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U.S. Department of the Interior

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Mammoth Cave National Park News Release

For Immediate Release, June 3, 2004
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Cell Tower Draft EA Available for Review, Comment

MAMMOTH CAVE NATIONAL PARK – Superintendent Ronald R. Switzer announced today a public review and comment period on a draft environmental assessment (EA) regarding issuance of a right-of-way permit which would allow construction of a cell phone tower within the park boundary. If the right-of-way is granted, Bluegrass Cellular would erect a 180-foot wireless telecommunications tower near the north boundary of the park where the Hickory Cabin Fire Tower once stood.

"The primary purpose is to improve telecommunications," said Switzer. "Better cell phone coverage would enhance the health and safety of park visitors, employees, and those who reside or travel in the area immediately north of the park."

The draft EA provides decision makers and the public with information and analysis of alternatives related to the proposed placement of a tower within Mammoth Cave National Park. The document is available for public review until July 15, 2004, and may be viewed on the Internet at http://www.nps.gov/maca/pphtml/documents.html. Hard copies may be requested by writing to Superintendent, Mammoth Cave National Park, P.O. Box 7, Mammoth Cave, Kentucky 42259. Comments may be sent to the same address.

"In accordance with the National Historic Preservation Act, we are looking for individuals or organizations who are interested in becoming consulting parties, to identify historic properties that might be affected by this right-of-way," added Switzer. Anyone interested in being a consulting party, or having questions about the draft EA, may contact Henry Holman, park management assistant, at 270/758-2187, or by email at henry_holman@nps.gov.

- NPS -

Environmental Assessment

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PURPOSE AND NEED

INTRODUCTION

This Environmental Assessment (EA) provides decision-makers and the public with information and analysis on alternatives related to the proposed placement of wireless telecommunication facilities within Mammoth Cave National Park. This EA is being prepared based on preliminary meetings with Bluegrass Cellular. An application for the placement of wireless telecommunications facilities within the park is expected to be received from Bluegrass Cellular in late 2004 or early 2005 for construction of facilities in 2005.

The National Park Service (NPS) is required by Section 704 (c) of the Telecommunications Act of 1966 (47 U.S.C. 332) to develop "procedures by which Federal departments and agencies may make available Federal properties, rights-of-way, and easements for wireless telecommunication services." The NPS is also required to comply with the provisions of the National Park Organic Act of 1916, the National Environmental Policy Act of 1969 (NEPA), the National Historic Preservation Act of 1966 (NHPA), the Archeological Resources Protection Act of 1979 (ARPA), the National Park Service Director's Order (DO) 12, and Reference Manual (RM)-53 Special Park Uses.

The wireless telephone signal strength within the park is not sufficient to provide reliable wireless telephone communication coverage. The affected population, which includes park visitors and other recreational travelers in the region, nearby residents, and non-recreational visitors and traffic in the park and surrounding area, is substantially more than 2,000,000 people annually. The use of cellular telephones by the public, park staff, concessions, and contractors working within the park is increasing. The total affected population in the park area will benefit by the improved telecommunication services for safety, personal, and business needs. The public should have increased capability to call for help using their wireless mobile telephones and in the near future enhanced 911 services should provide additional safety by locating wireless telephone users who are lost or injured. The primary purpose of the proposal is to provide improved telecommunications to enhance the health and safety of park visitors, employees, and those people residing or traveling in the area immediately north of the park.

This Environmental Assessment is intended to facilitate compliance with the National Environmental Policy Act and various other related administrative and legislative requirements.

DESCRIPTION OF THE PROPOSED ACTION

The proposed action would result in issuance of a right-of-way permit and construction and operation of wireless telecommunications facilities including a tower (180 feet tall), transmission, and support facilities surrounded by a security fence at the Hickory Cabin Fire Tower site. Buried electric and telephone utilities would be extended for a distance of approximately 600 feet along and within the existing access road corridor to the fire tower site. Antennas and coaxial lines would be placed on the tower for communications purposes. It is anticipated that nine directional panel antennas would be placed on the tower. The antennas would be arranged in a triangular fashion with three antennas oriented in each of three directions (sectors), each spaced 120 degrees apart. Associated equipment would be housed in a prefabricated building located at the base of the tower, which would be about 12 feet wide and 20 feet long. The Facilities would require 200 ampere single phase electrical service and telephone land lines. A backup propane powered generator would also be placed at the base of the tower. The area within fence would be about 65 feet square and would be surfaced with gravel. Site access would use the existing gravel road. An aircraft warning light would not be required because the proposed height of the tower is less than 200 feet above ground level. Co-location of equipment owned by other wireless telecommunication providers and National Park Service radio facilities is included in the proposal.

Any permit issued would provide for co-location of equipment owned by other wireless telecommunication providers and NPS radio facilities. Additional providers who propose to co-locate their facilities at this site would be required to execute an appropriate agreement with Bluegrass Cellular, in addition to acquiring a right-of-way permit from the National Park Service, and to bear all the costs associated with processing their permit application, including environmental and other analysis, and installation and maintenance of their equipment, and any necessary upgrade of utilities.

PERMITS, LICENSES, ENTITLEMENTS, AND REVIEWS NECESSARY TO IMPLEMENT THE PROJECT

The Telecommunications Act of 1996 addresses some of the technical problems that have arisen from the increasing popularity and use of mobile communications. President Clinton's memorandum of August 10, 1995, titled "Facilitating Access to Federal Property for the Siting of Mobile Services" directs federal agencies to develop procedures necessary to facilitate access to federal property for the siting of mobile service antennas. Section 704 (c) of the Telecommunications Act of 1996 and the regulations promulgated pursuant to the Act make federal property, including parklands available for placement of telecommunications equipment by duly authorized providers absent unavoidable conflicts with the department or agency mission, or the current or planned use of the property, or access to that property. The specific NPS guidance and procedures are contained in Director's Order 53: Special Park Uses and the accompanying reference manual, RM-53. The National Park Service general authority to issue right-of-way permits for power and communications facilities is in 16 U.S.C. Section 5 with regulations in Title 36 CFR Part 14.

Other permitting or review actions will be required before proceeding with the proposal. The following is a list of the requirements with a brief description of the purpose of each requirement.

- NPS Right-of-Way permit, which would be issued if no significant impacts are identified during the Environmental Assessment process.
- An archeological assessment of the proposed site would be completed in compliance with the Secretary of the Interior's Standards for Archeology and Historic Preservation.
- A Construction Stormwater Discharge Permit would be obtained from the Kentucky Division of Water if the area of disturbance is one acre or greater.
- All local and state construction permits
- Federal Communications Commission (FCC) license is required for building and operating a wireless telecommunication facility.
- National Historic Preservation Act (NHPA) Section 106 consultation for any properties outside the park as specified in 36 CFR 800, and, for properties inside the park, as specified in the comprehensive Programmatic Agreement between Mammoth Cave National Park and the Kentucky State Historic Preservation Officer, and the Advisory Council.
- Endangered Species Act (ESA) Section 7 consultation with the U.S. Fish and Wildlife Service (USFWS) to assess if there is any impact to any species protected by the ESA.
- Communication with the USFWS, under the requirements of Executive Order No. 13186 Responsibilities of Federal Agencies to Protect Migratory Birds to determine potential impact on migratory birds.
- Review of application and propagation data by National Park Service Field Operations technical Service Center (FOTSC) section.
- All National Environmental Policy Act (NEPA) requirements

DECISIONS TO BE MADE

- Whether to issue a permit for construction of wireless telecommunication facilities at one of the alternative sites in the park.

The potential effects of the alternatives considered were evaluated using the impact topics listed below. Impact topics included in the analysis are: wetlands and floodplains, vegetation, threatened and endangered species, air quality, soils/geology, water quality and hydrology, fish and wildlife (other than threatened and endangered species), migratory birds, cultural resources, visitor use, land use, transportation, social and economic, public health, public safety, Indian Trust resources, risk of unanticipated consequences, and cumulative impacts. Impact topics that are not relevant were not included, e.g., unique or important fish or fish habitat, urban quality, geohazards.

BACKGROUND

The mission and purpose of Mammoth Cave National Park was established by specific enabling legislation.[1] The mission includes the text of the legislative acts as well as related reports and speeches that were prepared in support of the legislation. Following is a selection of excerpts from the legislative record that specifically relate to resource values.

> *Your commission has also made a careful examination of the Mammoth Cave region of Kentucky and believes sufficient reasons exist to warrant its acceptance as a national park if requirements are met as outlined in this report. Below are briefly outlined some of these reasons. Mammoth Cave is the best known and probably the largest of a remarkable group of limestone caverns, 20 or more of which have been opened up and explored to a greater or less extent. There is good evidence that many more caverns yet to be discovered exist in this immediate territory, and it seems likely that most, if not all, of this entire group of caverns eventually would be found to be connected by passageways forming a great underground labyrinth of remarkable geological and recreational interest, perhaps unparalleled elsewhere. The Mammoth Cave area is situated in one of the most rugged portions of the great Mississippi Valley and contains areas of apparently original forests, which, though comparatively small in extent, are of prime value from an ecological and scientific standpoint and should be preserved for all time in their virgin state for study and enjoyment. Much of the proposed area is now clothed in forest, through which flows the beautiful and navigable Green River and its branch, the Nolin River. All this offers exceptional opportunity for developing a great national recreation park of outstanding service in the very heart of our Nation's densest population and at a time when the need is increasingly urgent and most inadequately provided for.*[2]

The connection between the report of the Southern Appalachian National Park Commission, the purpose of the proposed park, and the legislation that established Mammoth Cave National Park is clear in the speech by Congressman Thatcher, when he said,

> *The bill now under consideration (H.R. 12020) is drafted in strict accordance with the recommendations of the aforesaid commission.*[3]
>
> *The area called for in the bill would insure a great recreational ground, most advantageously located, where, in spring, summer, and fall thousands of our people may find—in addition to the pleasure and interest derived from an inspection of the caves and their many features of interest—the most delightful outdoor recreation in boating and fishing on Green and Nolin Rivers, lovely, navigable streams flowing for miles through the proposed park, and in traversing the picturesque and rugged hills and valleys and great forests of the region included in the proposed park area.*[4]

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[1] 16 U.S.C. 404-404f.

[2] United States Department of the Interior, Final Report of the Southern Appalachian National park Commission to the Secretary of the Interior, June 30, 1931 (GPO: Washington D.C., 1931) 18.

[3] Mammoth Cave National Park, Speech of Hon. Maurice H. Thatcher in the House of Representatives, March 5, 1930 (GPO: Washington, D.C., 1930) 8.

[4] Speech of Hon. Maurice H. Thatcher, 11. The same language appears in the Senate, Committee on Public Lands and Surveys, Report No. 823, May 10, 1926, and the House of Representatives, Committee on the Public Lands, Report No. 1178, May 12, 1926.

MISSION STATEMENTS

The following mission statements were created as broad statements of the mission requirements established by Congress in the Acts that created the National Park Service and Mammoth Cave National Park.

National Park Service Mission

> The National Park Service preserves unimpaired the natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration, of this and future generations. The Service cooperates with partners to extend the benefits of natural and cultural resources conservation and outdoor recreation throughout this country and the world.[5]

Mammoth Cave National Park Mission

> The mission of Mammoth Cave National Park is to protect and preserve for the future the extensive limestone caverns and associated karst topography, scenic riverways, original forests, and other biological resources, evidence of past and contemporary lifeways; to provide for public education and enrichment through scientific study; and to provide for development and sustainable use of recreation resources and opportunities.[6]

MANAGEMENT OBJECTIVES IN THE GENERAL MANAGEMENT PLAN RELATED TO THIS PROJECT

> To minimize impacts on fragile natural resources by locating facilities in areas that are able to support such use without sustaining unacceptable environmental damage.

