowstone fishing licenses, and fishing tackle and equipment, and offer limited food and beverage service. Yellowstone Park Service Station operates service stations in Mammoth Hot Springs, Canyon, Fishing Bridge, Grant Village, Old Faithful, and Tower that sell fuel, snacks, and refreshments. Most of the stations also offer vehicle towing and maintenance service for park visitors. Medcor. Inc. operates medical clinics at Old Faithful, Mammoth, and Lake that provide care for NPS and concessions employees as well as park visitors.

Northwestern Energy Operations

Northwestern Energy has been the primary electrical provider in the park since the late 1950s. They operate seven substations, three generator locations, and have 180 miles of electric lines (90 miles of transmission, and 90 miles of distribution). NWE provides power to Mammoth, Norris, Canyon, Lake, Grant Village, Madison, and Old Faithful and Tower. During the summer months, a NWE employee is stationed Monday-Friday at Canyon, Lake, Grant Village and Old Faithful. During the winter months NWE personnel are located in Bozeman, Montana which is situated one and a half hours drive from the park. Driving to a problem location and accessing the site within the park can take a number of hours more depending on the season and location of the outage. The NWE electric system currently has no automation of the power transmission and distribution equipment. Their land/mobile radio system is currently not able to be used due to the FCC mandate for narrow band radios. NWE personnel are using satellite phones for communication, but they are unreliable and have numerous limitations.

Methodology

Impacts to park operations focuses on (1) employee and visitor health and safety, (2) ability to protect and preserve resources, (3) staff size, whether staffing needs to be increased or decreased, (4) existing and needed facilities, (5) communication (i.e., telephones, radio, computers, etc.), and (6) appropriate utilities (sewer, electric, water). Park staff knowledge was used to evaluate the impacts of each alternative and is based on the current description of park operations presented in the Affected Environment section of this document.

Intensity Level Definitions

The thresholds of change for the intensity of impacts to park operations are defined as follows:

Negligible: Park operations would not be affected or the effect would be at or below the lower levels of detection, and would not have an appreciable effect on park operations.

Minor: The effect would be detectable, but would be of a magnitude that would not have an appreciable adverse or beneficial effect on park operations. If mitigation were needed to offset adverse effects, it would be relatively simple and successful.

Moderate: The effects would be readily apparent and would result in a substantial adverse or beneficial change in park operations in a manner noticeable to staff and the public. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.

Major: The effects would be readily apparent and would result in a substantial adverse or beneficial change in park operations in a manner noticeable to staff and the public, and be markedly different from existing operations. Mitigation measures to offset adverse effects would be needed, could be expensive, and their success could not be guaranteed.

Impacts of Alternative A – No Action

Implementation of the No-Alternative would mean that power outages would likely continue as they have in past years. No automation (SCADA) system would be installed, and all outages would be addressed by sending NWE employees to find, diagnose, and manually throw switches and breakers to re-route power while repairs are made. Adverse impacts due to power outages on park, concessioner, and NWE operations would continue. Personnel working on the electrical system in the field would continue with no reliable way of communicating with headquarters and colleagues. Communication is critical for the safe operation of the electrical system. As of January 1st, 2013 the Federal Communication Commission implemented the *FCC VHF/UNHF Narrowing Bandwidth Mandate*. This mandated NWE to abandon the previously used wide band radio system, which is the only method of communication NWE personnel had at their disposal, since the cell phone coverage is limited and has inherent limitations in its use.

Power outages would continue to affect park and concession operations. In the winter time, response time would remain anywhere from 4-48 hours depending on the weather and road conditions. Power outages with undetermined outage times would continue to divert staff from their routine duties and at times increase the work load created by the need to respond to power outages. Water treatment plants do not operate during power outages which can lead to limited quantities of potable water for domestic, structural fire and sanitary needs. Power outages would continue to affect guests and employees in park lodging and retail facilities. Certain perishable goods would be lost in long duration outages. NWE operations would not be upgraded, safety of their workers would remain a concern, and the reliability of the power grid in the park would remain at its current level. Impacts to park operations by implementing this alternative would be moderate, adverse and long-term.

Cumulative Effects: Cumulative impacts on park operations are based on the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions in Yellowstone National Park. A major source of impacts to operations and facilities is the continued use of the park by visitors and staff. Park infrastructure is in continual need of repair/replacement, mainly due to age and use. Past, ongoing, and future construction projects that would have an adverse impact on park staff include road construction projects (e.g., Norris to Golden Gate, Dunraven to Tower, etc.), building rehabilitation (e.g., Albright Visitor Center, Lake Hotel, etc.), utility replacement/upgrades (e.g., Lake Area Water line, Old Faithful Sewer main, etc.), and general maintenance associated with managing a large park. Activities considered in this analysis include park operations by interpretation, maintenance, administration, visitor protection, and resource management personnel. Impacts to park operations, including all associated needs for employing staff to conduct these actions (i.e., administrative, housing, vehicles, etc.), would continue in the current condition. Additional burdens on park operations typically include fire management actions, e.g., prescribed and wild fires, human use, emergency services, and construction projects. Beneficial impacts have also resulted from these activities, including improved access and quality of housing and other facilities. When added to other past, present, and reasonably foreseeable future actions in the park, Alternative A would have direct, short -term, negligible to moderate adverse impacts.

Impacts of Alternative B – Upgrade Existing Substations and Install Automation and Communication System

Implementation of Alternative B would reduce the duration and frequency of power outages within the park. The installation of a SCADA system would allow for remote switching and control of power company equipment. There would be less NWE personnel time involved in tracking down problems and rerouting of power. Fewer power outages would benefit park operations by reducing down time of staff, keeping visitor use areas well lit, and reduce wear and tear on sensitive electronic equipment. The addition of a narrowband radio system that covers the powerline corridor would benefit the NWE employees by allowing for good communication from within the entire NWE corridor, and their central office. Impacts to park operations from implementing this alternative would be long-term, moderate, and beneficial.

Cumulative Effects: The impacts from past, present and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative A. Alternative B, in conjunction with these past, present, and reasonably foreseeable projects would result in moderate, short- and long-term beneficial impacts to park operations.

Impacts of Alternative C – Upgrade Existing Substations and Install Automation and Communication System Via Fiber and Microwave

The impacts of implementing Alternative C on park operations would be the same as those discussed for Alternative B, in that the same benefits would occur by implementing a SCADA system and a land/mobile radio system. Impacts to park operations from implementing this alternative would be long-term, moderate, and beneficial.

Cumulative Effects: The impacts from past, present and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative A. Alternative B, in conjunction with these past, present, and reasonably foreseeable projects would result in moderate, short- and long-term beneficial impacts to park operations.

Impacts of Alternative D –Upgrade Existing Substation and Install Indication and Communication System Via Satellite

In Alternative D, the frequency and duration of outages would change only slightly due to a better system that alerts NWE personnel to problems with the system. The satellite system would help to identify

when problems with the electrical transmission and distribution system occur, but would not allow remote switching or rerouting of power. NWE linemen would still need to access the problem areas to manually throw switches, reroute power, and then make repairs. Satellite phones would be used for communication and would likely not be reliable in inclement weather or in heavily forested or very steep terrain areas. Some improvement would be incurred by a system that would indicate problems, so time needed to locate faults would be reduced. No improvement would be seen for accessing, rerouting power, or manually throwing switches and breakers would occur. Impacts to park operations from implementing this alternative would be long-term, minor, and beneficial.

Cumulative Effects: The impacts from past, present and reasonably foreseeable projects are the same as described in the cumulative effects section for Alternative A. Alternative D, in conjunction with these past, present, and reasonably foreseeable projects would result in minor, long-term beneficial impacts to park operations.

CONSULTATION AND COORDINATION

Internal Scoping

Scoping is a process to identify the resources that may be affected by a project proposal, and to explore possible alternative ways of achieving the proposal while minimizing adverse impacts. Internal scoping was conducted by an interdisciplinary team of professionals from the park. Interdisciplinary team members met on January 16, 2013 to discuss the purpose and need for the project; various alternatives; potential environmental impacts; past, present, and reasonably foreseeable projects that may have cumulative effects; and possible mitigation measures. The team also gathered background information and discussed public outreach for the project. Over the course of the project, team members have conducted individual site visits to view and evaluate the proposed project sites. Additional meetings were held in June 2013 to discuss scoping comments, further refine the project, select a preferred alternative based on impacts, and to brief park management on the process.

External Scoping

External scoping was conducted to inform the public about the proposed action and to generate input on the preparation of this EA. This effort was initiated with the release of a park news release and distribution of a scoping letter, which was mailed to over 150 interested parties and posted on the NPS Planning, Environment, and Public Comment (PEPC) website. In addition, an open house was held in Cody, Wyoming on May 21, 2013, with no attendance and in Bozeman, Montana on May 22, 2013, with three people in attendance. The public was given 32 days to comment on the project.

