

**PROGRAMMATIC AGREEMENT
AMONG THE
NATIONAL PARK SERVICE, THE ARIZONA STATE HISTORIC PRESERVATION
OFFICER, AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE TELECOMMUNICATION PLAN/ENVIRONMENTAL
ASSESSMENT FOR GRAND CANYON NATIONAL PARK, ARIZONA**

WHEREAS, the National Park Service (NPS) prepared a Telecommunications Plan/Environmental Assessment (plan/EA) for Grand Canyon National Park (park) pursuant to its authority as the federal land manager of the park. The plan/EA is needed to 1) comprehensively address substantial telecommunications deficiencies within developed areas of the park that currently inhibit NPS operations as well as the activities of visitors, park partners, and the community; and 2) ensure that telecommunications infrastructure is designed and located in a manner that minimizes impacts to park resources; and

WHEREAS, the NPS is required by the Telecommunications Act of 1996 to consider all Right of Way (ROW) permit applications to install telecommunications infrastructure on NPS lands, and the NPS will follow Director's Order 53 Special Park Uses (DO-53) and Reference Manual 53 Special Park Uses (RM-53) in considering all Right of Way (ROW) permit applications to install telecommunications infrastructure on NPS lands; and

WHEREAS, this plan/EA will provide guidance in response to future applications that the NPS receives; and

WHEREAS, the NPS is not proposing to directly develop new telecommunications infrastructure under this plan/EA. This infrastructure is typically proposed by private telecommunications companies through ROW permit applications. If and when ROW permits are approved and issued, the telecommunications company (permittee) is responsible for building and maintaining the related infrastructure according to the terms and conditions of the ROW permit; and

WHEREAS, the NPS is evaluating two alternatives for the Telecommunications Plan/EA. These alternatives are the undertaking and they include a no action alternative and an action alternative, which includes multiple elements that collectively would accomplish the proposed action to develop a plan for future park telecommunications infrastructure; and

WHEREAS, effects on historic properties cannot be fully determined because ROW permit applications, which would include specific proposals and site plans, have not yet been received by the NPS effects; and

WHEREAS, NPS has developed this programmatic agreement (PA or Agreement) for the Telecommunications Plan/EA pursuant to Section 106 of the National Historic Preservation Act of 1966 as amended (NHPA), 54 U.S.C. 306108, and its implementing regulations, 36 CFR Part 800, and NPS is a signatory to this PA; and

WHEREAS, the area of potential effects (APE) for physical, visual, and audible effects will be

defined for each ROW permit and include areas where telecommunications infrastructure is currently located; where it could be constructed, operated, and maintained; and areas from where the infrastructure is or could be visible or audible. Areas under consideration include Lindberg Hill, CC Hill, and Grand Canyon Lodge area on the North Rim, and Hopi Fire Lookout, Grand Canyon Village, and Desert View on the South Rim for telecommunications towers and associated facilities (see Appendix A); and these and other developed areas in the park, as yet undefined, for other telecommunications infrastructure; and

WHEREAS, NPS has consulted with the State Historic Preservation Officer (SHPO) and SHPO is authorized to enter this Agreement in order to fulfill its role of advising and assisting Federal agencies in carrying out Section 106 responsibilities under the following federal statutes: Sections 101 and 106 of the NHPA, 54 U.S.C. 300101 *et seq.*, at 36 CFR Part 800.2(c)(1)(i), and 800.6(b), and SHPO is a signatory to this Agreement; and

WHEREAS, in accordance with 36 CFR Part 800.6(a)(1), NPS notified the Advisory Council on Historic Preservation (ACHP) of the intent to prepare this programmatic agreement, with specified documentation on 12/23/2019, and the ACHP has chosen to participate in the consultation pursuant to 36 CFR Part 800.6(a)(1)(C)(iii); and

WHEREAS, pursuant to 36 CFR Part 800.3(f)(2), the park has consulted with traditionally associated tribes including the Havasupai Tribe, Hopi Tribe, Hualapai Tribe, Kaibab Band of the Paiute Indians, Las Vegas Paiute Tribe of Paiute Indians, Moapa Band of Paiute Indians, Navajo Nation, Paiute Indian Tribe of Utah, Pueblo of Zuni, San Juan Southern Paiute Tribe, and Yavapai-Apache Nation (Tribes); and

WHEREAS, the Tribes previously identified the Grand Canyon, from rim to rim, with the Colorado River and its associated elements as eligible for listing in the National Register of Historic Places (National Register) as a Traditional Cultural Property (TCP) and the SHPO concurred in a consensus determination of National Register eligibility on July 28, 2011; and