WILDERNESS STUDY AREAS

Approximately 39,200 acres of the park were designated as study areas during a wilderness study conducted in the early 1970s. Although none of the lands within the park were found suitable for wilderness designation, in the indefinite future some of the study areas may become suitable.[7] RM-53, Appendix 5, Exhibit 6, Page A5-45 contains the following requirements:

> "Except as specifically provided by law or policy, there will be no permanent road, structure or installation within any study, proposed, or designated wilderness area (see Wilderness Act, 16 U.S.C. § 1131). The NPS will not issue any new right-of-way permits or widen or lengthen any existing rights-of-way in designated or proposed wilderness areas. This includes the installation of utilities."

There is no proposed or designated wilderness within Mammoth Cave National Park. There are study areas with potential for wilderness designation in the future. The alternative sites

[5] United States Department of the Interior, National Park Service, GPRA on the GO: Government Performance and Results Act (GPRA) & Performance Management, Version 2.2, May 1998.
[6] Mammoth Cave National Park, Strategic Plan, 3.
[7] See Wilderness Recommendation: Mammoth Cave National Park, Kentucky. United States Department of the Interior, National Park Service. August 1974, page 1, which contains the following recommendation:

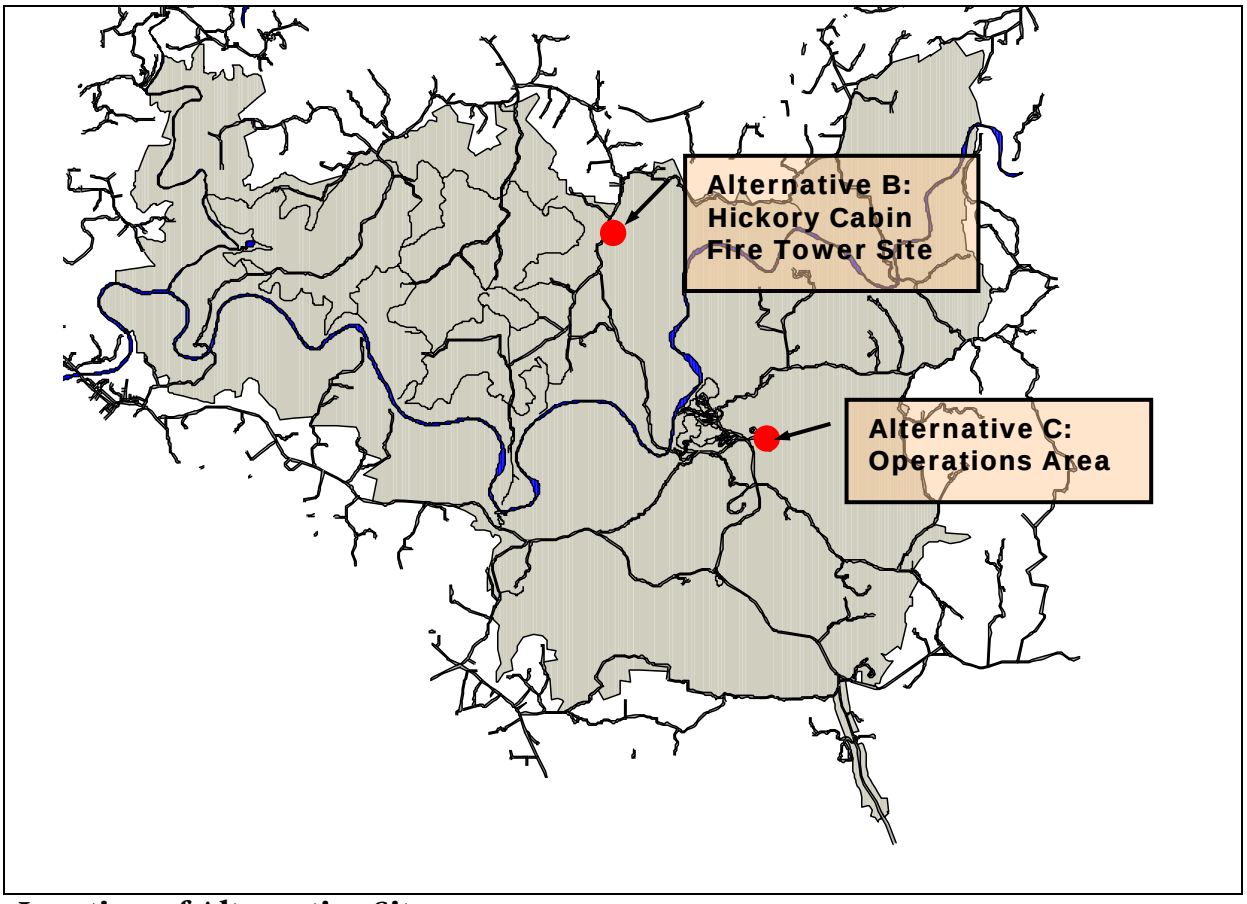
> "None of the lands in Mammoth Cave National Park are suitable at this time for wilderness designation and inclusion in the National Wilderness Preservation System because most of the area has been developed in the past and the imprint of man's work is still substantially noticeable."

considered in this EA are outside the designated study areas. A copy of the map from the 1970's Wilderness Study and Recommendation is attached in Attachment 2.

ALTERNATIVES

ALTERNATIVES CONSIDERED

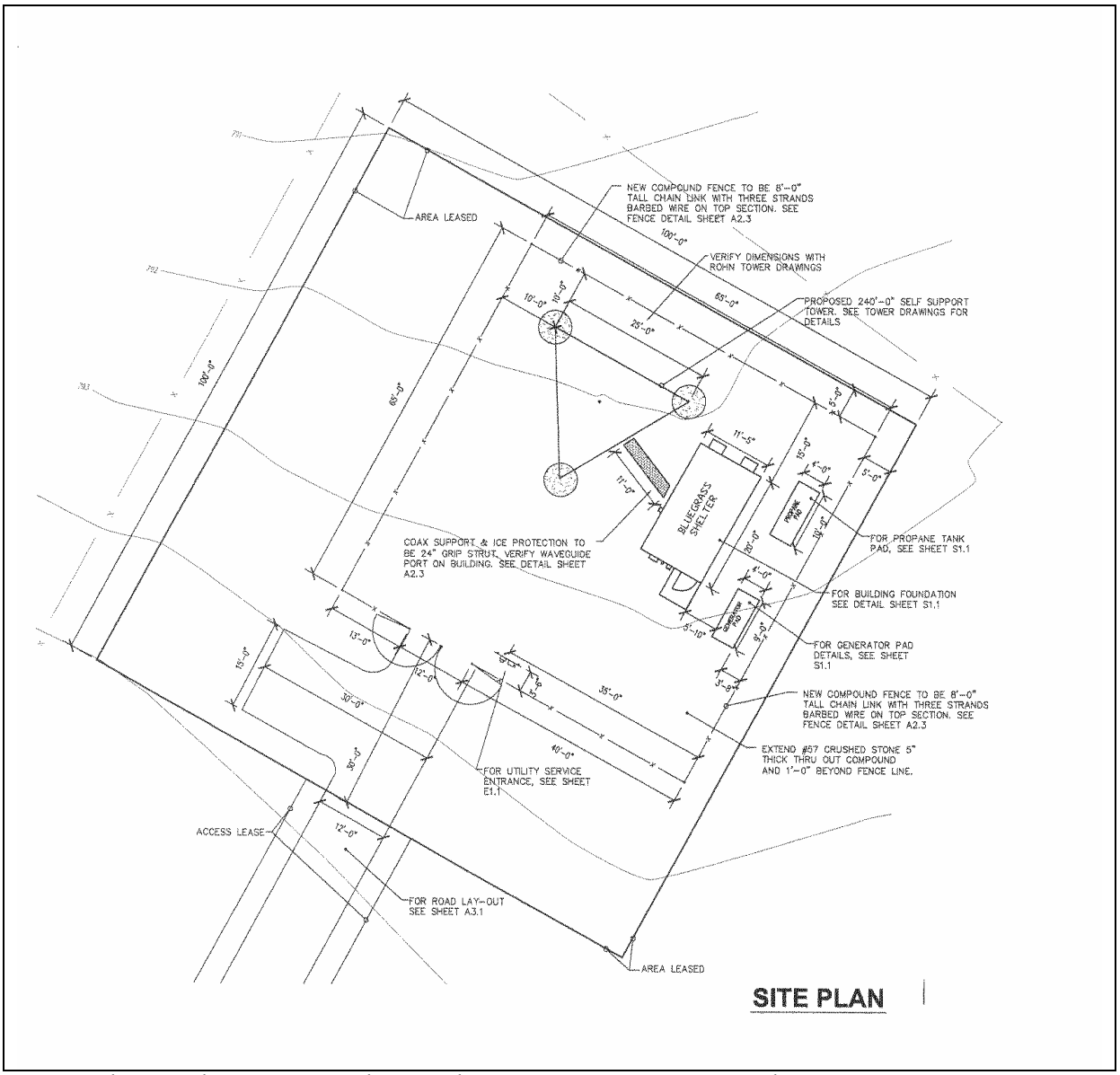
Alternative A: No Action
Alternative B: Construct WTF at Hickory Cabin Fire Tower Site
Alternative C: Construct WTF at Park Operations Area Site



Location of Alternative Sites

DESCRIPTION OF ALTERNATIVES

The alternative locations that can be considered are limited to those areas not included in the designated wilderness study areas. National Park Service policy forbids issuance of right-of-way permits in any wilderness study area (see RM-53, Appendix 5, Exhibit 6, Page A5-45). A similar level of construction would be involved at either of the sites chosen for this analysis. A typical site plan is shown below. The facilities to be constructed in the park would be expected to be similar, but not identical.



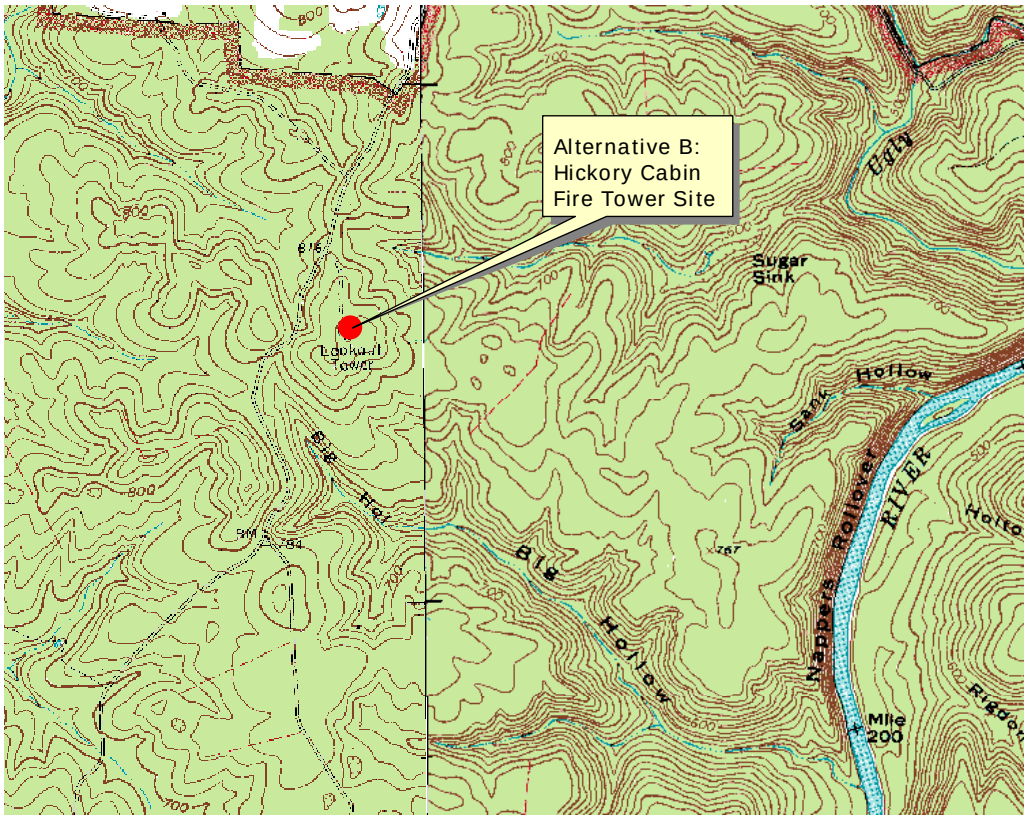
Typical Site Plan for Wireless Telecommunications Facility

ALTERNATIVE A: NO ACTION

The no action alternative would not permit any construction of wireless telecommunications facilities inside the park. This alternative would rely on wireless telecommunications providers to build facilities around the perimeter of the park. Some improvement of signal strength would occur in areas near the park boundary, but little, if any, improvement would be likely in the primary visitor use areas, which are located in the center of the park. A tower located along the ridge north of the park would be highly visible from roads that provide access to the park and would affect the visual quality of the rural communities in that area.