During the external scoping period, 11 pieces of correspondence which equated to 32 comments (19 substantive) were received through postings on the PEPC website and letters. Comments included the visual impacts and infrastructure associated with the towers, backup generators, solar panels and green energy and wildlife. No new alternatives resulted from public scoping.

Agency Consultation

A copy of this EA will be forwarded to the USFWS, to allow for consultation in accordance with the Endangered Species Act. Consultation for this project will occur during the public review period of this EA. For project specific impacts refer to the section: *Special Status Species*. Section 7 determinations of effect for this project on Threatened and Endangered Species are “may affect but not likely to adversely affect” to Canada lynx, “no effect” to lynx critical habitat and “may affect but no likely to adversely affect” grizzly bears (USFWS 2013).

In accordance with §106 of the National Historic Preservation Act, NPS provided the Wyoming State Historic Preservation Officer (WY SHPO) an opportunity to comment on the initial effects of this project. Consultation with WY SHPO on the designs of the towers and upgrades to the substations will be submitted during the public review period of this Environmental Assessment. This document’s analysis found there would be “no adverse effect” on historic properties, landmarks, or districts for the action proposed under the preferred alternative.

Native American Consultation

A scoping letter describing the proposed action was mailed to 73 tribal members of Yellowstone’s 26 associated tribes in May 2013, to solicit concerns and comments for the proposed project. The park did not receive any responses. The following tribes were consulted during the scoping period and will be consulted regarding the proposed action:

Assiniboine & Sioux Tribes, Fort Peck
Blackfeet Tribe

Cheyenne River Sioux Tribe
Coeur d'Alene Tribe
Comanche Tribe of Oklahoma
Confederated Salish and Kootenai Tribes
Confederated Tribes of the Colville Indian Reservation
Confederated Tribes of the Umatilla Indian Reservation
Crow Creek Sioux Tribe
Crow Tribe
Eastern Shoshone Tribe
Flandreau Santee Sioux Tribe
Gros Ventre and Assiniboine Tribes
Kiowa Tribe of Oklahoma
Lower Brule Sioux Tribe
Nez Perce Tribe
Northern Arapaho Tribe
Northern Cheyenne Tribe
Oglala Sioux Tribe
Rosebud Sioux Tribe
Shoshone-Bannock Tribes
Sisseton-Wahpeton Sioux Tribe
Spirit lake Sioux Tribe
Standing Rock Sioux Tribe
Turtle Mountain Band of Chippewa Indians
Yankton Sioux Tribe

Environmental Assessment Review and List of Recipients

The EA is subject to a 30-day public comment period. To inform the public of the availability of the EA, NPS will publish and distribute a letter to various agencies, tribes, and the 150-person mailing list, as well as publish a press release. The document will be available for review on the PEPC website at http://parkplanning.nps.gov/yell and at the park's visitor center. Copies of the EA will be provided to interested individuals, upon request by calling 307-344-7147.

During the 30-day public review period, the public is encouraged to submit their written comments to NPS, as described in the instructions at the beginning of this document. Following the close of the comment period, all public comments will be reviewed and analyzed, prior to the release of a decision document. The NPS will issue responses to substantive comments received during the public comment period, and will make appropriate changes to the EA, as needed.

List of Preparers

The following persons assisted with the preparation of the EA. All are employees of NPS at Yellowstone National Park, except where noted. *

Management:

- Dan Wenk, Superintendent
- Steve Iobst, Deputy Superintendent

Preparers:

- Sean Heath, Outdoor Recreation Planner
- Doug Madsen, Outdoor Recreation Planner
- Vicki Regula, Environmental Protection Specialist

Interdisciplinary Team (developed alternatives, provided technical input and conducted review of the EA):

- Jennifer Carpenter, Supervisory Environmental Protection Specialist
- Jim Knoelke, Facility Manager (Assistant Chief of Maintenance)
- Dan Stahler, Wildlife Biologist
- Mary Murphy, Concessions Specialist

REFERENCES

Banci, V.A. 1994. Wolverine. In: Ruggiero, L.F., Aubry, K.B., Buskirk, S.W., Lyon, L.J., Zielinski, W.J.,(eds.). 1994. The Scientific Basis for Conserving Forest Carnivores: American Martin, Fisher, Lynx, and Wolverine in the Western United States. USDA Forest Service General Technical Report RM-254.

Baril, L.M., L. Henry, and D.W. Smith. 2010. Yellowstone Bird Program 2009 Annual Report. National Park Service, Yellowstone Center for Resources, Yellowstone National Park, WY, YCR-2010-04.

Beauvais, G.P. and L. Johnson. 2004. Species Assessment for Wolverine (Gulo gulo) in Wyoming. U.S. Department of the Interior, Bureau of Land Management, Wyoming State Office, Cheyenne, WY.

Copeland, J.P., J. Peak, C. Groves, W. Melquist, K.S. McKelvey, G.W. McDaniel, C.D. Long, and C.E. Harris. 2007. Seasonal habitat associations of the wolverine in central Idaho. Journal of Wildlife Management 71:2201–2212.

Dickey, S.D., J. E. Gates, B. Dickey, and K. Ferebee. 2012. Bird and bat mortality at short, monopole cell towers in Rock Creek Park, Washington, D.C., USA. *Wildlife Society Bulletin*. doi:10.1002/wsb.114

Frank, D.A., and S.J. McNaughton. 1993 "Evidence for the Promotion of Aboveground Grassland Production by Native Large Herbivores in Yellowstone National Park." *Oecologia* 96:157–61.

Gunther, K.A. 1994. Bear management in Yellowstone National Park, 1960–1993. International Conference for Bear Resource Management 9(1):549–560.

Gunther, K. A., and H. E. Hoekstra. 1998. Bear-inflicted human injuries in Yellowstone National Park, 1970-1994. Ursus 10:377-384.

Gunther, K.A., M. A. Haroldson, K. Frey, .L. Cain, J. Copeland, and C.C. Schwartz.. 2004. Grizzly bear–human conflicts in the Greater Yellowstone Ecosystem 1992–2000. *Ursus* 15(1):10–22.

Houston, DB 1982. The northern Yellowstone Elk: ecology and management. Macmillan Publ. Co., New York, N.Y.

Koch, E.D., and C.R. Peterson. 1995. Amphibians and reptiles of Yellowstone and Grand Teton national parks. University of Utah Press: Salt Lake City, UT.

Lee, T. E., J. W. Bickham, and M. D. Scott. 1994. Mitochondrial DNA and allozyme analysis of North American pronghorn populations. Journal of Wildlife Management 58:307-318.

Manville, A.M., II. 2005. Bird strikes and electrocutions at power lines, communication towers, and wind turbines: state of the art and state of the science – next steps toward mitigation. Bird Conservation Implementation in the Americas: Proceedings 3rd International Partners in Flight Conference 2002, C.J. Ralph and T. D. Rich, Editors. U.S.D.A. Forest Service General Technical Report PSW-GTR-191, Pacific Southwest Research Station, Albany, CA: 1051-1064

McEneaney, T. 2006. Yellowstone bird report, 2005. CYR-2006-2, National Park Service, Yellowstone Center for Resources, Yellowstone National Park, WY.

McEneaney, T. 2007. Yellowstone bird report. National Park Service, Yellowstone Center for Resources, Yellowstone National Park, WY, YCR-NR-2007-01.

Meagher, M. 1973 The Bison of Yellowstone National Park. National Park Service Scientific Monograph Series No. 1. Washington DC: National Park Service.

National Park Service, 1997. Yellowstone's Northern Range: Complexity and Change in Wildland Ecosystems. Yellowstone National Park.

National Park Service, U.S. Department of the Interior. 2010. Yellowstone resources and issues: An annual compendium of information about Yellowstone National Park. Yellowstone National Park, WY.

Natural Resource Council. 2002. Ecological dynamics on Yellowstone's northern range. The National Academics Press, Washington, D.C..

Phillips, M.P., and D.W. Smith. 1996. The wolves of Yellowstone. Voyageur Press, Stillwater, Minnesota, USA.

Reat, E.P., O.E. Rhodes, Jr., J.R. Heffelfinger, and J.C. Devos, Jr., 1999. Regional genetic differentiation in Arizona pronghorn. Proceedings of the 18th Biennial Pronghorn Antelope Workshop. 18: 25-31.

Ruediger, B.J., S. Claar, S. Gniadek, B. Holt, L. Lewis, S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wenger, and A. Williams. 2000. Canada lynx conservation assessment and strategy, second edition. U.S. Forest Service, U.S. Fish and Wildlife Service, Bureau of Land Management, National Park Service. Forest Service Publication #R1-00-53, Missoula, Montana

Schwandt, J.W. 2006. Whitebark Pine in Peril: A case for restoration. USDA Forest Service, Report R1-06-28, Missoula, Montana.

Singer, F. J. 1995 "Grassland Responses to Elk and Other Ungulate Grazing on the Northern Winter Range of Yellowstone National Park." Northwest Science 69:191–203.

Singer, F.J., ed. 1996. Effects of grazing by wild ungulates in Yellowstone National Park. USDI, National Park Service, NPS/NRYELL/NRTR/96-01.