WHEREAS, the Tribes retain important prehistoric and historic cultural and spiritual connections to the Grand Canyon; and

WHEREAS, the Hopi Tribe and the Havasupai Tribe have submitted comments on this undertaking that are directly addressed by this agreement and are invited signatories to the agreement; and

WHEREAS, there are three (3) National Historic Landmark Districts (NHL Districts), twelve (12) historic districts, and other historic properties within the APE; and

WHEREAS, the NPS has used the procedures for public involvement under the National Environmental Policy Act to assist in satisfying the public involvement requirements under Section 106 of the NHPA pursuant to 36 CFR 800.2(d)(1-3). These procedures included press releases (July 2019 and December 2019), email (July 2019 and December 2019, each to over 1,500 individuals), webinars (August and December 2019), public meetings (June and December 2019), Facebook posts, and park and NPS websites including

<https://parkplanning.nps.gov/GCTelecommunications>. Public involvement included the general public and local, state, federal, and other government entities. Documents available for public review included two Section 106 letters to SHPO and the draft programmatic agreement; and

WHEREAS, NPS will continue to implement Section 106 for this undertaking following this PA and the process identified in 36 CFR Part 800 or the 2008 Programmatic Agreement Among the National Park Service (U.S. Department of the Interior), the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers for Compliance with Section 106 of the National Historic Preservation Act (NPS Servicewide PA), as applicable; and

NOW, THEREFORE, NPS, SHPO, and ACHP agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the effects of the undertaking on historic properties.

STIPULATIONS

The NPS shall ensure that the following stipulations are carried out:

I. Continuing Section 106 Consultation

NPS will continue to implement Section 106 for this undertaking following the process identified in this Agreement, 36 CFR Part 800, or the NPS Nationwide PA, as applicable, as planning for the undertaking continues. Definitions will follow 36 CFR Part 800.16 and as included in Appendix C.

II. Area of Potential Effects

For each undertaking, the NPS shall define the area of potential effects (APE) for each ROW permit and include areas where telecommunications infrastructure is currently located; where it could be constructed, operated, and maintained; and areas from where the infrastructure is or could be visible or audible. Areas under consideration include Lindberg Hill, CC Hill, and the Grand Canyon Lodge area on the North Rim and Hopi Fire Lookout, Grand Canyon Village, and Desert View on the South Rim for telecommunications towers and associated facilities (Appendix A); and these and other park developed areas for other telecommunications infrastructure.

III. Definitions

This PA follows 36 CFR 800.16 and the definitions included in Appendix C.

IV. Telecommunications Infrastructure Planning

- A. *The Secretary of the Interior's Standards for the Treatment of Historic Properties – Guidelines for Preserving and Rehabilitating Historic Buildings and Guidelines for Preserving and Rehabilitating Cultural Landscapes*, and *NPS Director's Order (DO) 28*:

Cultural Resource Management will be followed for this undertaking, the Telecommunications Plan/EA.

- B. The telecommunications infrastructure will be located, designed, and installed according to the specifications provided in Appendix B. This includes requirements for telecommunications towers and associated facilities; small-cell nodes, microwaves, and associated facilities; and fiber optic communications cable.
- C. In the event of any changes to the project scope, the following measures shall be implemented in consultation with the signatories:
 - The NPS shall assess and revise the project APE as needed to incorporate any additional areas where historic properties may be potentially affected.
 - The NPS shall carry out additional investigations to identify historic properties that may be affected.
 - The NPS shall assess the project's effect on any new historic properties and explore measures to avoid, minimize, or mitigate effects on these properties.
 - The NPS shall ensure the preparation of appropriate reports and documents, notify Section 106 consulting parties about any changes in the project's effect on historic properties, and provide an opportunity for review and comment.
- D. Projects to be implemented under this plan will be submitted for NPS cultural resources and Section 106 review and consultation with SHPO and other consulting parties, as appropriate.
- E. Additional information on the following items will be submitted to SHPO in appropriate sequence for the implementation schedule: Non-historic buildings, new construction, and amenities.
 - Identify potential effects to NHL districts, historic districts, other historic properties from project-related work on non-historic buildings, new construction, and amenities.
 - Avoid or minimize effects in accordance with the Secretary of the Interior's Standards for Rehabilitation.

V. Professional Qualifications

NPS shall ensure that all historic preservation work is conducted under the supervision of a professional who meets the Secretary of the Interior's standards, as per Section 112(a)(1)(A) of the NHPA and at 36 CFR Part 800.2(a)(1).