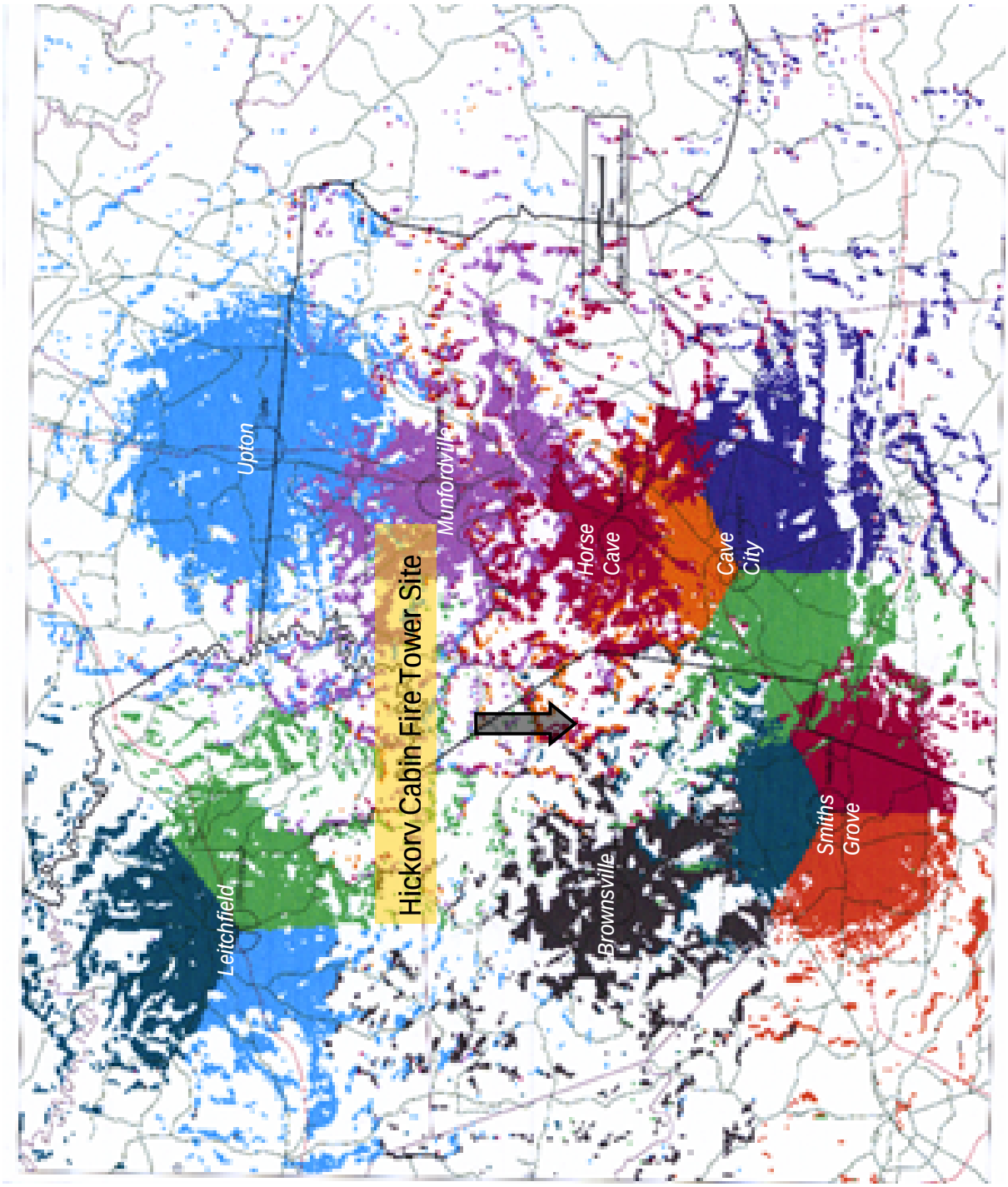
ALTERNATIVE B: CONSTRUCT WTF AT HICKORY CABIN FIRE TOWER SITE

Alternative B would construct and operate wireless telecommunications facilities at the site of the former Hickory Cabin Fire Tower. This site is one of the few suitable locations for wireless telecommunications facilities in the park. The Hickory Cabin Fire Tower site is previously disturbed. The fire tower, which was constructed in the 1930s, was removed in late 1980s. The area has been used as a maintenance storage area to stockpile gravel and other materials since the 1930s. There is road access to the site and telephone and electric utilities are available nearby in the Green River Ferry Road corridor. This site would provide service to the primary visitor use areas on the Mammoth Cave Ridge including the Visitor Center and Mammoth Cave Hotel as well as most of the backcountry trail system in the northwest quadrant of the park. The existing cleared area at the Hickory Cabin Fire Tower site will accommodate the footprint of the facility (65 feet square) without additional clearing. The portable building will be approximately 12 feet wide and 20 feet long.

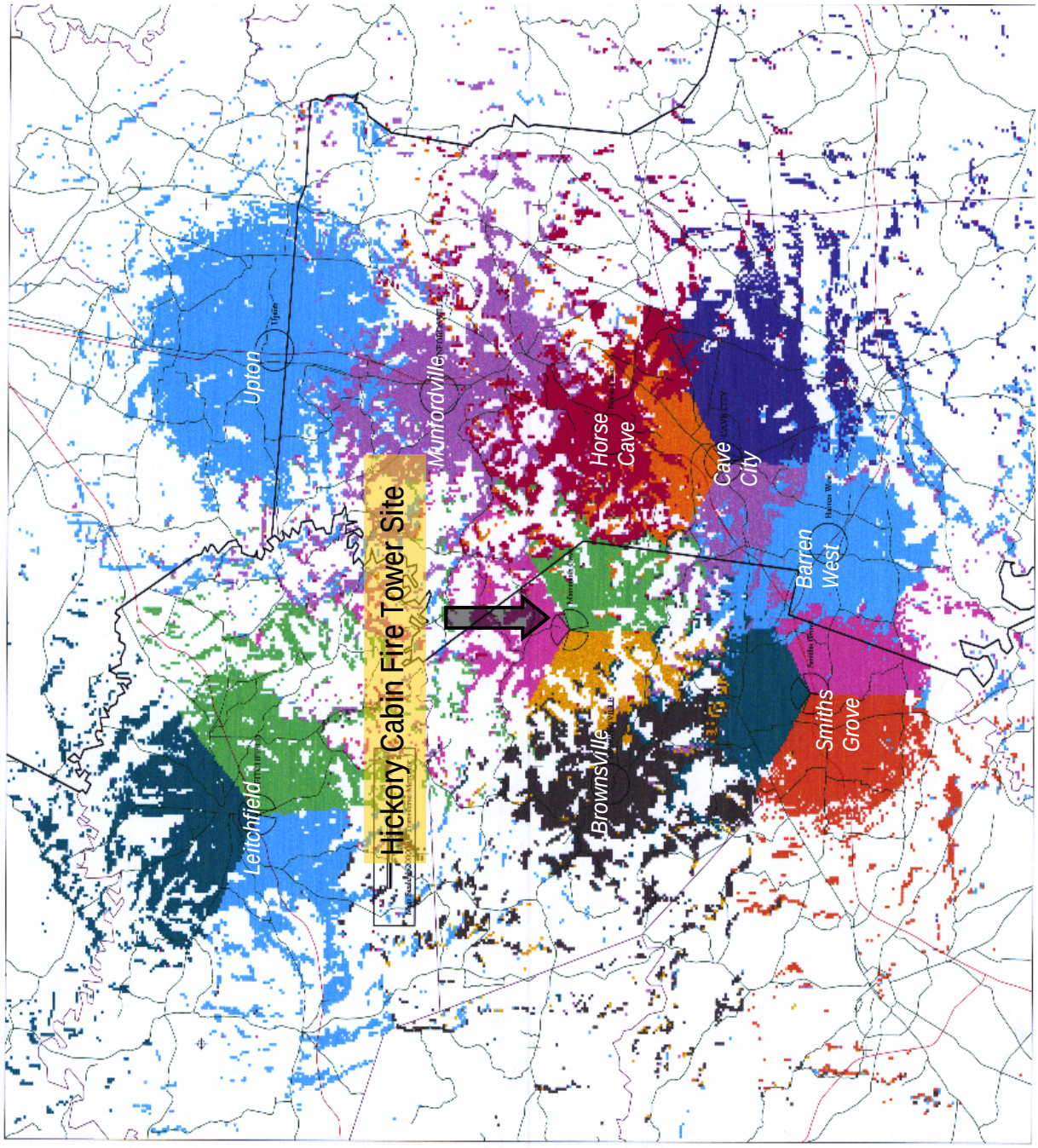


Location of Alternative B at the Hickory Cabin Fire Tower Site

The elevation at this site is approximately 860 feet above sea level. The top of a tower 180 feet tall would be at 1,040 feet in elevation. The underlying rock at this site is Caseyville sandstone conglomerate. Beneath the conglomerate are Glen Dean and Hardinsburg sandstone followed by layers of the Haney Limestone, Big Clifty Sandstone, Girkin Limestone, and St. Genevieve Limestone.



Service Provided by existing WTF facilities within 15 miles of Mammoth Cave National Park -- Reducing the drawings to page size makes the legends difficult to read. The shaded areas show the estimated coverage from each existing site.



Service with Addition of Hickory Cabin Fire Tower WTF Site -- The shaded areas show the estimated coverage from each existing site with the Hickory Cabin Fire Tower Site shown in the center.