Thurow, T.L. 1991. Hydrology and erosion. In: Heitschmidt, R.E.C.; Stuth J.W., eds. Grazing management: an ecological perspective. Portland, OR: Timber Press: 141-159.

United States Fish and Wildlife Service. 1982. Grizzly Bear Recovery Plan. USDI USFWS. Denver, CO.

United States Fish and Wildlife Service. 2006. The 2005 North American Trumpeter Swan Survey.

U.S. Fish and Wildlife Service. 2009. Designation of Critical Habitat for the Contiguous United States Distinct Population Segment of the Canada Lynx, Environmental Assessment. Prepared by Region 6. Denver, Colorado.

Varley, J.D., and P. Schullery. 1998. Yellowstone fishes: Ecology, history, and angling in the park. Stackpole Books, Mechanicsburg, Pennsylvania.

White, P. J., T. L. Davis, K. K. Barnowe-Meyer, R. L. Crabtree, and R. A. Garrott. 2007. Partial migration and philopatry of Yellowstone pronghorn. Biological Conservation 135:518-526.

APPENDIX A

Visibility of Proposed NorthWestern Energy Electrical System Improvements
from Adjacent Historic Districts

September, 2013

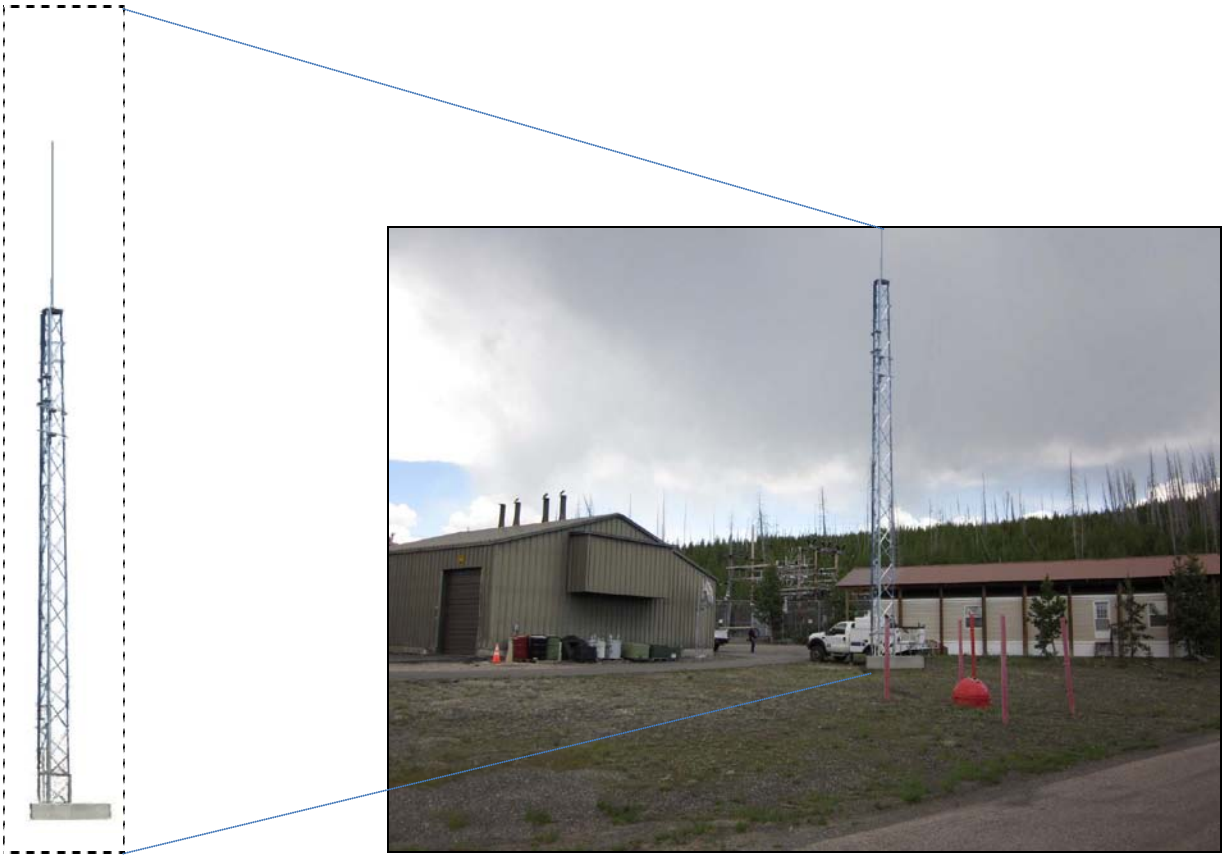


Photo simulation of proposed radio communications tower at the Old Faithful operations area

Report by Zehra Osman, Branch of Cultural Resources
Photos and Photo Simulations by Doug Madsen, Branch of Environmental Quality
Maps by Julie Rose, Branch of Physical Sciences
Yellowstone Center for Resources

Summary

This report analyzes the visibility of proposed electrical substation infrastructure upgrades from adjacent historic districts. Existing power substations located at Mammoth, Norris, Canyon, Lake, Grant Village, Madison, Old Faithful, and Buffalo Mountain (located on US Forest Service land just north of the park) are proposed to receive improvements such as an equipment building, a propane tank, a communication tower, and modifications to existing chain-link fence.

An interdisciplinary team of Yellowstone National Park staff, including the Branch Chief of Cultural Resources Management, conducted site visits to each substation July 31, 2013. A visual assessment was conducted utilizing a boom truck at the approximate location of the proposed tower at each of the seven substations, noting where the boom truck was visible from adjacent historic districts and other visitor use areas.

This report describes where the boom truck was visible and compares existing photos to photo simulations of the proposed communication tower to determine the relative visual affect on the historic districts in order to assist with compliance with Section 106 of the National Historic Preservation Act. Under 36 CFR Part 800, Federal land managing agencies are required to consider the effects of proposed actions on properties listed in, or eligible for inclusion in, the National Register of Historic Places. It is anticipated that the proposed tower(s) would be either barely visible or somewhat visible in the distant background from the Mammoth Hot Springs Historic District, Fort Yellowstone National Historic Landmark District, and Grand Loop Road Historic District. Based on photo simulations in this visual analysis, no adverse effects are anticipated on historic properties.

Background

In order to improve the reliability, safety, and overall service quality of the existing electrical power distribution in the park, Yellowstone National Park in conjunction with NorthWestern Energy (NWE), one of the electricity providers for the park, proposes to install a Supervisory Control and Data Acquisition (SCADA) System. SCADA systems are common across the region and country to allow for remote switching of equipment, quicker diagnosis of the location of transmission line breaks, and safer working conditions for electric company personnel. Currently, extended power outages have caused concerns for Yellowstone National Park visitors and staff due to safety hazards, loss of inventory, and revenue losses for affected concessioners. The proposed NWE project includes installation of a tower, either 30 or 60 feet tall, for an employee mobile radio communications system in conjunction with the automation system that would allow safer operations within the park. The Federal Communications Commission (FCC) Narrowing Bandwidth Mandate, which went into effect on January 1, 2013, meant that the previous NWE radio communication system can no longer be used. Cell phone coverage is limited in many locations of the park and is not considered a viable option.

Proposed Project

The proposed installation of a SCADA system would result in the following modifications to each of the existing substations located at Mammoth, Norris, Canyon, Lake, Grant Village, Madison, Old Faithful, and Buffalo Mountain (located on US Forest Service land just north of the park).

Communication System Towers – A new tower would be installed at each substation within the park and at Buffalo Mountain, which is outside the park boundary. The tower would be 30-feet tall at the Mammoth Hot Springs substation and 60-feet tall for all other substations. They would

be three-legged, of a galvanized steel metal lattice design, and would have a dull matte finish. All towers would be equipped with a VHF yagi antenna and have 24-30 inch elements. No tower lighting is proposed. A concrete foundation would be placed at each location to support the tower (See cover photo).

Equipment Buildings – A new pre-fabricated equipment building would be installed at each substation. Each equipment building would contain a propane back-up generator. At Norris and Mammoth, these new buildings would replace existing older and smaller buildings. The substation at Grant Village already has an adequate building; therefore, it would not receive a new one. The standard size for these buildings would be 16 feet by 24 feet to accommodate the relay and communication equipment needed for automation. At the Mammoth Hot Springs substation, two smaller buildings 12-feet by 14-feet and 12-feet by 7-feet would be used instead (see Figure 9). Buildings would be built on a 6-inch concrete slab, have a non-reflective metal roof, and meet NPS specification for color, finish, and placement to reduce the degree of visual impact. They would be finished in Park Service brown to blend in with their surroundings.

Security Fencing – Each existing substation has chain-link security fencing. For the substations at Canyon and Norris, proposed facility improvements may require the relocation and possible expansion of security fencing.