VI. Identification and Evaluation of Historic Properties

- A. A Class III, Intensive Archaeological Inventory will occur in all areas of the APE with a potential for ground disturbing activities that have not been previously surveyed to current professional standards, before work begins in that area.
- B. Areas selected for staging equipment and materials are expected to be located in existing disturbed areas where there is no potential for archaeological resource disturbance.
- C. As part of its identification efforts, the NPS has consulted with the Tribes. The NPS shall continue to consult with the Tribes regarding properties of traditional religious and cultural importance that may be affected by the undertaking and shall provide opportunities for review and comment on draft and final versions of Class III Inventory Reports. The consultation process will remain open for any Tribe that expresses a desire to participate.
- D. All archaeological resources identified during Class III inventories and through Tribal consultation will be evaluated for eligibility for National Register listing, in consultation with the consulting parties.
- E. If the SHPO disagrees with the NPS's determination of eligibility, the NPS shall consult with the SHPO to resolve the objection. If a resolution cannot be agreed upon, the NPS shall forward the required documentation to the Keeper of the National Register for a formal determination of eligibility.

VII. Project Finding of Effect and Avoiding, Minimizing, or Mitigating Adverse Effects

- A. The NPS has determined through consultation with SHPO and Tribes that effects on historic properties cannot be fully determined because the NPS has not yet received ROW permit applications, which would include specific proposals and site plans. The NPS will seek to avoid adverse effects to all types of historic properties, with input from consulting parties. Avoidance and minimization measures for the protection of historic properties may include (but are not limited to) redesigning project elements, fencing limits of construction, monitoring construction activities, and placing infrastructure away from archaeological site boundaries. Refer to Appendix B for additional measures.
- B. If adverse effects to historic properties are unavoidable, the NPS shall resolve adverse effects to historic properties through the development and implementation of a Historic Properties Treatment Plan (HPTP), which will be developed in consultation with the parties to the Telecommunications Plan/EA programmatic agreement and will specify a program of measures to resolve adverse effects. The public will be provided the opportunity to participate in the development of the HPTP. The NPS shall ensure that the HPTP is consistent with the Secretary of the Interior's Standards and Guidelines for Historic Properties, and National Register guidelines. A Memorandum of Agreement (MOA) would not be needed.

VIII. Monitoring

- A. NPS will prepare a monitoring and discovery plan (MDP) and submit it to SHPO and Tribes for review and comment before ground-disturbing activities proceed. Consultation will proceed per Stipulation IX. NPS will consider all comments in a revised draft and provide all consulting parties with the final MDP.
- B. The MDP will minimally include all locations and situations when monitoring is required. The Arizona State Museum site recording criteria and current SHPO guidance will be followed for determining the presence of isolated occurrences versus archaeological sites, and documenting findings. The 2007 Memorandum of Agreement Regarding Collections, Inadvertent Discovery, and Intentional Excavation of American Indian Human Remains, Funerary Objects, Sacred Objects, and Objects of Cultural Patrimony at Grand Canyon National Park, Arizona (2007 MOA), will be adhered to for protecting, documenting, and consulting on discoveries of human remains.
- C. A cultural resources specialist will identify when and where ground-disturbing activities, including excavation or grading need to be monitored. Such work will only proceed when a cultural resource specialist is present to conduct the monitoring.
- D. Per any tribe's request, a tribal resource monitor will be invited to be on-site when ground disturbing work is occurring. The notification time frame would be 30-days in advance of the ground-disturbing work to the greatest extent possible.

IX. Post Review Unanticipated Discoveries

- A. If previously unrecorded and/or buried cultural resources are discovered during any portion of the project, work at that location will immediately cease, and an assessment made by a qualified cultural resource specialist. The NPS will notify SHPO. If American Indian-associated resources are discovered the Tribes would also be notified. Work in that area will not resume until the resources are identified and documented, and an appropriate mitigation strategy developed and implemented in consultation with SHPO and, as appropriate, Tribes.
- B. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are encountered during any portion of the project, provisions outlined in the Native American Graves Protection and Repatriation Act and the 2007 MOA would be followed.

X. Review and Comment Process

The Section 106 review and comment period will be 30 calendar days unless otherwise specified. If a party does not comment within the specified review period, the NPS will follow-up by telephone or e-mail with the party. If, after such reasonable and good faith efforts to reach an unresponsive consulting party there has still been no response, the NPS will proceed to the next step prescribed by 36 CFR Part 800, or the 2008 NPS nationwide PA, as applicable.