Hickory Cabin Fire Tower Site

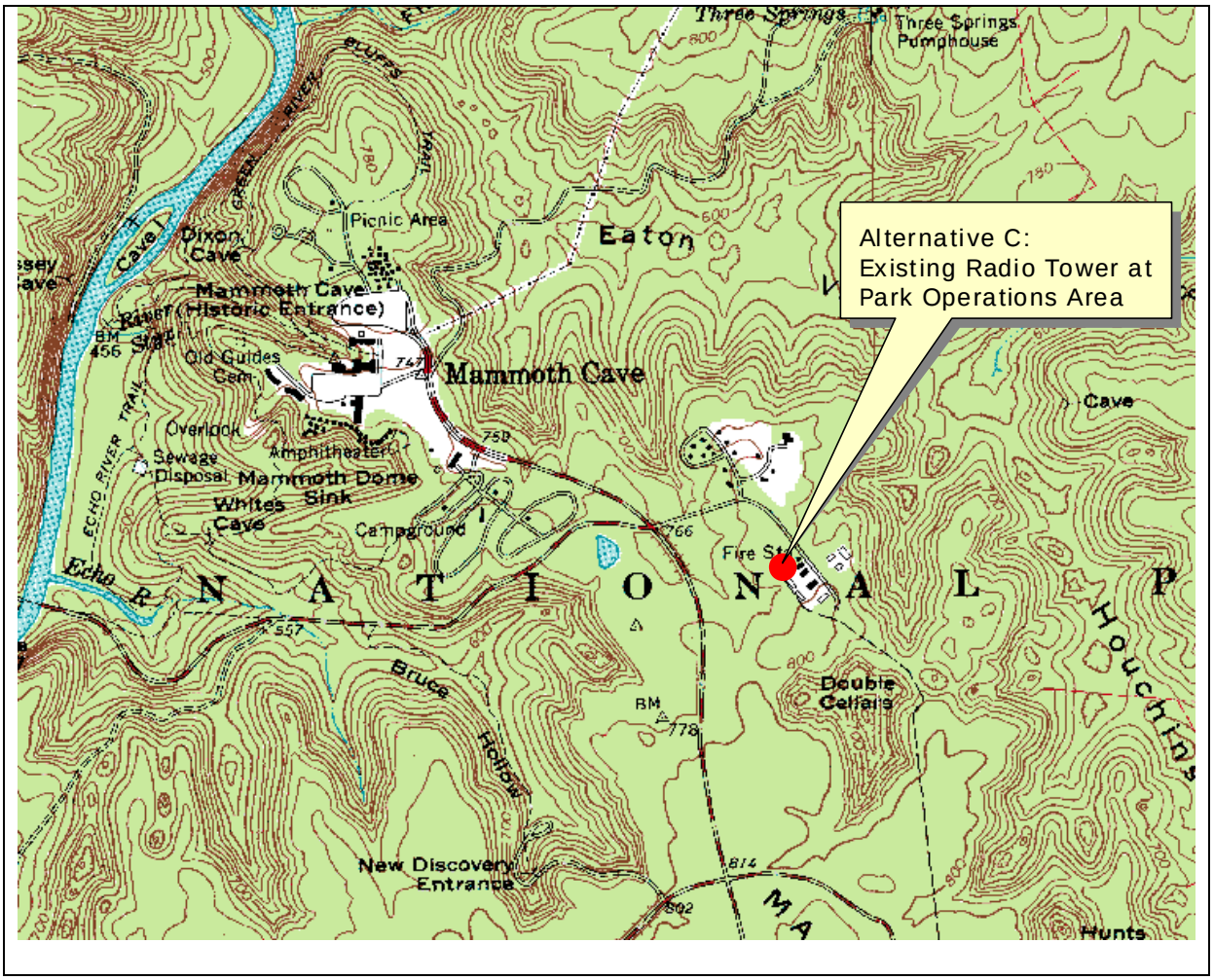
Existing Gravel Access Road to Hickory Cabin Fire Tower Site

ALTERNATIVE C: CONSTRUCT WTF IN PARK OPERATIONS AREA

Alternative C would construct and operate wireless telecommunication facilities at the park Operations Area. Facilities would be co-located with existing park radio tower and repeater. Ground level at the Operations Area is about 760 feet above sea level. Placement of the antenna on the existing tower could not be much above 120 feet above ground level or in the range of 880 to 900 feet above sea level. This alternative would provide adequate signal strength for the major visitor facilities in the Headquarters Area, but would provide very little improvement in the rest of the park, particularly on backcountry trails north of the Green River. A tower in the Operations Area that would reach the same elevation as the Hickory Cabin Fire Tower site would have to be 280 feet tall. A tower of this magnitude would require aircraft warning lighting and would be visible to visitors in the Headquarters area and from other vantage points south of the Green River.

Operations Area Site

Access to Operations Area Site



Location of Alternative C in the Park Operations Area

ALTERNATIVES AND ALTERNATIVE TECHNOLOGIES CONSIDERED AND REJECTED

Locations Outside the Park:

This alternative would rely on construction of wireless telecommunications facilities outside the park to provide service within the park. The telecommunication towers currently located around the park to the west, south, and east do not provide adequate signal strength in the park (see the service map on page 9). Locations generally north of the park would provide only limited service improvement in the park. Locations outside the park would not provide sufficient signal strength to provide reliable telephone service in the primary visitor use areas of the park. Any tower outside the park would be highly visible from roads approaching the park, and could affect historic properties. Telecommunication service providers may, independent of this proposal, construct additional facilities outside the park in the future; however, construction of at least one tower in the park would still be necessary. Locations outside the park also would not offer the same opportunities for co-location with the park radio system. Because locations outside the

park would not provide the needed improvement in communications within the park to provide for public safety and security this alternative was rejected.

Install Building Repeater(s):
This alternative would install small repeaters in buildings in the Headquarters Area to improve service in and around the buildings. This alternative was investigated by Bluegrass Cellular; however, the signal strength required for a repeater to function is not present. Propagation studies show that both the Hickory Cabin site and the Operations Area site would provide sufficient signal strength for cellular telephone use inside buildings in the Headquarters Area. This alternative would be a viable alternative to improve service inside buildings in situations with marginal service.

Wi-Fi™ Technology *[IEEE 802.11A/B/G].*
This technology is associated mainly with data transfer using wireless Local Area Network (LAN) systems. Wi-Fi Networks operate unlicensed 2.4 and 5 gigaHertz (GHz) radio bands with similar transfer rates as Ethernet systems. It is less expensive overall because there is no hardwired network. Costs are incurred for special adapters for each piece of equipment to communicate with the Wi-Fi networks.

Presently very few Wi-Fi systems are available to the public. Most systems are used within corporate offices and are only now expanding to airports, restaurants, and other public use areas. There have been security concerns with the technology. According to the Wi-Fi Alliance, security can be implemented with several different types of security protocols.

The wireless signals have limited range, can be diminished by structural features such as walls and metal, and have potential security issues, and is mainly for data transfer. Security issues have been fixed based on industry statements. Therefore, Wi-Fi technology is inappropriate for this project because of range, possible security issues, and the needs of service.

Earth Satellite Communication Systems

Satellite based communication provides wireless communication between earth base stations and satellites (geosynchronous or low earth) in earth orbit. Information is retransmitted from the earth base to the satellite, which is then retransmitted back to another earth base station.

This type of system has a limited number of uplink and downlink beams. Transmissions received or transmitted by the earth base stations need to be transmitted to commercial users such as wireless telecommunication facility customers by a ground network system or by direct reception by individual handheld receivers. The system is expensive due to the high costs of personal handsets, the extensive costs related to the ground network that is needed to support satellite communication systems and the costs of the satellite operation, manufacture and launching.

One concept being tested by NASA is the Advanced Communications Technology Satellite (ACTS). This is called "a switchboard in the sky" because of the large number of uplink and downlink beams and is "steerable" or moved from link locations in various locations. This concept uses one very expensive satellite or a constellation (20 to 250) of cheaper satellites to complete the assignments. Several companies have indicated their intent to complete such a

system, but these systems are still several years in the future. Therefore, this technology is not appropriate for this project due to limits of ground networks and costs of system infrastructure.

Personal Communication System-Over Cable (PCS-over-cable or PCS).

This technology has been operational since 1996 in several areas of the country most notably San Diego, California and Duluth, Minnesota. In these locations the phone service provider and the cable television provider joined together to offer "one stop shopping for their local customers." They would be able to provide cable TV, high-speed data communications and wireless telecommunications.

This system operates over the cable TV lines. PCS over cable is intended for a high-density population area with an extensive above ground cable system. The PCS units have limited range and would be limited even further by the dense tree cover in Mammoth Cave National Park.

There are no cable TV lines adjacent to the park. Because of the lack of television cable connection along park roads and the limitations created by dense forest cover, PCS-over-cable is not a feasible alternative for this project.

Software Defined Radio (SDR).

Using a simplified definition, SDR is a wireless communication that uses a computer to define transmitter modulation and the receiver uses a computer to recover the signals. It was initially demonstrated in a Department of Defense project in 1995.

Original estimates stated that this technology would not be generally available until 2010. The FCC issued a Notice of Inquiry requesting public comment on SDR in March 2000. In December 2000, the FCC issued a Notice of Proposed Rulemaking. Increased interest and research has allowed the estimated widespread implementation date to be moved up to approximately 2004 or 2005.

This technology is commonly referred to as 4G technology or 4^{th} generation technology. SDR has the capability to interoperate with any of the previous technologies of generations 1G (analog), 2G (digital), 2.5G (packet switching) or 3G (packet switching with even greater transfer speeds). Presently telecommunications systems in the United States are moving from 2G to 3G technologies.

The greatest asset of SDR is its versatility. Present wireless systems employ protocols that vary from one service to another and many vary from one country to another country. Using an all inclusive software repertoire, the SDR can be set in any mode by launching the required computer program. This will allow a single radio transceiver to be used in the role of cordless phone, wireless phone, wireless fax, wireless e-mail, pager, wireless videoconferencing, wireless web browser, a GPS unit and other future functions. Because this 4G technology is not generally available, it is not feasible for this project at this time.

IDENTIFICATION OF THE ENVIRONMENTALLY PREFERRED ALTERNATIVE

Identification of the "environmentally preferred alternative" is based on evaluation of the direct, indirect, and cumulative impacts on park resources. Cost is not a factor in the selection of the environmentally preferred alternative. The environmentally preferred alternative is the alternative

that best promotes the national environmental policy as expressed in the National Environmental Policy Act (NEPA) § 101 (b).[8] This includes alternatives that:

> fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.
>
> ensure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings.
>
> attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.
>
> preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.
>
> achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities.
>
> enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

The environmentally preferred alternative is the alternative that causes the least damage to the biological and physical environment, and the alternative that best protects, preserves, and enhances historic, cultural, and natural resources.

Alternative B uses a site that is within the park development zone. There was a fire tower on this site for about 50 years. The site currently is used as a materials storage area, has an existing road access, and required utilities are available nearby and can be placed within the existing access road corridor. The proposed cell tower can be installed without additional clearing. This site offers the greatest improvement in telephone service at a location that is away from the primary visitor use areas. Because of the dense forest cover a tower at this location would not be visible from the primary visitor use areas. Other locations would not provide the same improvement in telephone service, and would involve a greater degree of impacts on the environment. Alternative B is identified as the environmentally preferred alternative because it would provide greater benefits associated with improvement of telecommunications with negligible or minor environmental impacts.

[8] U.S. Department of the Interior, National Park Service. Director's Order #12, Handbook: Conservation Planning, Environmental Impact Analysis, and Decision Making (§2.7, D.). January 2001, 22.

AFFECTED ENVIRONMENT

THE PARK IN GENERAL

Mammoth Cave National Park is located in south central Kentucky, in the counties of Edmonson, Barren, and Hart. The park is within the Second Congressional District.

In establishing Mammoth Cave National Park, Congress relied heavily on the recommendations of the Southern Appalachian National Park Commission incorporating it into Senate Report No. 823 which in turn was referenced in the Act establishing the park. The Commission recommended that the park contain 28,578 hectares including the extensive limestone caverns and associated topography, portions of the Green and Nolin rivers, and a substantial segment of the rugged landscape north of Green River. The Commission stated that the area containing these features offered

> *"exceptional opportunity for developing a great national recreational park of outstanding service in the very heart of our nation's densest population and at a time when the need is increasingly urgent and most inadequately provided for."*[9]

Today the park encompasses 21,380 hectares acquired by a combination of donations and public and private funds. Mammoth Cave National Park contains the world's longest known cave system and offers internationally renowned examples of karst topography. Many types of cave formations are present within the extensive 360 plus mile cave system. The park is part of what is believed to be the most diverse cave ecosystem in the world. Of the more than 130 species of fauna within the cave system, fourteen species of troglobites are known to exist only within Mammoth Cave and other caves in the immediate vicinity. Many of these species have been isolated from other cave systems for over a million years, resulting in fragile and unique populations. One of these species is the federally endangered Kentucky Cave Shrimp *Palaemonias ganteri*. Water of the proper quality and quantity is essential to preserving life within the cave system.

In addition to the world renowned cave system, the park is noted for its outstanding scenic rivers, valleys, bluffs, forests, and abundant wildlife. The park includes twenty-five miles of the Green River and six miles of the Nolin River. The Green River supports a diverse freshwater mussel population including six federal endangered species in addition to its role as the master stream controlling the geologic development of Mammoth Cave and its unique ecosystem.