Propane Tank – Each equipment building would be supplied with a back-up generator that is served from an above-ground propane tank. At Old Faithful, the alternative to installing a separate propane tank is to plumb into the existing Park Service propane facilities. If there is a need for a new tank, each of the propane tanks would be a 1,000 gallon capacity and about 4'diameter and 12' long. Tanks would be sited in such a way that the equipment building would serve as a screen from visitor view. For this reason, visibility of propane tanks is not anticipated.

Adjacent Historic Properties

All nine substations are shown on a parkwide map (Figure 5). Historic properties adjacent to each individual substation are presented on maps referenced in Figure 2, below. They include the North Entrance Road Historic District, Roosevelt Arch NHL, Yellowstone Park Company Historic District, North Entrance Cultural Landscape, Mammoth Hot Springs Historic District, Fort Yellowstone NHL District, Grand Loop Road Historic District, Lake Historic District, Fishing Bridge Historic District, Old Faithful Historic District, Old Faithful Cultural Landscape, and South Entrance Road Historic District.

A file search conducted at MT SHPO on Sept. 12, 2013 indicates that several historic properties are located within one mile of the proposed Buffalo Mt. repeater site, though none appear to be within visual distance of the project area (See Figure 1). These properties all appear to be related to mining in the Jardine area. According to MT SHPO, none of the properties have been evaluated for eligibility to the National Register of Historic Places (NRHP).

Figure 1: Adjacent Gallatin National Forest Historic Properties

Site Number	Eligibility Status	Site Type 1	Owner
24PA0361	undetermined	Historic Log Structure	Combination
24PA0357	undetermined	Historic Irrigation System	Forest Service
24PA0362	undetermined	Historic Mining	Forest Service

24PA0363	undetermined	Historic Log Structure	No Data

Methodology for Determining the Visibility of the Proposed Tower

In order to determine the visibility of the proposed 60-foot communications tower, park staff tested the visibility of a boom truck at proposed tower locations. In June/July 2013, NorthWestern Energy parked a boom truck at the approximate location of the proposed tower at each of the seven park substations. Crews raised the boom truck bucket and placed an orange flag (a florescent orange traffic vest) at the top of a pole extension to the height the tallest proposed tower (60 feet). Park staff checked for the visibility of the orange flag from various visitor-use areas, including adjacent historic districts.

Once the boom was raised and the flag in place, park staff drove the Grand Loop Road, and any other road in the area a distance of 2-3 miles in each direction. Visibility of the boom and flag were blocked by terrain, trees, buildings, in most areas. When the boom or flag were visible, photos were taken. These photos were used to create the visual simulations found in the EA and this document.

Methodology for Photo Simulations of Proposed Tower

In order to illustrate the potential visibility of the proposed tower, photo simulations were developed at those locations where the flag and/or boom truck was visible. Photo points showing where the orange flag was visible are recorded on Figures 8, 18, and 25. Using Adobe PhotoShop, a photo of a tower similar to one that is proposed was overlaid onto the image of the boom truck. This process is shown in Figures 3 and 4 below.

Figures 3 and 4: *In the photo on the left, NorthWestern Energy crews erect a boom truck bucket and flag extension to the approximate height of the proposed tower. The photo-shopped image on the right shows a tower (similar to that proposed in this project) superimposed on top of the boom truck. The boom truck is then erased from the image using PhotoShop software.*

Outcomes

It is anticipated that the 16' by 24' dark brown building would be minimally visible only at Norris and Mammoth substations, since these are the only two operations areas that are visible to the public. Propane tanks would be sited in such a way that the equipment building would serve as a screen from visitor view. For this reason, visibility of 12-foot long propane tanks is not anticipated. Since they were likely visible, a photo simulation was developed for the two smaller buildings proposed for the Mammoth substation (see Figure 9). The building proposed for the other substations would not be visible; therefore photo simulations for these were not developed.

Figure 2: Visibility Assessment Results

Map Figure	Substation Location	Adjacent Historic Properties	Visibility, Photos, and Photo Simulations
5	Parkwide Substation Locations	--	--
6	Buffalo Mountain	North Entrance Road HD, Roosevelt Arch NHL, Yellowstone Park Transportation Company HD, North Entrance Cultural Landscape	Not visible
7	Buffalo Mountain	Adjacent Gallatin National Forest Historic Properties	Not visible
8	Mammoth	Mammoth Hot Springs HD, Fort Yellowstone NHL District, Grand Loop Road HD	Visible in the distant background from all three; see figures 9-17 for photo simulations. Figure 8 shows photo points.
18	Norris	Grand Loop Road HD	Briefly visible in foreground; see figures 19 and 20 for photo simulation. Figure 18 shows photo point.
21	Canyon	Grand Loop Road HD	Not visible
22	Madison	Grand Loop Road HD	Not visible
23	Lake	Grand Loop Road HD, Lake HD, Fishing Bridge HD	Not visible; see figure 24
25	Old Faithful	Grand Loop Road HD, Old Faithful Historic HD	Visible in the distant background from Grand Loop Road; see Figure 26 & 27 for photo simulation. Figure 25 shows photopoints.
28	Grant Village	South Entrance Road HD	Not visible

The boom truck/orange flag was visible from the following substations. Photo simulations were created for these proposed towers (see Figure 2 for photopoint and photo simulation locations):

- Mammoth Substation: 30-foot tower visible in the distant background from Mammoth Hot Springs Historic District, Fort Yellowstone National Historic Landmark District, and Grand Loop Road Historic District

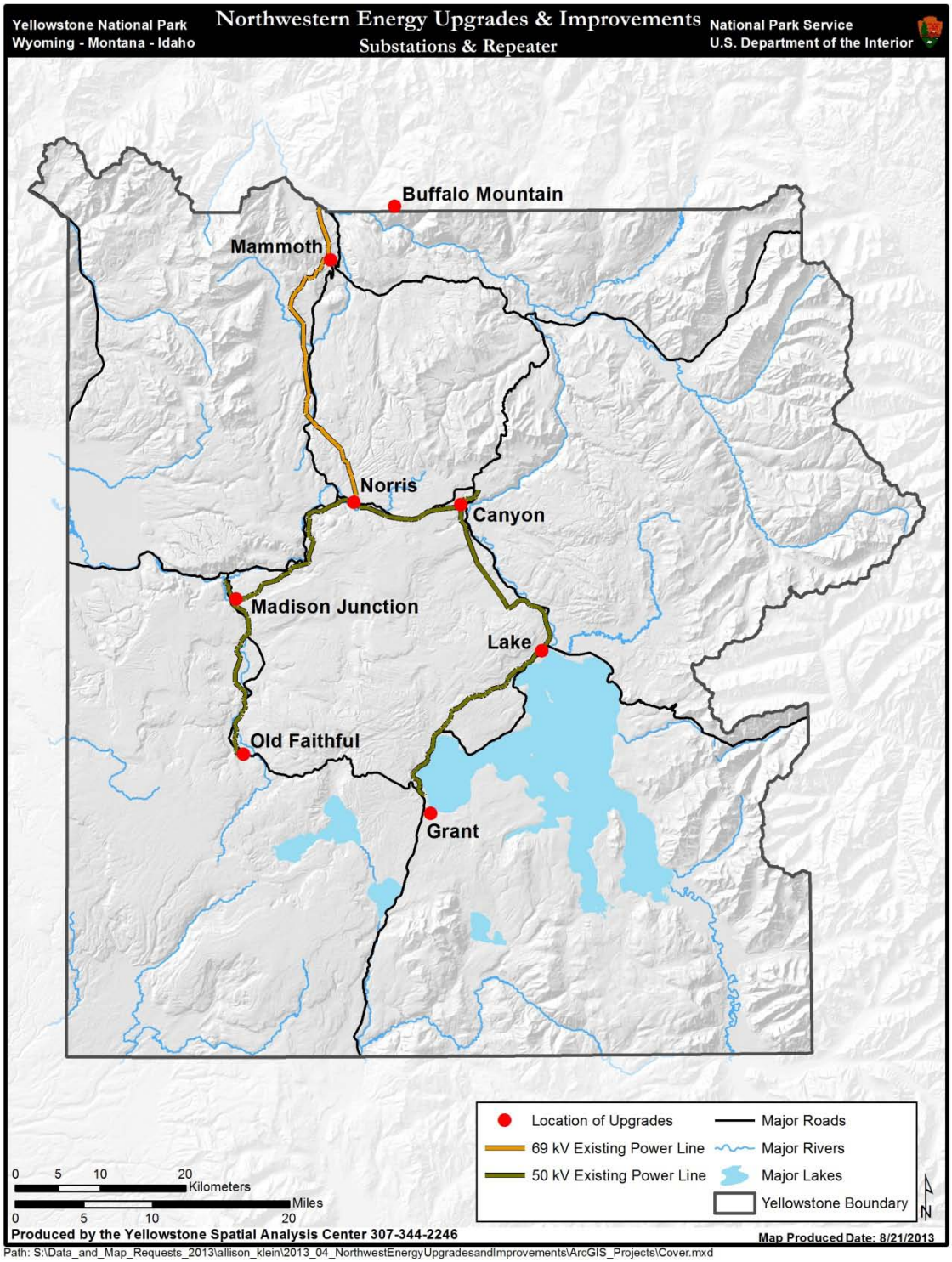
- Norris Substation: 60-foot tower visible briefly in the foreground through roadside trees from Grand Loop Road Historic District
- Old Faithful Substation: 60-foot tower visible in the distant background from Grand Loop Road Historic District

The boom truck/orange flag was not visible from historic districts adjacent to the substations at Grant Village, Madison, Canyon, and Lake. Photo-simulations were not created for these proposed towers.