XI. Communication among Parties to this PA

Electronic mail (email) will serve as the official correspondence method for all communications regarding this Agreement and its provisions unless a consulting party has requested otherwise.

XII. Curation

The NPS shall ensure that all artifacts, samples, and records resulting from the undertaking are curated in accordance with 36 CFR Part 79, except as determined through consultations with Tribes and carried out in accordance with federal and state laws pertaining to the treatment and disposition of Native American Human Remains, Associated/Unassociated Funerary Objects, and Objects of Cultural Patrimony.

XIII. Confidentiality

To the maximum extent allowed by federal and state law, the NPS will maintain confidentiality of sensitive information regarding historic properties that could be damaged through looting or disturbance, and/or to help protect a historic property to which a Tribe attaches religious or cultural significance. However, any documents or records the NPS has in its possession are subject to the Freedom of Information Act (FOIA) (5 U.S.C. 552 et. seq.) and its exemptions, as applicable. The NPS will evaluate whether a FOIA request for records or documents would involve a sensitive historic property, or a historic property to which a Tribe attaches religious or cultural significance, and if such documents contain information that the NPS is authorized to withhold from disclosure by other statutes including Section 304 of the NHPA, as well as the Archaeological Resources Protection Act. If this is the case, then the NPS will consult with the Keeper and the ACHP regarding withholding the sensitive information. If a Tribally sensitive property is involved, the NPS will also consult with the relevant Tribe before making a determination in response to a FOIA request.

XIV. Duration

This PA will expire if its stipulations are not completed within ten (10) years of its execution, unless before its expiration the signatories agree in writing to an extension for carrying out its terms. In the event of expiration before completion of all stipulations, NPS shall comply with 36 CFR Part 800 or the 2008 NPS nationwide PA as applicable, with regard to this undertaking that otherwise would have been covered by this PA.

XV. Amendments

This PA may be amended when such an amendment is agreed to in writing by the signatories (signatory and invited signatory signatures). An amendment may be executed in counterparts each of which shall be deemed an original and all of which together shall constitute one and the same instrument. The amendment will be effective on the date a copy signed by the signatories is provided to the ACHP.

XVI. Dispute Resolution

- A. Should any signatory (signatory and invited signatory signatures) to this PA object at any time to any actions proposed or the manner in which the terms of this PA are implemented, NPS shall notify the signatories and invited signatories of the objection and consult with such parties to resolve the objection. If NPS determines that the objection cannot be resolved, NPS will forward all documentation relevant to the dispute, including the NPS proposed resolution, to the ACHP. The ACHP will be requested to provide NPS with its advice on the resolution of the objection within 30 calendar days after its receipt of the relevant documentation. Before reaching a final decision on the dispute, NPS shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP and any signatories and invited signatories and provide them with a copy of this written response. NPS will then proceed according to its final decision.
- B. If the ACHP does not provide its advice regarding the dispute within 30 calendar days, NPS may make a final decision on the dispute and proceed accordingly, after preparing its written response that takes into account any timely advice or comments and provide the signatories and invited signatories with a copy of such written response.
- C. NPS's responsibility to carry out all other actions subject to the terms of this PA that are not the subject of the dispute remain unchanged.

XVII. Withdrawal of Invited Signatories

Any invited signatory to this Agreement may withdraw its participation in this Agreement by providing 30 calendar days written notice to the other parties. During the 30-calendar day period the Agreement signatories will consult on amendments or other actions that would avoid termination of the invited signatory's participation in the Agreement. Withdrawal of an invited signatory does not terminate this Agreement.

XVIII. Termination

If any signatory (signatory or invited signatory signatures) to this PA determines that its terms will not or cannot be carried out, that party shall promptly consult with the other signatories and invited signatories to attempt to develop an amendment to the PA that would avoid termination. If after 30 calendar days (or another time period agreed to by all signatories) an amendment cannot be agreed upon, any signatory (signatory or invited signatory signatures) may terminate the PA upon written notification to the other signatories.

Once the PA is terminated, and before work continues on the undertaking, NPS must either a) execute a PA pursuant to 36 CFR Part 800.6 or b) request, take into account, and respond to the comments of the ACHP under 36 CFR Part 800.7. NPS shall notify the signatories as to the course of action they will pursue.

XIX. Anti-Deficiency Act

This Agreement shall be subject to available funding, and nothing in this Agreement shall bind the state or federal agencies to expenditures in excess of funds authorized and appropriated for the purposes outlined in this Agreement.