On October 27, 1981, Mammoth Cave National Park was listed by the United Nations Educational Scientific and Cultural Organization (UNESCO) as a World Heritage Site and on March 27, 1990 as an International Biosphere Reserve. In April 1996, the Mammoth Cave Area Biosphere Reserve was officially extended and now includes lands within Barren, Butler, Edmonson, Hart, Metcalfe, and Warren counties in Kentucky.

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[9] "Final Report of the Southern Appalachian National Park Commission to the Secretary of the Interior, June 30, 1931." United States Government Printing Office. 1931, page 18.

The Rivers

The Green River and its tributary Nolin River flow through the park. These base-level streams possess one of the most diverse fish (84 species) and invertebrate fauna (51 species of mussels alone) in North America. An unused navigation dam (Lock and Dam 6) just beyond the downstream park boundary interrupts normal flow of 16.5 miles of the Green River and all of the Nolin River within the park. Habitats for eight federally listed endangered species are seriously degraded through reduction of natural flow velocity and resultant siltation. The seven federally endangered mussel species are effectively excluded from the Lock and Dam 6 impoundment because the impounded waters do not meet their habitat requirements.

Fishes

Accepted literature, museum records, and a 1990 survey by Cicerello and Hannan indicate the Green River within Mammoth Cave National Park supports 84 fish species or two-thirds of the 121 documented species from the Upper Green River drainage (Burr and Warren 1986).

Federally Listed Endangered Species

The park is located in portions of Barren, Edmonson, and Hart Counties in Kentucky. The species considered in this document are identified by the U.S. Fish and Wildlife Service as known to occur within or with the potential to occur within Mammoth Cave National Park. Species contained in the list which have no known presence within the park are indicated by insertion of (NP) following the common name.

Listed Endangered Species

Indiana Bat	*Myotis sodalis*[10]
Gray Bat	*Myotis griescens*
Red-cockaded Woodpecker (NP)	*Picoides borealis*
Bachman's Warbler (NP)	*Vermivora bachmanii*
Kirtland's Warbler (NP)	*Dendroica kirtlandii*
Kentucky Cave Shrimp	*Palaemonias ganteri*[10]
Rough Pigtoe	*Pleurobema plenum*
Clubshell	*Pleurobema clava*
Ring Pink	*Obovaria retusa*
Fanshell	*Cyprogenia stegaria*
Pink Mucket (NP)	*Lampsilis abrupta*
Orange-Foot Pimpleback (NP)	*Plethobasus cooperianus*
Cumberlandian Combshell (NP)	*Epioblasma brevidens*
Northern Riffleshell	*Epioblasma torulosa biloba*
Tubercled Blossom (NP)	*Epioblasma torulosa torulosa*
Purple Cat's Paw	*Epioblasma obliquata obliquata*
Cracking Pearly Mussel	*Hemistena lata*

[10] Critical habitat has been established within the park for these species.

Hydrology

Mammoth Cave is by far the world's longest known cave system. It is the heart of the South-central Kentucky Karst, which is an integrated set of subterranean drainage basins covering more than 644 square kilometers. The surveyed extent of Mammoth Cave currently stands at over 580 kilometers with potential to exceed 1,610 kilometers. There are more than 200 other caves within the park which are disconnected fragments of the larger system or associated with local drainage features. The geology and geography of the area has resulted in a variety of karst basins, which have become the most thoroughly understood conduit-flow aquifers in the world.

The park is bisected east to west by the Green River, which defines the hydrologic base level and divides the region into two distinct physiographic areas. North of the river an alternating series of limestones and insoluble rocks are exposed with the main limestone strata accessible only near the river an in the bottom of a few deeply incised valleys. This has resulted in rugged topography with streams that alternately flow on insoluble rocks, over waterfalls, enter caves in limestone, and resurge at springs perched on the next lower stratum of insoluble rock. The caves are numerous but are relatively smaller with smaller drainage basins when compared to Mammoth Cave. South of the Green River the surface and subsurface is defined by the Mammoth Cave karst aquifer, a component of which is the Mammoth Cave System. The complex nature of the Mammoth Cave karst aquifer is demonstrated by the number of groundwater basins, sub-basins, and intricate groundwater flow routes throughout the region. By using data from groundwater traces, we are able to identify which groundwater recharge areas contribute flow into particular points of interest, wells, springs, and caves.

The Mammoth Cave karst aquifer owes the majority of its recharge to areas outside the park boundary. This recharge, in the form of precipitation or the injection of liquid wastes, enters the aquifer through numerous sinking streams and countless sinkholes. Any practices that may have an adverse impact to water quality within the recharge area of the park can directly affect the water quality of the park.

The Mammoth Cave karst aquifer exhibits convergent flow, much like the convergent flow patterns of a dendritic surface stream system. While other aquifers may possess diffuse flow, where contaminants slowly disperse, the convergent flow of the Mammoth Cave karst aquifer would channel recharge and pollutants toward a common trunk conduit or spring.

Flow through the Mammoth Cave karst aquifer can be very rapid, on the order of hundreds to thousands of cubic meters per day. Contaminants entering the karst aquifer can thus be rapidly transported unaltered through the conduit system. The karst aquifer is very dynamic, that is, it responds nearly instantaneously to rainfall. Aquifer stage can rise 10s of meters in a matter of hours (there are numerous records showing stage rises of over 30 meters over the course of one day). In addition, chemical and bacteriological properties of the groundwater can change dramatically following rainfall events. These stage rises can activate high-level overflow routes between groundwater basins and thus direct flow in different directions depending upon aquifer conditions.

Because large portions of the upper Green River watershed and the groundwater basins affecting Mammoth Cave National park lie outside park boundaries, activities conducted in these areas

greatly influence water quality within the park. The primary activities that influence the park's water quality include: disposal of domestic, municipal, and industrial sewage; solid waste disposal; agricultural and forestry management practices; oil and gas exploration and production, urban land-use; and recreational activities.

Since a 1990-92 water quality inventory was completed, several large scale land use changes occurred. The Caveland Environmental Authority regional sewer program was completed for the Cave City and Park City areas. Hundreds of homes, dozens of businesses, and several small sewage package systems are now connected to a state-of-the-art sewage collection, conveyance, and treatment facility. In the past, during the course of the water quality inventory, each of the above producers discharges sewage on-site via septic systems, dry wells, or sinkholes, and ultimately into Mammoth Cave National Park's karst watershed. Over the past five years the US Department of Agriculture (USDA) spent nearly $1,000,000 on Best Management Practices (BMPs) specifically designed to reduce animal waste runoff in the Mammoth Cave region. A total of 83 structures were built between 1990 and 1995. Additionally, the USDA spent hundreds of thousands of dollars on other BMPs designed to reduce soil erosion and pesticide use in the Mammoth Cave area. Thus, water quality is likely improving in sections of Green River in Mammoth Cave National Park.

Specific Areas Affected by the Proposal

This EA considers two alternative locations, i.e., the Hickory Cabin Fire Tower site and the Operations Area site.

Wetlands and Floodplains

There are no wetlands at either of the alternative sites. The sites are situated more than 300 feet in elevation above the floodplain of the Green River.

Vegetation

Vegetation at both sites is dense second growth forest. At the Hickory Cabin site, the predominant tree species is Virginia pine. The Operations Area site contains mixed hardwoods dominated by Oak, Hickory, and Black Gum trees. Impacts to vegetation were analyzed in terms of direct removal of vegetation.

Threatened and Endangered Species

Federally listed Indiana and Gray bats are likely present in caves near the alternative sites and would be expected to forage in the sites. The Indiana bat would also be expected to roost in trees in or near the alternative sites. Gray bats use caves for both their winter and summer roosts. Indiana bats establish their summer maternity colonies in trees and hibernate in caves in the winter.

Federally listed mussels are found in the Green River. At least six species of endangered mussels are known to be present in mussel beds within the park.

The Kentucky Cave Shrimp is known to be present in the caves underneath the Operations Area site. The Hickory Cabin Fire Tower site is located just east of a groundwater divide north of the

Green River. Surface drainage from this site generally would enter the Big Hollow drainage basin to the south and the Ugly Creek drainage to the north and east. However, the subsurface drainage is not well defined. Therefore, it is assumed that, at least in some conditions, groundwater from the headwaters of Big Hollow may overflow into cave streams in Running Branch Cave and Ganter Cave, which both have been documented to contain Kentucky Cave Shrimp.

Eggert's Sunflower (federally threatened) has not been found at either alternative site.

The Bald Eagle (federally threatened) is present in Mammoth Cave National Park at least seasonally, but is usually seen in or near the river valleys in the northwestern quadrant of the park and has not been seen at the alternative sites.

A federal candidate species, the Surprising Cave Beetle, is found in several caves within Mammoth Cave National Park. Neither of the alternative locations is near any of the known locations for the Surprising Cave Beetle.

Air Quality

Due to their relative proximity and regional influences, air quality is assumed to be the same at all alternative sites. Mammoth Cave National Park is a Class I area under the Clean Air Act. Based on data collected from 1991-1999, Mammoth Cave National Park ranks as the third most polluted National Park in the United States. The measures used in developing the ranking were visibility, ozone, and acid precipitation.[11] The park has recently initiated monitoring for mercury.

Soils/Geology

Soils at both alternative sites are disturbed by past agricultural uses and by the development of park facilities. A sandstone conglomerate of the Caseyville formation followed by Glen Dean and Hardinsburg sandstones, Haney limestone, Big Clifty sandstone, and Girkin and St. Genevieve limestone formations underlies the Hickory Cabin Fire Tower site. The Operations Area site is underlain with Big Clifty sandstone followed by Girkin and St. Genevieve limestone formations. The major caves in the park are located primarily in the Girkin and St. Genevieve formations. The Operations Area site is directly above portions of Mammoth Cave while there are no known caves underneath the Hickory Cabin Fire Tower site.

Water Quality and Hydrology

The Hickory Cabin Fire Tower site is located north of Green River. The surface drainage from this location generally would be into Ugly Creek and Big Hollow. Some of the runoff from the west side of the knob and access road enters the headwaters of the Dry Prong of Buffalo Creek. Surface drainage sinks quickly into the Haney limestones but is generally perched above the Big Clifty sandstone and appears along the ridge sides as springs which subsequently sink into the underlying Girkin and St. Genevieve limestones. The subsurface drainage would predominantly follow the surface water patterns except there is potential for overflow between the subsurface drainage basins during periods of increased flow resulting from heavy rainfall.

[11] Polluted Parks in Peril: The Five Most Air Polluted National Parks in the United States. Compiled by Harvard G. Ayers, Appalachian State University. Boone, North Carolina. October 2000, p. 1.

The Operations Area site is located within and near the downstream end of the Echo River groundwater basin. Surface drainage is perched above the Big Clifty Sandstone but quickly sinks into the underlying limestone when it reaches the ridge sides and enters cave streams in Mammoth Cave.

Fish & Wildlife Other than Threatened and Endangered Species

For all alternative sites the most commonly seen wildlife in the project area are deer, squirrels, common insects, and common bird species.

Migratory Birds

A number of migratory birds pass through the park seasonally. None of the federally threatened or endangered species of migratory birds is known to be present in or to migrate through the park or any of the alternative sites. The U.S. Fish and Wildlife Service (FWS) has determined that there is a growing problem of bird collisions with communications towers. FWS has convened the Communication Tower Working Group to conduct research to determine what it is about communication towers that attracts and results in the killing of migratory songbirds. In 2000, FWS issued voluntary guidelines to be used in tower siting decisions. The guidelines encourage co-location, heights of less than 200 feet above ground level, configurations that do not require guy wires and aviation warning lights, and other measures to reduce the potential effects on migratory birds.[12] The habitats found within Mammoth Cave National Park do not encourage concentrated use by migratory birds. Instead the use by migratory birds is dispersed. The alternative sites were evaluated by a park biologist who found that "the Hickory Cabin and Ranger Station Sites do not possess characteristics making them an obvious migratory or daily movement flyway for birds. In addition, the sites are not within or near a wetland or other known bird concentration area."[13]

Cultural Resources

Archeological surveys have been completed in the Operations Area related to other development actions and no archeological sites were identified. An archeological survey of the Hickory Cabin Fire Tower site was completed on February 23, 2004 by the University of Kentucky, Program for Archeological Research (UK-PAR). No cultural resources were found at the Hickory Cabin Fire Tower Site.