At the Buffalo Mountain substation outside the park, the nearest park historic districts include the North Entrance Road Historic District, the North Entrance Road Cultural Landscape, the Yellowstone Park Company Transportation Company Historic District, and the Roosevelt Arch. This existing substation is approximately five miles from these historic districts and was not discernible from any of them. No boom truck, pole extension, and/or orange flag were erected at this site. According to MT SHPO, none of the adjacent Gallatin National Forest historic properties have been evaluated for eligibility to the National Register of Historic Places (NRHP). Given that the proposed tower should not be visible from these properties, the tower should not cause alteration to the characteristics of properties qualifying them for inclusion in or eligibility for the NRHP, if any such properties are present.

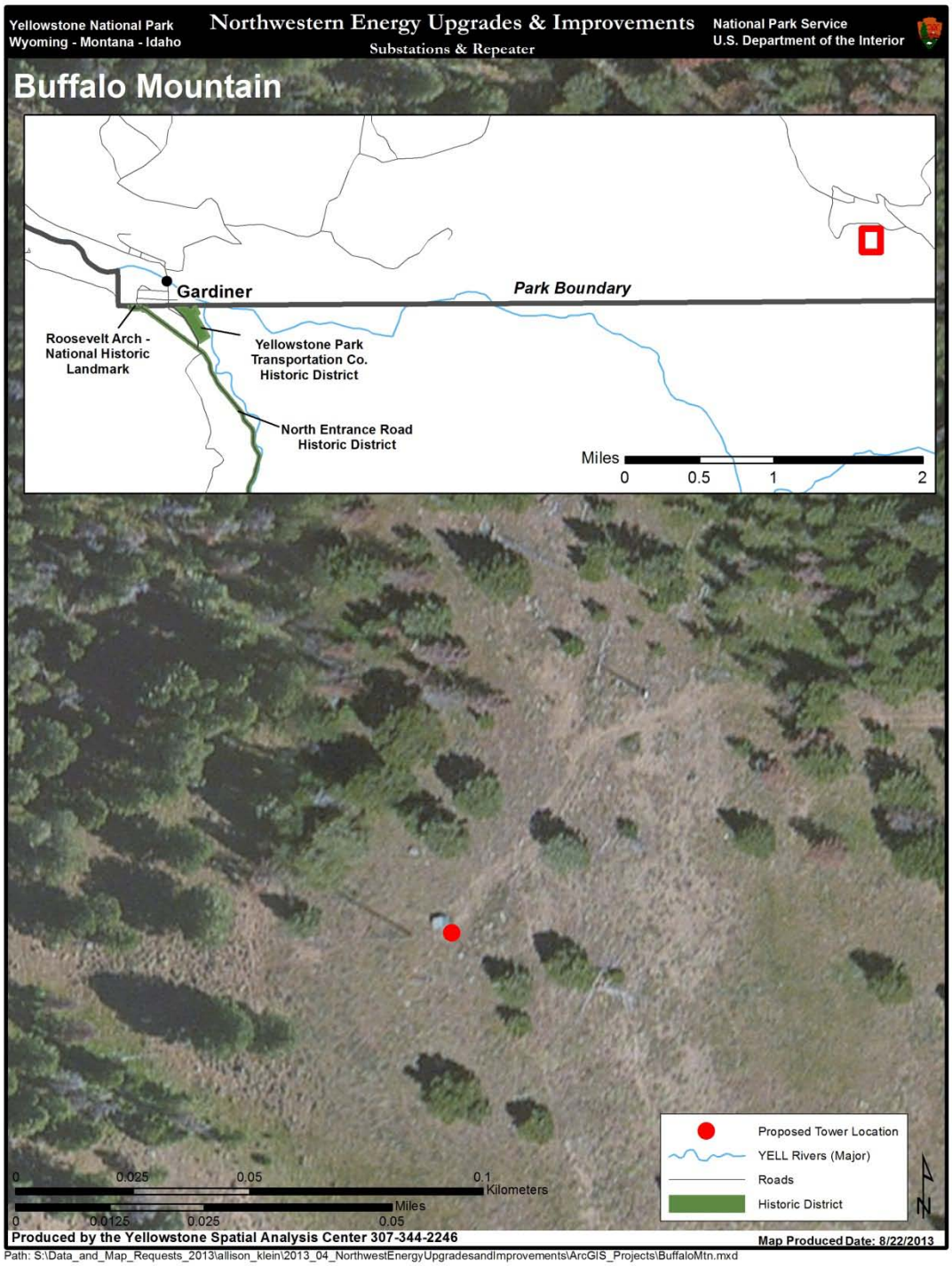
Under 36 CFR Part 800, Federal land managing agencies are required to consider the effects of proposed actions on properties listed in, or eligible for inclusion in, the National Register of Historic Places. Based on photo simulations in this visual analysis, no adverse effects are anticipated on historic properties.

Figure 5: Parkwide Substation Locations



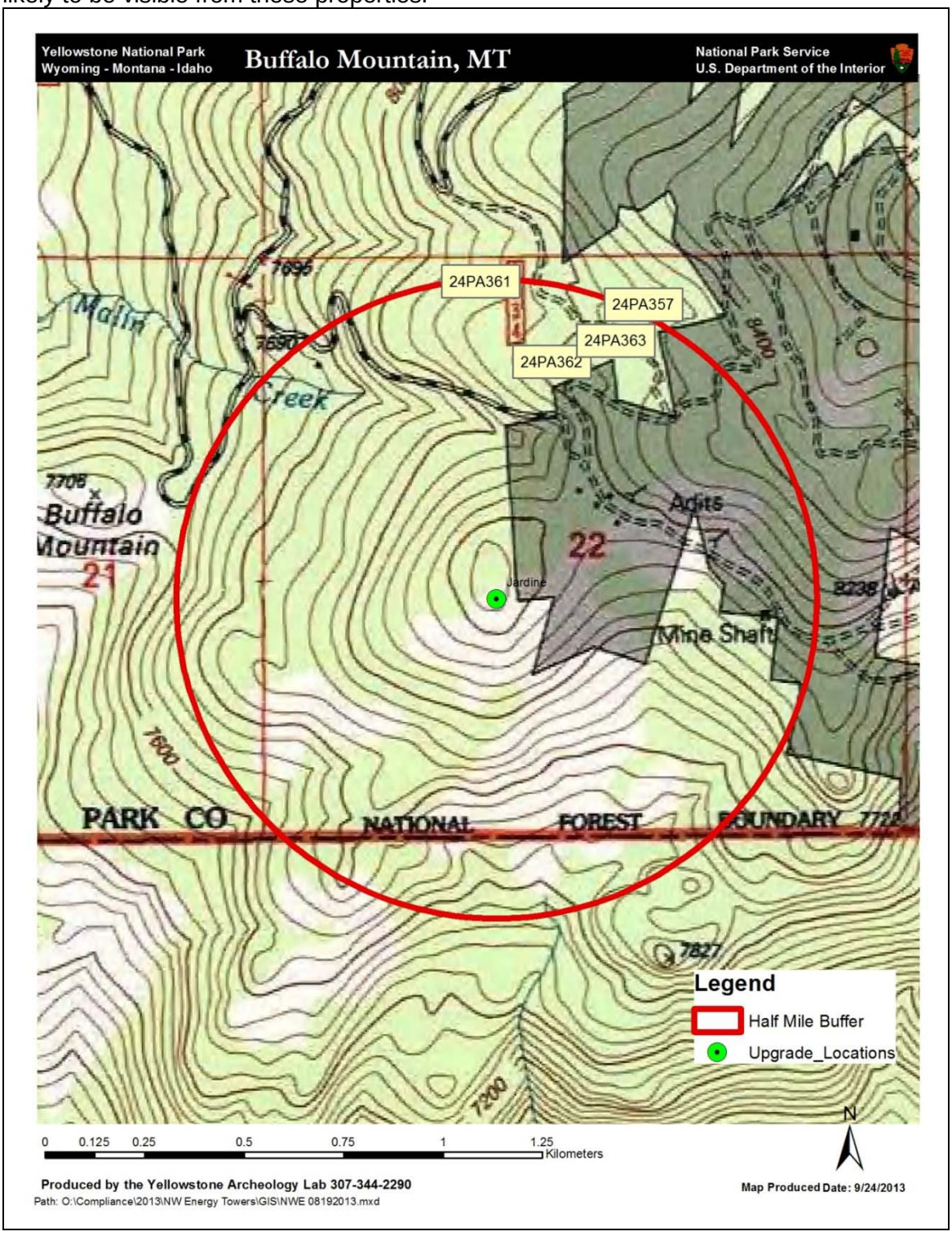
Buffalo Mountain Substation (from Yellowstone National Park)

Figure 6 shows this substation is approximately five miles from adjacent Yellowstone National Park historic districts and was not discernible from any of them. No boom truck, pole extension, and/or orange flag were erected at this site.