If a tower at one of the alternate sites is visible from a historic property and is found to diminish the integrity of that property, then there would be an adverse effect on the property [36 CFR 800 (a)(2)(v)]. The existing radio tower as well as the tower proposed in Alternative C would be visible from individual buildings in the Operations Area that are listed on the National Register. A tower as proposed in Alternative B would not be visible from historic properties in the park.

[12] Clark, Jamie Rappaport, Director, U.S. Fish and Wildlife Service. "Service Guidance on the Siting, Construction, Operation and Decommissioning of Communications Towers." Letter to Regional Directors. Online. Internet. http://migratorybirds.fws.gov/issues/towers/comtow.html

[13] Moore, Bill. Email, Subject: "Communication Tower/Bird Strike Site Evaluation." 26 March 2004.

The park is currently consulting with the SHPO to determine the area of potential effect and if there are properties outside the park that might be affected.

Visitor Use

Both alternative sites are within park development zones and are used in support of park operations. Neither site serves as a visitor use area. Mammoth Cave National Park receives about two million visitors annually based on traffic counts, and 400,000 people annually participate in cave tours. The Operations Area site is adjacent to the primary visitor use area of the park and is located about ¼ mile from the Headquarters Campground (111 campsites) and ¾ miles from the Visitor Center and Hotel. Ten miles of developed surface trails are present south of the Green River. There are about 65 miles of backcountry trails and 13 backcountry campsites north of Green River. Park visitation is heavier in the Spring Break, Summer, and Fall Color seasons and lighter in the Winter. Use of the surface trails is highest in the spring and fall seasons. Recreational use (fishing, boating, canoeing, and camping) on the Green and Nolin Rivers in the park is heaviest in the Summer. Forever Resorts LLC operates the Mammoth Cave Hotel and associated facilities under a concession contract. The Miss Green River boat tours on the Green River are also operated under a concession contract. Two canoe liveries operate in the park under Incidental Business Permits. Double J stables is located adjacent to the park and operates guided rides in the park under an Incidental Business Permit.

Land Use

Both alternative sites are located within the park development zone. Use of either site would not require changes in land use zones. Both sites are located outside the defined Wilderness Study Areas.

Transportation

The Green River Ferry Road is an important access road for people traveling north and south through the park, for access to outdoor recreation north of the Green River, and for park operations. Although important to the park and to local residents and commuters, it does not serve as a primary transportation corridor between major population centers.

Social and Economic

Mammoth Cave National Park has been a major tourist attraction in Kentucky for over 190 years. The park generates a significant contribution to the economy of gateway communities, and is important on a statewide level. Accomplishment of the park mission is an important social and economic factor within the region.

Energy Requirements & Conservation

Commercial power is available at both alternative sites. A propane fuel generator would be provided for back-up power at either site.

Public Safety

Public safety is affected by the lack of telephone service in most of the park.

Public Health

There are no public health concerns associated with this project.

Indian Trust Resources

There is no information about Indian Trust Resources among the alternative sites.

ENVIRONMENTAL CONSEQUENCES

Following is a table that summarizes the probable impacts of the alternatives related to the relevant resources or resource values that may be affected by the proposed project. The need for mitigating actions, if any, is identified for each resource value. Following the table is a narrative discussion of the effects of the proposal related to each resource or resource value.

Impacts or potential impacts have at least three important attributes: context (i.e., location in space and time), duration, and intensity or severity. In the following discussion, the terms impact, effect, and environmental consequences are used interchangeably. Impacts are direct, indirect, and/or cumulative. Impacts can be adverse or beneficial. The duration of impacts is defined as temporary (less than two years), short-term (two to five years), long-term (five to twenty years), and permanent (more than twenty years). The intensity of impacts is described using the following threshold terms: negligible, minor, moderate, major, impairment. The following descriptions of the thresholds are for natural resource issues. Analogous relative threshold factors are employed for the other issues. Negligible impacts are so minute that they have no observable effect, and parameter measurements are well within the natural range of variability. Minor impacts are detectable, parameter measurements are within the natural range of variability, but are not expected to have any long-term effects. Moderate impacts are detectable, parameter measurements are outside the natural range of variability for short periods, and changes may be long-term. Major impacts are detectable, parameter measurements are outside the natural range of variability for short to long periods, and changes may be long-term to permanent. Impairment occurs when major impacts result in significant and usually permanent effects on park resources or values as defined in Section 1.4 of the National Park Service Management Policies 2001 (December 2000, p. 11-13).

IMPACT SUMMARY TABLE:

RESOURCE OR IMPACT CATEGORY	**ALTERNATIVE A**	**ALTERNATIVE B**	**ALTERNATIVE C**
	No Action	Construct WTF at Hickory Cabin Fire Tower Site	Construct WTF in Park Operations Area
WETLANDS AND FLOODPLAINS– Impacts would occur if wetlands are dredged or filled. There are no wet lands or floodplains that would be affected at any of the alternative sites.			
Description of Attributes	No wetlands or floodplains	No wetlands or floodplains	No wetlands or floodplains
Type of Effect	No Effect	No Effect	No Effect
Severity	No Effect	No Effect	No Effect
Duration	No Effect	No Effect	No Effect
Mitigating Actions Needed: None.			

RESOURCE OR IMPACT CATEGORY	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
	No Action	Construct WTF at Hickory Cabin Fire Tower Site	Construct WTF in Park Operations Area
VEGETATION – The vegetation at each alternative site is part of a non-historic managed landscape. Tree removal is expected to be limited at either site. Impacts are analyzed in terms of direct removal of trees.			
Description of Attributes	No WTF	180 foot tower	270-300 foot tower
Type of Effect	No clearing	Direct – Clearing not required	Direct – removal of 10-15 trees
Severity	No Effect	Negligible	Negligible
Duration	No Effect	Short Term	Short Term
Mitigating Actions Needed: Tree removal, if any should conform to the requirements contained in the park "Hazard Tree Management Plan," approved June 20, 2000. The plan specifies actions necessary to avoid unintentional or incidental taking of Indiana bats, i.e., when possible trees that may provide roosting habitat for Indiana bats would be removed while the bats are hibernating in caves (November 15 to April 1) or following examination by a park biologist to ensure that bats are not roosting in the trees to be removed.			

THREATENED AND ENDANGERED SPECIES – Indiana and Gray bats likely forage in the project area and Indiana bats may roost in trees in the project area. The Bald Eagle is seldom seen in the project area. The project alternative sites are in or near groundwater basins that contain the Kentucky Cave Shrimp. Eggert's Sunflower is not present at the alternative sites, and the sites are at least ½ mile from known locations of the Surprising Cave Beetle. Impacts from noise and the presence of a structure were analyzed related to bats. Unmitigated runoff could affect the Cave Shrimp.			
Description of Attributes	No Effect	Construction noise and runoff and 180 foot tower	Construction noise and runoff and 270-300 foot tower
Type of Effect	No Effect	Direct and Indirect	Direct and Indirect
Severity	No Effect	Negligible	Negligible
Duration	No Effect	Temporary	Temporary
Mitigating Actions Needed: All tree removal activities should conform to the park "Hazard Tree Management Plan" (approved June 20, 2000). Ensure adequate erosion control plan is in place and followed.			

RESOURCE OR IMPACT CATEGORY	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
	No Action	Construct WTF at Hickory Cabin Fire Tower Site	Construct WTF in Park Operations Area
AIR QUALITY – Some amount of dust and particulates would be produced by construction during dry weather.			
Description of Attributes	No Dust or particles from construction	Dust and fine particulates from construction	Dust and fine particulates from construction
Type of Effect	No Effect	Indirect	Indirect
Severity	No Effect	Negligible	Negligible
Duration	No Effect	Temporary	Temporary
Mitigating Actions Needed: Dust should be controlled by wetting the surface if it becomes an issue during construction.			

SOILS / GEOLOGY – The primary issues are ground disturbance and erosion prevention during construction. The effect of any ground disturbance is likely permanent. The site would be graded and leveled. The amount of grading varies between the sites.			
Description of Attributes	No Dust or particles from construction	Grading and leveling of site Rock excavation for foundations	Grading and leveling of site Rock excavation for foundations
Type of Effect	No Effect	Direct	Direct
Severity	No Effect	Negligible	Negligible
Duration	No Effect	Permanent	Permanent
Mitigating Actions Needed: Adequate erosion control during construction activities would include silt fencing and check dams.			

WATER QUALITY AND HYDROLOGY – Stormwater runoff during construction could, if not mitigated, result in erosion and sedimentation.			
Description of Attributes	No construction	Erosion and downstream sedimentation	Erosion and downstream sedimentation
Type of Effect	No Effect	Direct and Indirect	Direct and Indirect
Severity	No Effect	Negligible	Negligible
Duration	No Effect	Temporary	Temporary

RESOURCE OR IMPACT CATEGORY	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
	No Action	Construct WTF at Hickory Cabin Fire Tower Site	Construct WTF in Park Operations Area
Mitigating Actions Needed: Control stormwater runoff during construction to prevent erosion and downstream sedimentation.			

FISH & WILDLIFE (other than threatened or endangered species) – Effects are primarily from noise and other disturbances during the period of construction. The impact of disturbance is expected to be minimal except during installation, which would be a relatively short period.			
Description of Attributes	No construction	Noise and disturbance	Noise and disturbance
Type of Effect	No Effect	Direct and Indirect	Direct and Indirect
Severity	No Effect	Negligible	Negligible
Duration	No Effect	Temporary	Temporary
Mitigating Actions Needed: None			

MIGRATORY BIRDS – Effects include potential for attracting migratory birds which could result in killing some birds. FWS has issued interim guidelines seeking voluntary compliance to keep towers under 200 feet in height with no aviation lights and no guy wires. There would also be noise and disturbance during construction. Threatened or endangered migratory bird species are not known to be present or to migrate through the alternative sites.			
Description of Attributes	No construction	Construction noise and disturbance Tower height 180 feet, no guy wires, aviation lights not required	Construction noise and disturbance. Tower height 280 feet, no guy wires, aviation lights are required
Type of Effect	No Effect	Direct and Indirect	Direct and Indirect
Severity	No Effect	Negligible	Minor
Duration	No Effect	Long-term to Permanent	Long-term to Permanent
Mitigating Actions Needed: Insure that FWS interim siting guidelines are followed.			

RESOURCE OR IMPACT CATEGORY	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
	No Action	Construct WTF at Hickory Cabin Fire Tower Site	Construct WTF in Park Operations Area
CULTURAL RESOURCES – Both alternative sites are previously disturbed. Surveys by Archeologists found no cultural materials at either site. Historic properties or districts would be affected if a tower is visible from that property or district.			
Description of Attributes	No Construction—Potential for tower to be constructed near the park in location where it would be highly visible	No archeological resources present – not visible historic properties in the park – efforts in concert with SHPO underway to determine if there are properties outside the park in area of potential effect	No archeological resources present – visible from historic properties in Operations Area
Type of Effect	Indirect--Possible Visual Intrusion	Indirect--Possible Visual Intrusion	Indirect--Visual Intrusion
Severity	None--Minor	None--Negligible	Indirect--Minor
Duration	Permanent	Permanent	Permanent
Mitigating Actions Needed: None unless need is determined during 106 process.			