Buffalo Mountain Substation (from Gallatin National Forest)

Figure 7 shows this substation and adjacent historic properties (Figure 1). The tower is not likely to be visible from these properties.



Mammoth Substation

Figure 8: Photo points are shown where the boom truck/flag were visible. Photo simulations of the proposed tower were developed for these views.

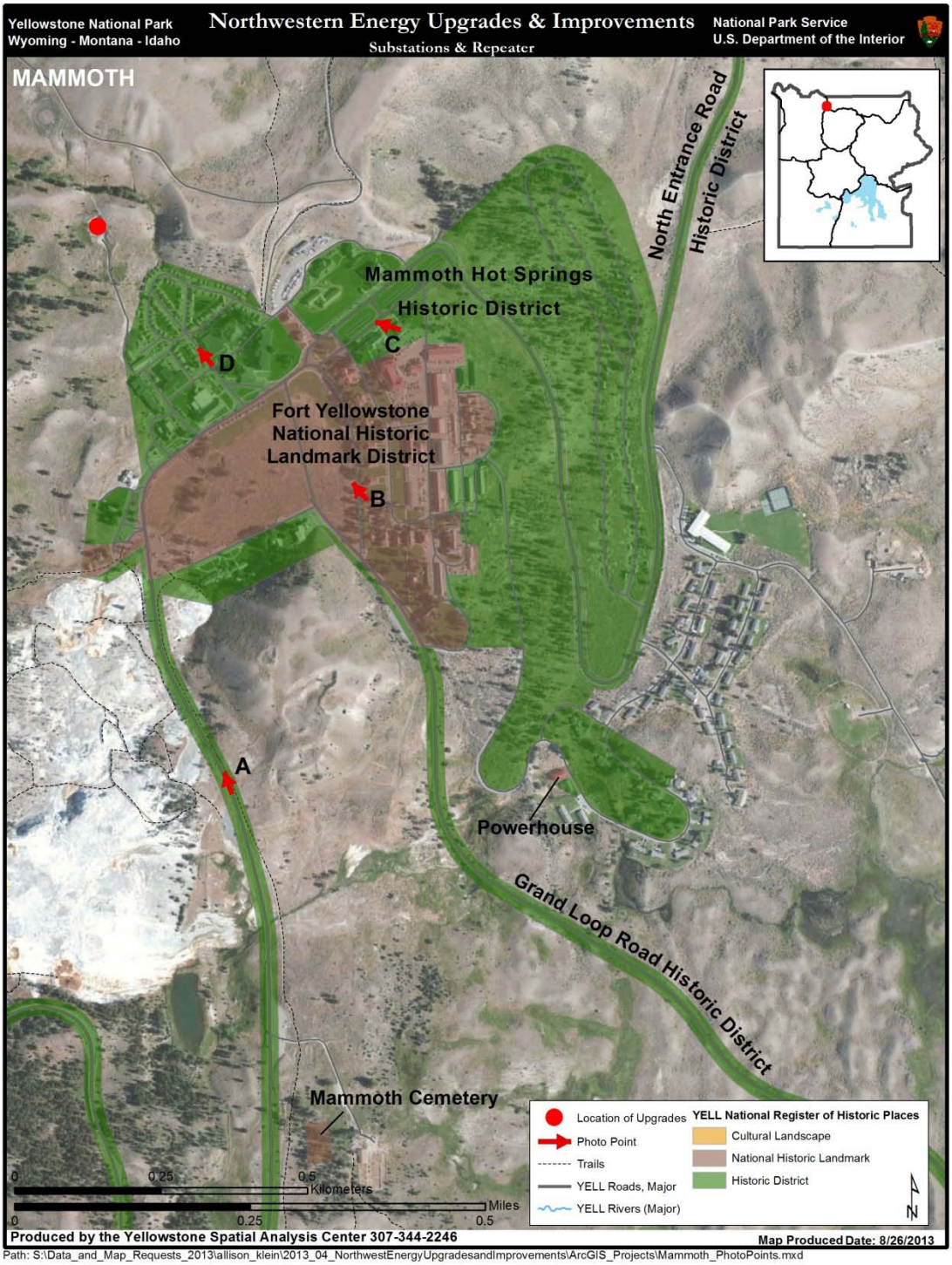


Figure 9: *A photo simulation of the proposed equipment building in front of the proposed 30-foot tower at the Mammoth Hot Springs substation (right side of photo).*

Figure 10 and 11: *The photo at the top shows the boom truck in the center-right portion of the photo as viewed from the Grand Loop Road Historic District at Photo Point A. The photo-shopped image on the bottom is a photo-simulation of the proposed tower, which would be half as tall as the height of the boom truck.*

Figure 12 and 13: *The photo at the top shows the boom truck left of center of the photo to the left of the Mammoth Hotel as viewed from Photo Point B at the Fort Yellowstone National Historic Landmark District Front Row Officers Quarters. The photo-shopped image on the bottom is a photo-simulation of the proposed tower, which would be half as tall as the boom truck.*

Figure 14 and 15: *The photo at the top shows the 60-foot boom truck to the right of center of the photo as viewed from the Post Office in the Mammoth Hot Springs Historic Districts at Photo Point C. The photo-shopped image on the bottom is a photo-simulation of the proposed tower, which would be half as tall as the boom truck, or 30-feet.*

Figure 16 and 17: *The photo at the top shows the 60-foot boom truck to the right of center of the photo as viewed from the Mammoth Hotel Cottages in the Mammoth Hot Springs Historic Districts at Photo Point D. The photo-shopped image on the bottom is a photo-simulation of the proposed tower at 30-feet tall, or half the height of the boom truck.*

Norris Substation

Figure 18: Photo points are shown where the boom truck/flag were visible from the Grand Loop Road Historic District. A photo simulation of the proposed tower was developed for this view.