VISITOR USE – Construction work would not be visible to visitors but tower would or would not be visible depending on location.			
Description of Attributes	No Construction No facility in park (Tower outside park would be visible on roads approaching park.)	Tower would not be visible from visitor use areas within the park	Tower would be visible in primary visitor use areas
Type of Effect	No effect	Direct and Indirect	Direct and Indirect
Severity	No construction effects	Negligible	Minor
Duration	No construction effects	Permanent	Permanent
Mitigating Actions Needed: None			

RESOURCE OR IMPACT CATEGORY	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
	No Action	Construct WTF at Hickory Cabin Fire Tower Site	Construct WTF in Park Operations Area
LAND USE – The proposal would not require any changes in land use or land use designations.			
Description of Attributes	No facility	Facility located in Development zone – not in Natural Zone or Wilderness Study Area	Facility located in Development zone – not in Natural Zone or Wilderness Study Area
Type of Effect	No Effect	No Effect	No Effect
Severity	No Effect	No Effect	No Effect
Duration	No Effect	No Effect	No Effect
Mitigating Actions Needed: None. No changes in land use designation are required or needed.			

TRANSPORTATION – Moving equipment and supplies may require traffic control for safety. The roads used are not primary transportation corridors between major population centers.			
Description of Attributes	No construction traffic	Traffic control for safe entry and exit of vehicles and equipment from site	Traffic control for safe entry and exit of vehicles and equipment from site
Type of Effect	No Effect	Indirect	Indirect
Severity	No Effect	Negligible	Negligible
Duration	No Effect	Temporary	Temporary
Mitigating Actions Needed: Insure the contractor performs as specified to maintain traffic flow.			

SOCIAL AND ECONOMIC – The primary effects would be the improvement in telephone communications and the funds paid to contractors for work to construct the WTF. There would be an increase in air time used by consumers and, as a result, an increase in revenue to cellular telephone service providers.			
Description of Attributes	No Construction	Greater improvement in signal strength and construction dollars effect on economy	Less improvement in signal strength and construction dollars effect on economy
Type of Effect	No Effect	Indirect	Indirect
Severity	No Effect	Minor Benefit	Negligible Benefit
Duration	No Effect	Permanent	Permanent
Mitigating Actions Needed: None			

RESOURCE OR IMPACT CATEGORY	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
	No Action	Construct WTF at Hickory Cabin Fire Tower Site	Construct WTF in Park Operations Area

PUBLIC HEALTH – There are no public health concerns associated with this project. Analysis conducted by Richard A. Tell Associates, Inc. indicates there is no hazard to the public from radio frequency fields that could be generated by operation of the proposed facilities.			
Description of Attributes	No Effect	No Effect	No Effect
Type of Effect	No Effect	No Effect	No Effect
Severity	No Effect	No Effect	No Effect
Duration	No Effect	No Effect	No Effect
Mitigating Actions Needed: None			

PUBLIC SAFETY – Security and safety measures would be included at each of the alternative sites. The improved telephone communications would benefit the public and park staff. In the future, enhanced 911 service would provide the ability to locate lost or injured backcountry users who have cell phones.			
Description of Attributes	No Effect	Improved signal strength in all major visitor use areas	Improved signal strength in some major visitor use areas
Type of Effect	No Effect	Direct & Indirect	Direct & Indirect
Severity	No Effect	Minor	Minor
Duration	No Effect	Long-term to Permanent	Long-term to Permanent
Mitigating Actions Needed: None			

INDIAN TRUST RESOURCES - There are no Indian Trust Resources in the park, and the park retains no records or other information of Indian Trust resources.			
Description of Attributes	Not Applicable	Not Applicable	Not Applicable
Type of Effect	Not Applicable	Not Applicable	Not Applicable
Severity	Not Applicable	Not Applicable	Not Applicable
Duration	Not Applicable	Not Applicable	Not Applicable
Mitigating Actions Needed: None			

RESOURCE OR IMPACT CATEGORY	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
	No Action	Construct WTF at Hickory Cabin Fire Tower Site	Construct WTF in Park Operations Area
RISK OF UNANTICIPATED CONSEQUENCES – Because both the alternative sites have been previously disturbed and there is existing access to both sites, the risk of unanticipated environmental effects is minimal.			
Description of Attributes	No construction in park— Increased probability of WTF near north park boundary	Construct WTF	Construct WTF
Type of Effect	Indirect/cumulative	Indirect	Indirect
Severity	Minor risk	Negligible risk	Negligible risk
Duration	Long-term	Temporary	Temporary
Mitigating Actions Needed: None			

CUMULATIVE IMPACTS – Cumulative impacts include other actions governmental and private that can reasonably be predicted to occur as a result of implementation of each alternative. The most likely cumulative impact would be that other telecommunications companies would request permits to locate WTF inside the park. Because of existing zoning and designation of wilderness study areas, co-location is the more likely outcome, and there is little potential for this to involve additional locations in the park. Selection of the no action alternative could result in construction Wireless Telecommunication Facilities immediately north of the park. WTF in the area immediately north of the park would be highly visible from the roads approaching the park and would affect the visual quality of that area.			
Description of Attributes	Possible construction of WTF north of park	More requests to locate WTF in the park	More requests to locate WTF in the park
Type of Effect	Possible direct/indirect/cumulative	Indirect	Indirect
Severity	Minor	Minor	Minor
Duration	Permanent	Permanent	Permanent
Mitigating Actions Needed: None			

ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

The following discussion summarizes the likely effects of the alternatives for each resource or resource value evaluated in this environmental assessment. Cumulative effects and impairment are also discussed for each resource category.

Cumulative effects are the additional actions by any entity that can reasonably be predicted to occur as a result of the proposed action. Cumulative impact is defined by the Council on Environmental Quality regulations in 40 C.F.R. Section 1508.7 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. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

The meaning of impairment is spelled out in the National Park Service (National Park Service) Organic Act of 1916 (16 USC 1); the National Park Service General Authorities Act of 1970, including amendments in 1978 (16 USC 1a-1); and the National Park Service Management Policies 2001 (Section 1.4). Impairment means impact(s)

> "that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. Whether an impact meets this definition depends on the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts."[14]

The effects of both action alternatives on most resources or resource values are similar, if not identical, because each alternative requires a comparable level of construction on the similar sites. In the following discussion of the environmental consequences, they are referred to collectively as the proposal. In cases where there is a discernable difference in the effects of the action alternatives, they are identified separately.

WETLANDS AND FLOODPLAINS

There are no wet lands that would be affected at any of the alternative sites. Each alternative site is more than 300 feet in elevation above the Green River floodplain. The proposal would not affect wetlands or floodplains.

No Action. The no action alternative would not affect wetlands or floodplains.

Impairment. The proposal would not impair wetlands or floodplains. The no action alternative would not impair wetlands or floodplains.

Cumulative Effects. There are no measurable cumulative effects on wetlands or floodplains.

[14] National Park Service Management Policies 2001, Section 1.4.5. December 2000, p. 12.

VEGETATION

Vegetation at both alternative sites is second growth. At the Hickory Cabin Fire Tower site a major component is planted Virginia pines. At the Operations Area site the dominant trees are oak, hickory, and black gum. Tree removal would not be required at the Hickory Cabin Fire Tower site. At the Operations Area site, at least 10-15 trees greater than 6 inches in diameter would have to be removed to provide adequate cleared area. Trenching for utilities would result in severed tree roots and removal of underbrush. The impact on vegetation would be negligible and short-term.

No Action. The no action alternative would not effect vegetation.

Impairment. The proposal would not impair vegetation or natural processes. The no action alternative would not impair vegetation.

Cumulative Effects. There are no measurable cumulative effects on vegetation because of the proposal.

THREATENED AND ENDANGERED SPECIES

Indiana and Gray bats (endangered) are likely to forage in the project area, and Indiana bats may roost in trees in or near the alternative sites from April 1 through November 15 annually. The primary effect from construction and operation of the facility would be noise. It is anticipated that few trees would be removed. Removal of trees would be performed under the guidelines in the park Hazard Tree and Vegetation Management Plan which was developed in consultation with the U.S. Fish and Wildlife Service and specifies conditions for removal of trees to prevent the inadvertent taking of Indiana bats.[15] The proposal is not likely to adversely affect Indiana or Gray bats.

The Bald Eagle (threatened) has a transient presence in all alternative sites, but is seldom seen. No effects are expected related to the Bald Eagle.

The Operations Area site is within the Echo River groundwater basin that contains the Kentucky Cave Shrimp (endangered). The Hickory Cabin Fire Tower site is on the north side of the river and near a divide between two groundwater basins. The potential effects are related to runoff from the sites during construction. Adequate controls are needed to prevent erosion and sedimentation as well as to capture any spills of hazardous materials. It is expected that standard erosion control methods would be installed early in the construction period, which would further reduce the chances of sediments or hazardous materials entering the groundwater from the site. Stormwater runoff from the sites is not likely to enter cave streams directly because both locations are ridge top sites. No adverse effects are expected related to the Kentucky Cave Shrimp.

[15] See Mammoth Cave National Park Standard Operating Procedures Handbook, Section H. Chapter 1. See also Mammoth Cave National Park Impact Assessment file IA-0003, "Revise Hazard Tree and Vegetation Management Plan."

Both alternative sites are more than a half mile away from the Green River, which provides habitat for endangered mussels. As noted earlier, some of the species may no longer be present. The proposal is not likely to have adverse effects on endangered mussel species.

The Surprising Cave Beetle (candidate for federal endangered status) is located in caves which are more than one mile from either of the alternative sites. The proposal is not likely to affect the Surprising Cave Beetle.

Informal consultation with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act will be completed before a final decision is made. The draft environmental assessment will be used as the basis for consultation rather than a separate biological assessment.

In summary, the proposal is not likely to adversely affect other threatened and endangered species.

No Action. The no action proposal would not affect threatened and endangered species.

Impairment. The proposal would not impair threatened and endangered species. The no action alternative would not impair threatened and endangered species.

Cumulative Effects. The proposal is not expected to produce any measurable cumulative effects related to threatened and endangered species.

Air Quality

The primary effects would be dust and fine particulates produced by construction activities in dry weather. Controls are required to prevent production of excessive amounts of dust. Water would be used to wet the surface to prevent dust. The effects are expected to be negligible and temporary.

No Action. The no action alternative would have no effect on air quality.

Impairment. The proposal would not impair air quality. The no action alternative would not impair air quality.

Cumulative Effects. There are no measurable cumulative effects on air quality because of the proposal.

Soils and Geology

The primary issues are ground disturbance and erosion prevention during construction. Appropriate erosion and sedimentation control measures would be in place at all times. The soils at each of the alternative locations have been previously disturbed by agricultural and construction activities. Some rock excavation is anticipated for the tower foundations. Rock excavation would be accomplished using impact tools. Blasting would not be permitted. The effects on geology and soils are negligible but permanent.

No Action. The no action alternative would not affect soils and geology.

Impairment. The proposal would not impair soils and geology. The no action alternative would not impair soils and geology.

Cumulative Effects. There are no measurable cumulative effects on soils and geology.

WATER QUALITY AND HYDROLOGY

Stormwater runoff during construction, if not properly mitigated with silt fencing or other erosion control devices, could result in erosion and sedimentation. Silt fencing and check dams will be utilized to prevent erosion and sedimentation. The effects are expected to be temporary and negligible.

No Action. The no action alternative would not affect water quality and hydrology.

Impairment. The proposal would not impair water quality and hydrology. The no action alternative would not impair water quality and hydrology.

Cumulative Effects. There would be no cumulative effects related to water quality and hydrology.

FISH AND WILDLIFE (OTHER THAN THREATENED OR ENDANGERED SPECIES)

The effects are similar to the effects on threatened or endangered species. However, abundant species would be present near the construction areas and would be exposed to the construction disturbance, i.e., noise and presence of people and equipment. The effects are expected to be negligible and temporary.

No Action. The no action alternative would not affect fish and wildlife.

Impairment. The proposal would not impair fish and wildlife. The no action alternative would not impair fish and wildlife.

Cumulative Effects. There would be no measurable cumulative effects on fish and wildlife.