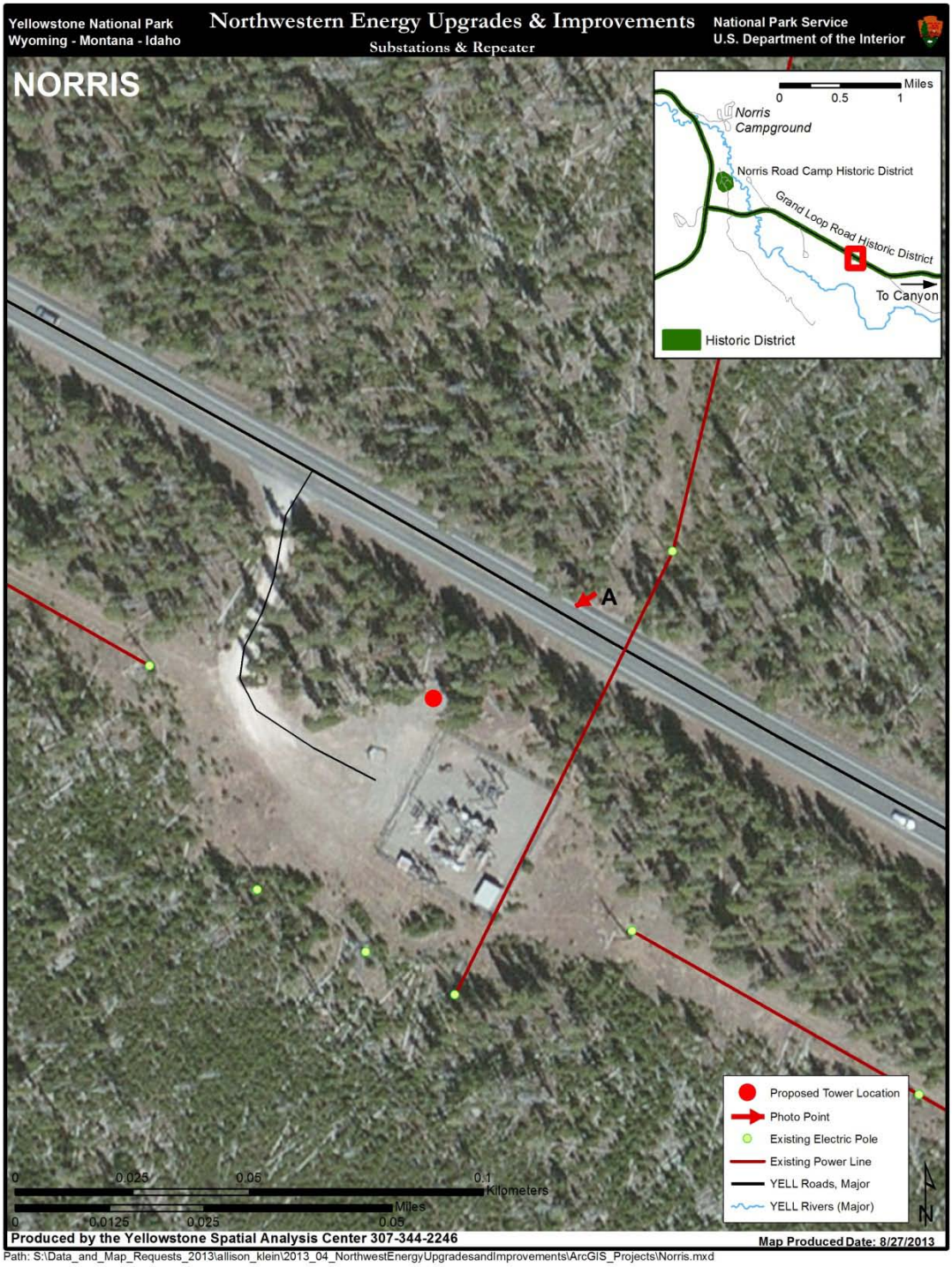
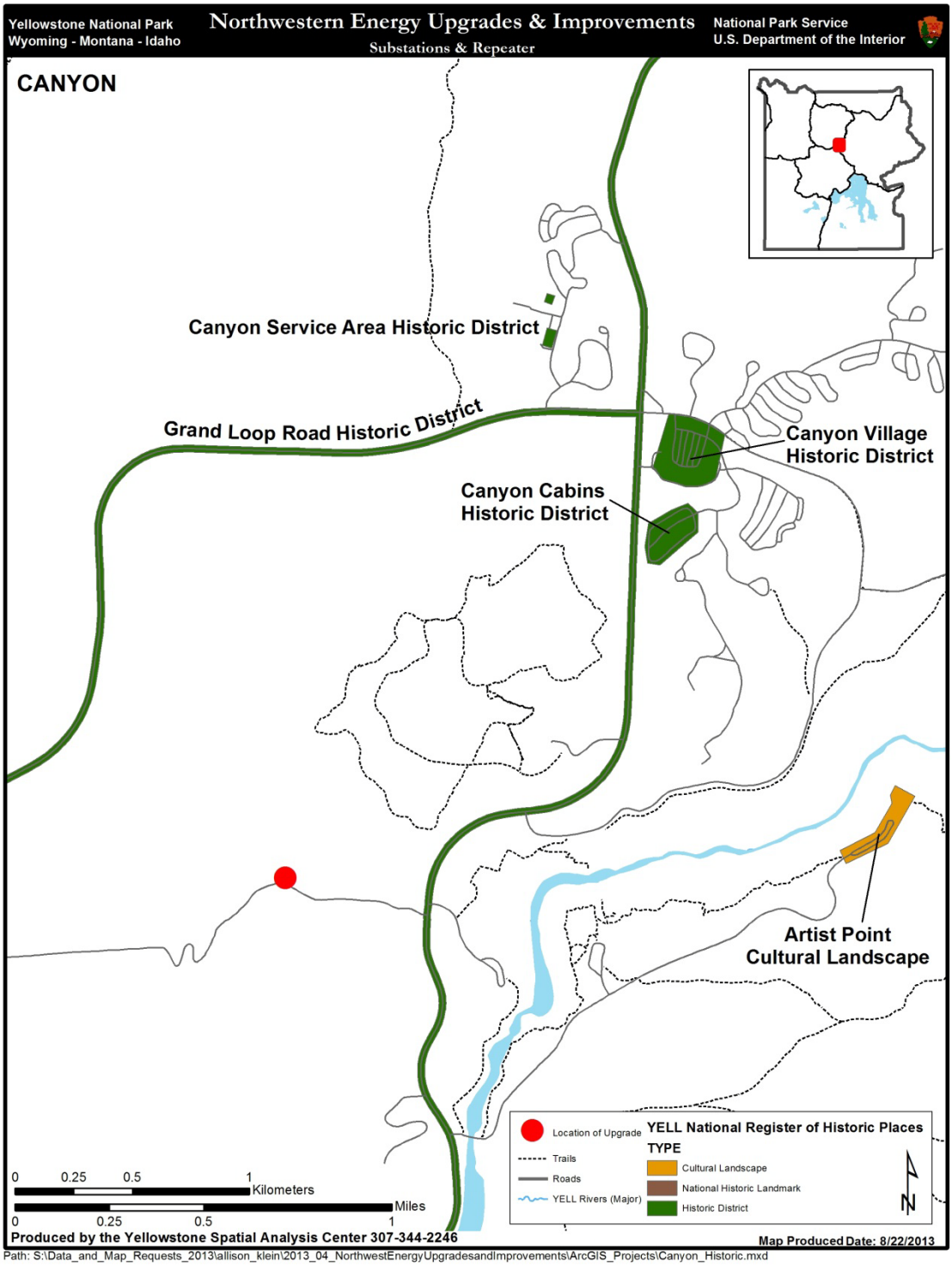


Figure 19 and 20: *The photo at the top shows the boom truck and orange flag at the center of the photo as viewed from the Norris-Canyon sections of the Grand Loop Road Historic District near Norris from Photo Point A. The photo-shopped image on the bottom is a photo-simulation of the proposed tower.*

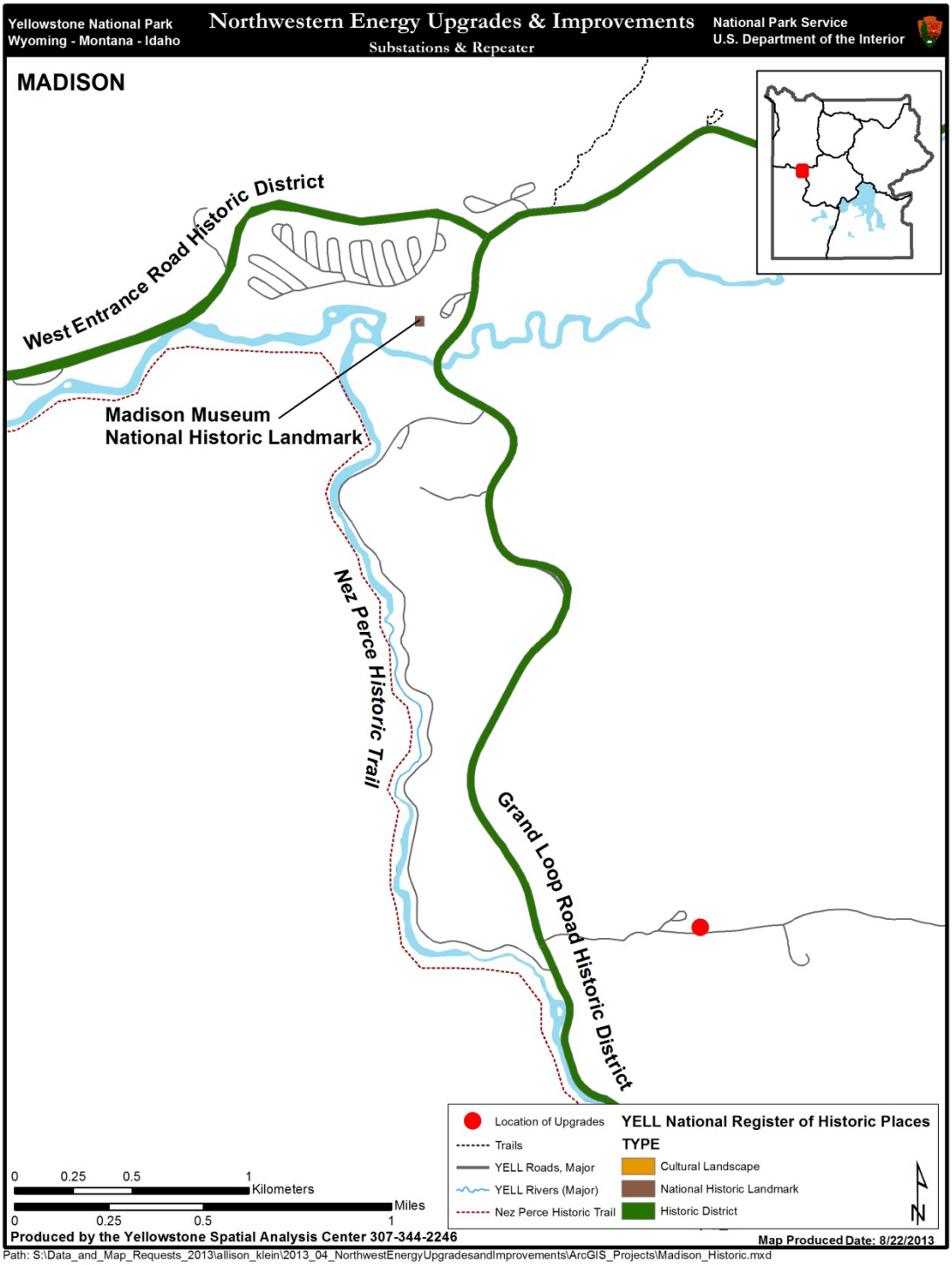
Canyon Substation

Figure 21: The boom truck erected at this substation was not discernible from any adjacent historic districts. A photo simulation of the proposed tower was not developed for this area.



Madison Substation

Figure 22: The boom truck erected at this substation was not discernible from any adjacent historic districts. A photo simulation of the proposed tower was not developed for this area.



Lake Substation

Figure 23: The boom truck erected at this substation was not discernible from any adjacent historic districts due to dense vegetation. A photo simulation of the proposed tower was not developed for this area.

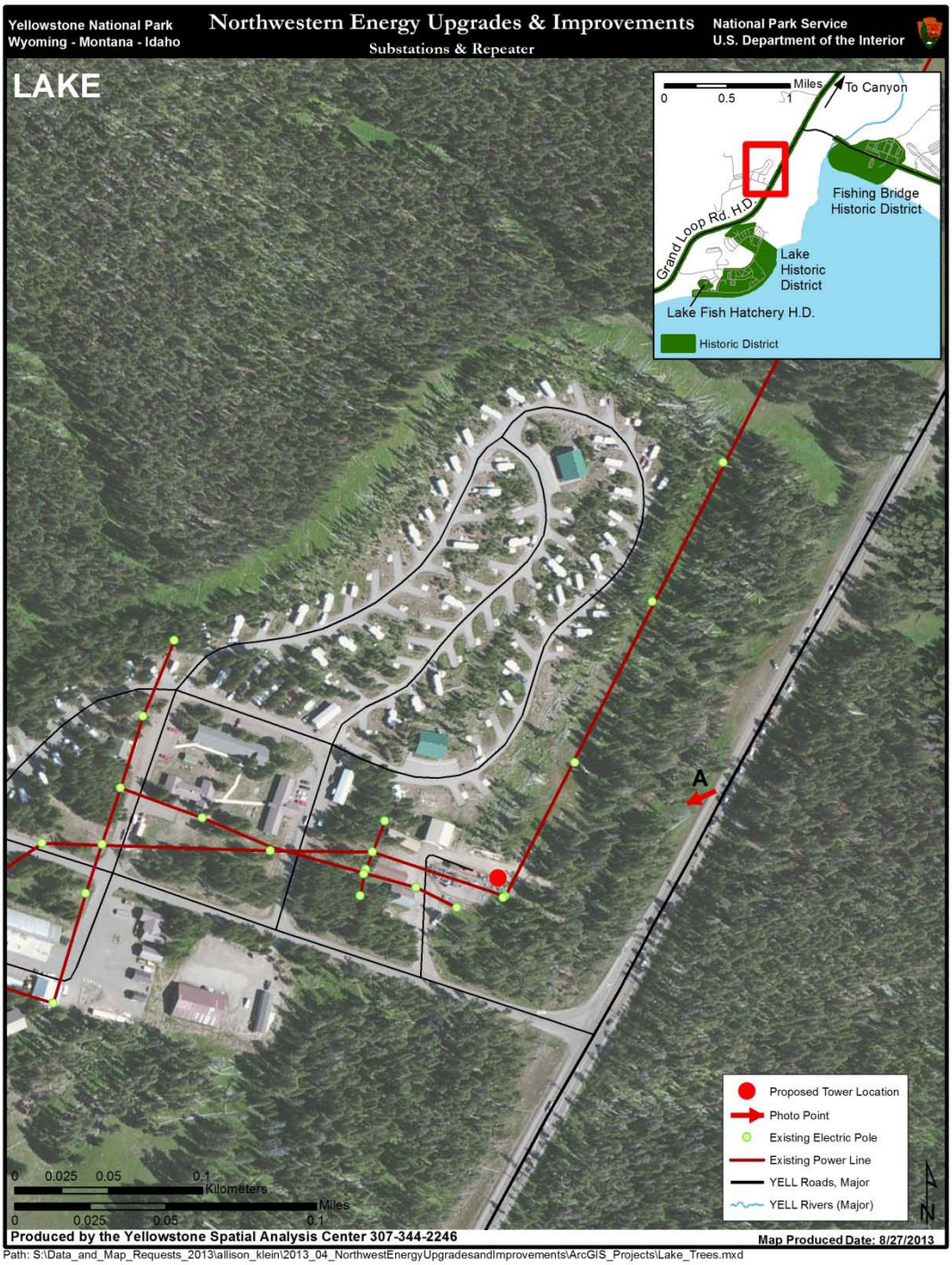


Figure 24: View from Grand Loop Road Historic District near Lake. The existing substation, boom truck, and flag are not visible from the road due to dense vegetation.

Old Faithful Substation

Figure 25: Photo points are shown where the boom truck/flag were visible from the Grand Loop Road Historic District. A photo simulation of the proposed tower was developed for this view. The orange flag and boom truck bucket extension were not discernible from any other points within the historic districts.

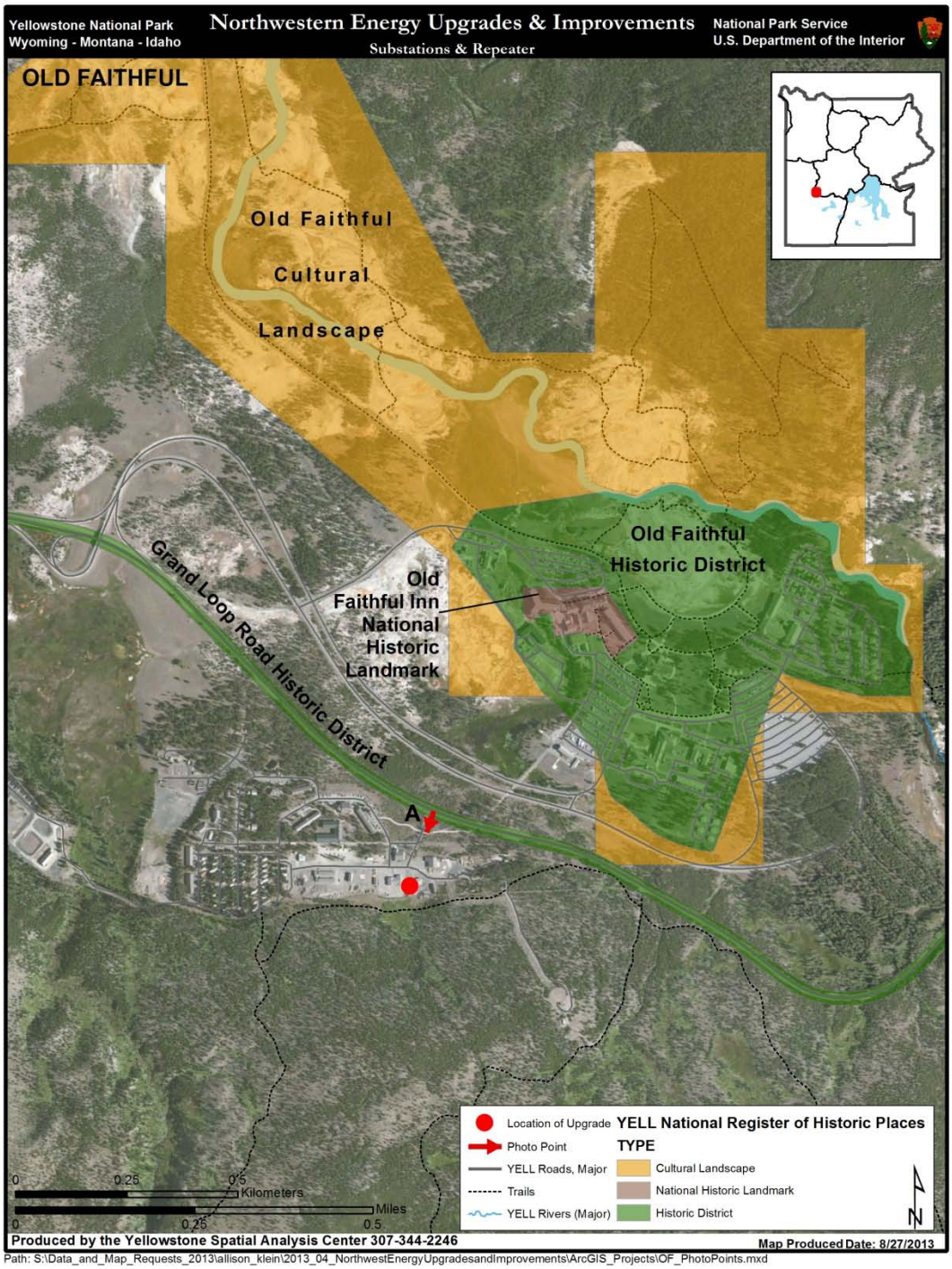


Figure 26 and 27: *The photo at the top shows the orange flag as viewed from the Grand Loop Road Historic District near Old Faithful from Photo Point A. The photo-shopped image on the bottom is a photo-simulation of the proposed tower.*

Grant Village Substation

Figure 28: The boom truck erected at this substation was not discernible from any adjacent historic districts. A photo simulation of the proposed tower was not developed for this area.