MIGRATORY BIRDS

In 2000, the U.S. Fish and Wildlife Service issued voluntary guidelines to be used in tower siting decisions. The guidelines encourage co-location, heights of less than 200 feet above ground level, configurations that do not require guy wires and aviation warning lights, and other measures to reduce the potential effects on migratory birds. The effects of construction on migratory birds are primarily noise and other physical disturbance during the period of construction. No threatened and endangered migratory bird species are known to be present or to migrate through the sites. Construction is expected to produce temporary negligible effects on migratory birds. Alternative B would construct a tower 180 feet in height above ground level and would conform to the FWS guidelines. The effects from Alternative B on migrating birds would be negligible but long-term to permanent. Alternative C would construct a tower approximately 280 feet in height above ground level and would therefore require aviation warning lights which would be more likely to attract night migrating birds. Even though the FWS interim guidelines allow lights on towers of this height, Alternative C would be more likely to result in a higher frequency of bird strikes. The effects from Alternative C would be minor but long-term to permanent.

No Action. The no action alternative would not affect migratory birds.

Impairment. The proposal would not impair migratory birds. The no action alternative would not impair migratory birds.

Cumulative Effects. There would be no measurable cumulative effects on migratory birds.

CULTURAL RESOURCES

An archeological survey of the Hickory Cabin Fire Tower area was completed on February 23, 2004 by the University of Kentucky Program for Archeological Research. No cultural resources were found. The Operations Area site has been examined by archeologists in conjunction with other previous construction actions, and there are no cultural resources in that area. Based on the comprehensive Programmatic Agreement between Mammoth Cave National Park, the State Historic Preservation Officer (SHPO), and the Advisory Council, 106 consultation is not required for sites within the park. However, the park will consult with the SHPO and any consulting parties concerning any historic properties outside the park that potentially could be affected if the proposed tower is visible from those properties. A final decision about the proposal will not be made until that consultation is completed.

No Action. The no action alternative would have no effect on cultural resources.

Impairment. The proposal would not impair cultural resources. The no action alternative would not impair cultural resources.

Cumulative Effects. There would be no measurable cumulative effects on cultural resources.

VISITOR USE

Neither of the alternative sites serves as a visitor use area. The tower proposed for the Hickory Cabin Fire Tower site would not be visible to visitors from within the park, and would have no effect on visitor experience. The Hickory Cabin Fire Tower site is several miles from the Visitor Center and other primary visitor use areas. The dense forest cover limits visibility. At a height of 180 feet, the tower would not have aircraft warning lights. The tower at the Operations Area site would be visible to most park visitors from the Visitor Center, Hotel, and HQ Campground. Because of its greater height, 270-300 feet, it would be required to have warning lights. The lack of forest cover in the Visitor Center area and the close proximity of the Operations Area (less than one mile) would make the tower at the Operations Area highly visible. The effects on visitor experience from a highly visible tower in the Operations Area site would be minor but permanent. The construction effects related to visitor use would be negligible and temporary.

No Action. The no action alternative would not affect visitor use.

Cumulative Effects. There would be no measurable cumulative effects related to visitor use.

LAND USE

The proposal would not require any changes in land use or land use designations. No locations outside the established development zone would be considered for construction of wireless telecommunications facilities. No effects are expected.

No Action. The no action alternative would not effect land use or land use designations.

Cumulative Effects. The proposal would have no measurable cumulative effects related to land use.

TRANSPORTATION

The sites are not near major transportation routes. Temporary negligible effects on traffic in the immediate vicinity of each site would be anticipated when moving equipment and materials. The effects would last only a few minutes for each event.

No Action. The no action alternative would have no effect on transportation.

Cumulative Effects. There would be no measurable cumulative effects on transportation.

SOCIAL AND ECONOMIC

The primary social and economic issue is improvement of cellular telephone service, which would also result in improved visitor safety and security. The Hickory Cabin Fire Tower site would provide greater telecommunications benefits than the Operations Area site. The effects would be minor, but the duration would be long-term to permanent. The construction funds that would be paid for construction of the facilities would enter the economy in a variety of ways. The amount of funds would be negligible, and the effects are expected to be negligible and short-term.

No Action. The no action alternative would be expected to have no effect on social or economic values.

Cumulative Effects. There would be no measurable cumulative social or economic effects.

PUBLIC HEALTH

The project would not affect public health.

No Action. The no action alternative would not affect public health.

Cumulative Effects. There would be no measurable cumulative effects related to public health.

PUBLIC SAFETY

Security and safety measures would be incorporated in the facility regardless of which site is selected. The proposal would have beneficial effects on public safety by providing telephone service in the major visitor use areas of the park. The beneficial effects would be minor but permanent.

No Action. The no action alternative would not affect public safety.

Cumulative Effects. There is potential for cumulative beneficial effects related to public safety. After enhanced 911 service is provided in the future, it will become possible to locate lost or injured backcountry users from their cellular telephone signal. The cumulative effects would be minor but long-term or permanent.

Indian Trust Resources

There are no Indian Trust resources in the park and the park retains no records or other information related to Indian Trust resources. There would be no effect on Indian Trust resources.

No Action. The no action alternative would not affect Indian Trust resources.

Cumulative Effects. There would be no cumulative effects related to Indian Trust resources.

Risk of Unanticipated Consequences

Because of the well known attributes of wireless telecommunications facilities, the relative ease of connection to existing utilities, and the existing road access to both alternative sites, the risk of unanticipated consequences is limited. Adequate contract supervision and project inspection to insure the work remains on schedule would mitigate the remaining uncontrolled risks. The risk of unanticipated consequences is negligible and short-term.

No Action. The no action alternative would not have a risk of unanticipated consequences.

Impairment. There would be no impairment associated with the risk of unanticipated consequences.

Cumulative Effects. There are no reasonably discernable cumulative effects related to unanticipated consequences. The no action alternative would have no cumulative effects.

Cumulative Impacts

Cumulative impact is defined by the Council on Environmental Quality regulations in 40 C.F.R. Section 1508.7 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. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

The future implementation of enhanced 911 service would allow lost or injured visitors to be located using their cellular telephone signal. The co-location of equipment at the site on the park of other telecommunication providers and co-location of park radio communications equipment is considered to be a part of the proposal and not a cumulative effect. The no action alternative could result in construction of a Wireless Telecommunication Facility (WTF) on the ridge immediately north of the park. No other cumulative effects have been identified related to this project.

No Action. The no action alternative could result in construction of WTF immediately north of the park. WTF in the area immediately north of the park would be highly visible from the roads approaching the park and would affect the visual quality of that area.

Impairment. There would be no impairment of resources related to the cumulative effects of the proposal. The no action alternative would not result in impairment of resources.

SUMMARY OF MITIGATING ACTIONS

The following list restates the mitigating actions identified in the preceding discussion of the likely environmental consequences of the proposal. These are the important conditions that should be utilized to limit the potential for unexpected adverse consequences.

Implement the U.S. Fish and Wildlife Service interim siting guidelines to minimize the risk to migratory birds.

Tree removal would conform to the park "Hazard Tree Management Plan" (approved June 20, 2000). The park completed formal consultation with the U.S. Fish and Wildlife Service before approval of the plan. The primary issue is protection of Indiana bats. Any trees to be removed should be removed when Indiana bats are hibernating in caves (November 15th to March 31st) and therefore are unlikely to be roosting in trees.

Dust should be controlled by wetting the surface if it becomes an issue during construction.

Erosion and sedimentation control measures should be in place to prevent movement of soils from the site into caves.

A Construction Stormwater Discharge Permit would be obtained, if required, along with any other required construction permits.

Effective construction management and supervision should be provided to insure that public safety and other concerns related to construction are properly addressed, and that any contractors perform as specified.

CONSULTATION AND COORDINATION

Kentucky State Clearinghouse in the Kentucky Natural Resources and Environmental Protection Cabinet (The clearinghouse is expected to distribute copies to the following Kentucky State Agencies.):

- Division of Water
- Division of Waste Management
- Division for Air Quality
- Division of Forestry
- Nature Preserves Commission
- Division of Conservation
- Department for Natural Resources
- Department of Fish and Wildlife Resources

United States Fish and Wildlife Service, Kentucky Field Office in Frankfort, Kentucky

Kentucky State Historic Preservation Officer

Mr. Scott McCloud, Vice President, Wireless Networks, Bluegrass Cellular

BellSouth Personal Communications, LLC

PUBLIC INVOLVEMENT

The Draft Environmental Assessment was available for public review and comment for a period of thirty days beginning on June 7, 2004. A press release was issued to announce the availability of the draft document for public review and to seek public involvement in the 106 process. The availability of the document was published in newspapers of local and regional circulation. A notice was placed in the Federal Register announcing the availability of the environmental assessment. The document was posted on the Mammoth Cave National Park Internet site. Hard copies were sent to the agencies and individuals listed above. Hard copies were available to the public on request.

PREPARERS

Henry Holman, Management Assistant, Mammoth Cave National Park

ATTACHMENTS

1. Copy of February 19, 2004 letter from Bluegrass Cellular including copy of Cellular License to Kentucky RSA #3 Cellular General Partnership
2. Wilderness Study Map
3. 7.5 minute topographic maps of the alternative locations
4. Section 7, Endangered Species Act compliance (will be added when consultation is complete)
5. Section 106, National Historic Preservation Act compliance (will be added when consultation is complete)
6. Letter from Richard Tell Associates, Inc., February 27, 2004, containing "Analysis of RF emissions associated with proposed Bluegrass Cellular cellular telephone tower in Mammoth Cave National Park" including resume
7. Agency Comments (will be added following review period)
8. Public Comments (will be added following review period)

REFERENCES

16 USC 1-5

36 CFR Part 14

Barr, Thomas C., Jr. Final Technical Report to the National Park Service; Contract No. CX500050204; "Ecological Effects of Water Pollutants in Mammoth Cave." University of Kentucky. Lexington, Kentucky, December 1976, 45 pages.

Cellular License – KNKN867 – Kentucky RSA #3 Cellular General Partnership. Online. Internet, Federal Communications Commission Universal License Search at http://wireless2.fcc.gov/UlsApp/UlsSearch/license.jsp?licKey=13248&printable.

Cicerello, Ronald R. and Richard R. Hannan. 1990. Survey of the Freshwater Unionids (Mussels) (Bivalvia: Maragraitiferidae and Unionidae) in the Green River in Mammoth Cave National Park, Kentucky. Technical Report prepared for Mammoth Cave National Park, National Park Service, United States Department of The Interior, Mammoth Cave, Kentucky.

Clark, Jamie Rappaport, Director, U.S. Fish and Wildlife Service. "Service Guidance on the Siting, Construction, Operation and Decommissioning of Communications Towers." Letter to Regional Directors. 11 March 2004. Online. Internet at http://migratorybirds.fws.gov/issues/towers/comtow.html.

Executive Order 13186 of January 10, 2001. Responsibilities of Federal Agencies to Protect Migratory Birds. Federal Register: January 17, 2001 (Volume 66, Number 11) page 3853-3856. Online. Internet, Federal Register via GPO Access at http://www.gpoaccess.gov/fr/.

Pearson, William D. and Thomas G. Jones. A Final Report Based on a Faunal Inventory of Subterranean Streams and Development of a Cave Aquatic Biological Monitoring Program Using a Modified Index of Biotic Integrity. Draft in Mammoth Cave National Park files. University of Louisville, Louisville, Kentucky, August 1998, 78 pages.

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Prentice, Guy. Archaeological Overview and Assessment of Mammoth Cave National Park. National Park Service, Southeastern Archaeological Center, Tallahassee, Florida, 1993.

Reference Manual-53: Special Park Uses, Rights-of-Way, Wireless Telecommunication Facilities. Appendix 5, Exhibit 6.

Tell, Richard A. Analysis of RF emissions associated with proposed Bluegrass Cellular cellular telephone tower in Mammoth Cave National Park. Letter, 27 February 2004.

Trader, Patrick D. Letter Report for Phase I Archaeological Survey for Hickory Cabin Cell Tower. Letter, 27 February 2004.