XX. Counterpart Signatures

This PA may be executed in counterparts each of which shall be deemed an original and all of which together shall constitute one and the same instrument.

Execution of this Agreement by NPS, SHPO, and ACHP and implementation of its terms evidence that the NPS has taken into account the effects of this undertaking on historic properties and afforded the ACHP an opportunity to comment.

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ASSESSMENT FOR GRAND CANYON NATIONAL PARK, ARIZONA**

SIGNATORIES:

ADVISORY COUNCIL ON HISTORIC PRESERVATION



John Fowler, Executive Director 11/5/2020
Date

NATIONAL PARK SERVICE



Edward T. Keable, Superintendent 68.15.20
Grand Canyon National Park Date

STATE HISTORIC PRESERVATION OFFICE



Kathryn Leonard Aug 18, 2020
State Historic Preservation Officer Date

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INVITED SIGNATORIES:

HAVASUPAI TRIBE

Eva Kissoon, Chairwoman

Date

HOPI TRIBE

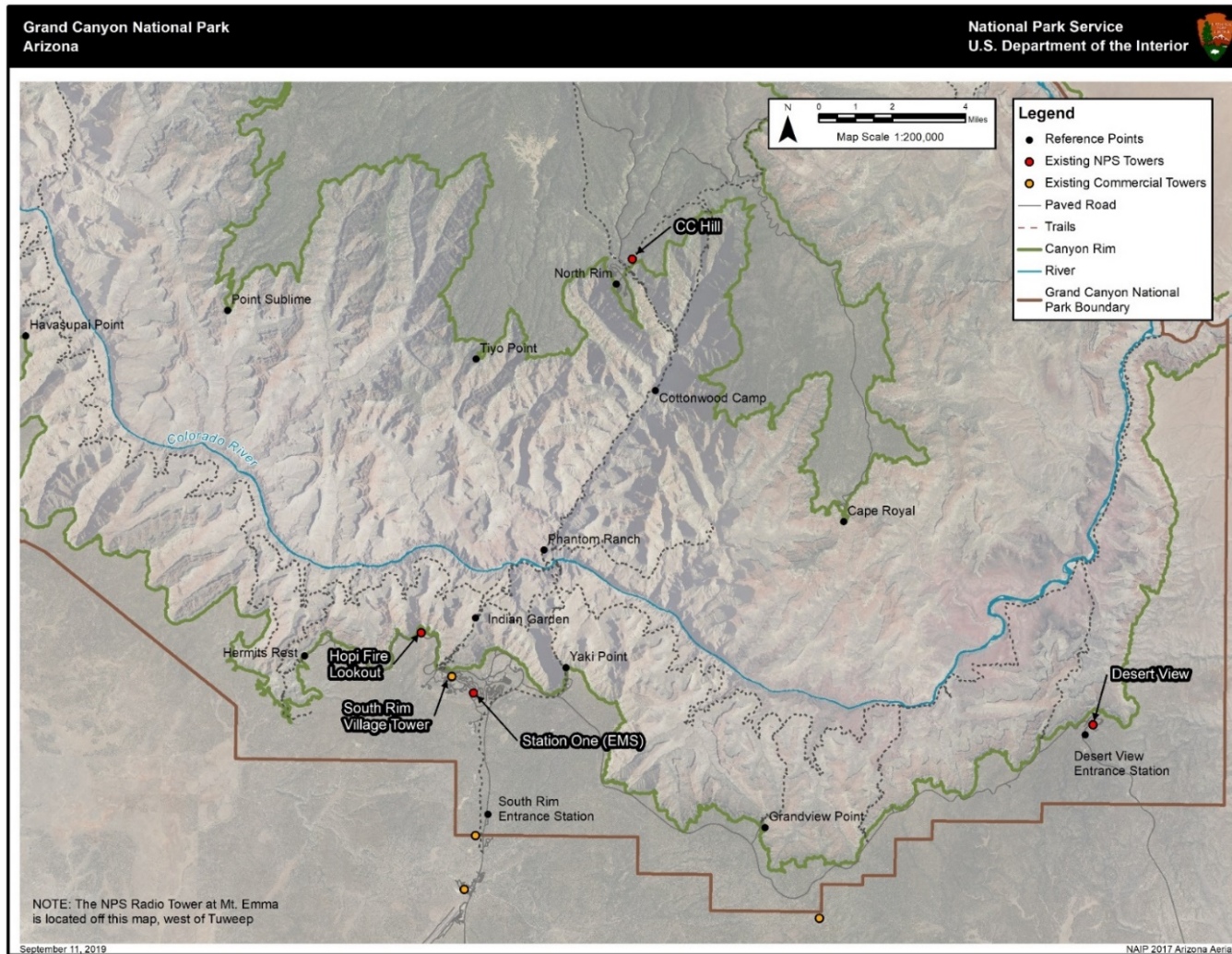
Timothy Nuvangyaoma, Chairman

Date

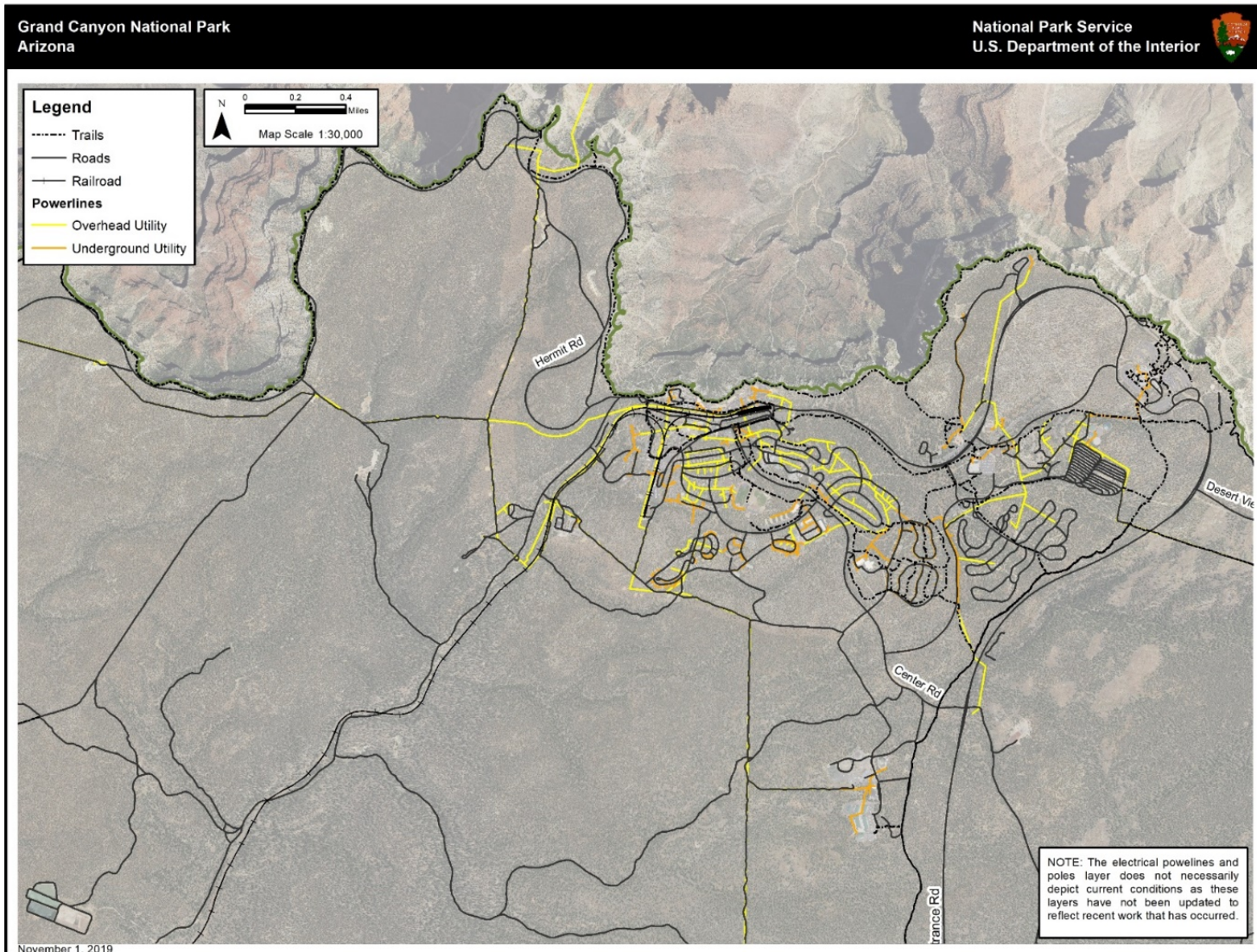
**Stewart Koyiyumptewa,
Hopi Cultural Preservation Office**

Date

Appendix A
Map of Areas Being Considered for APE

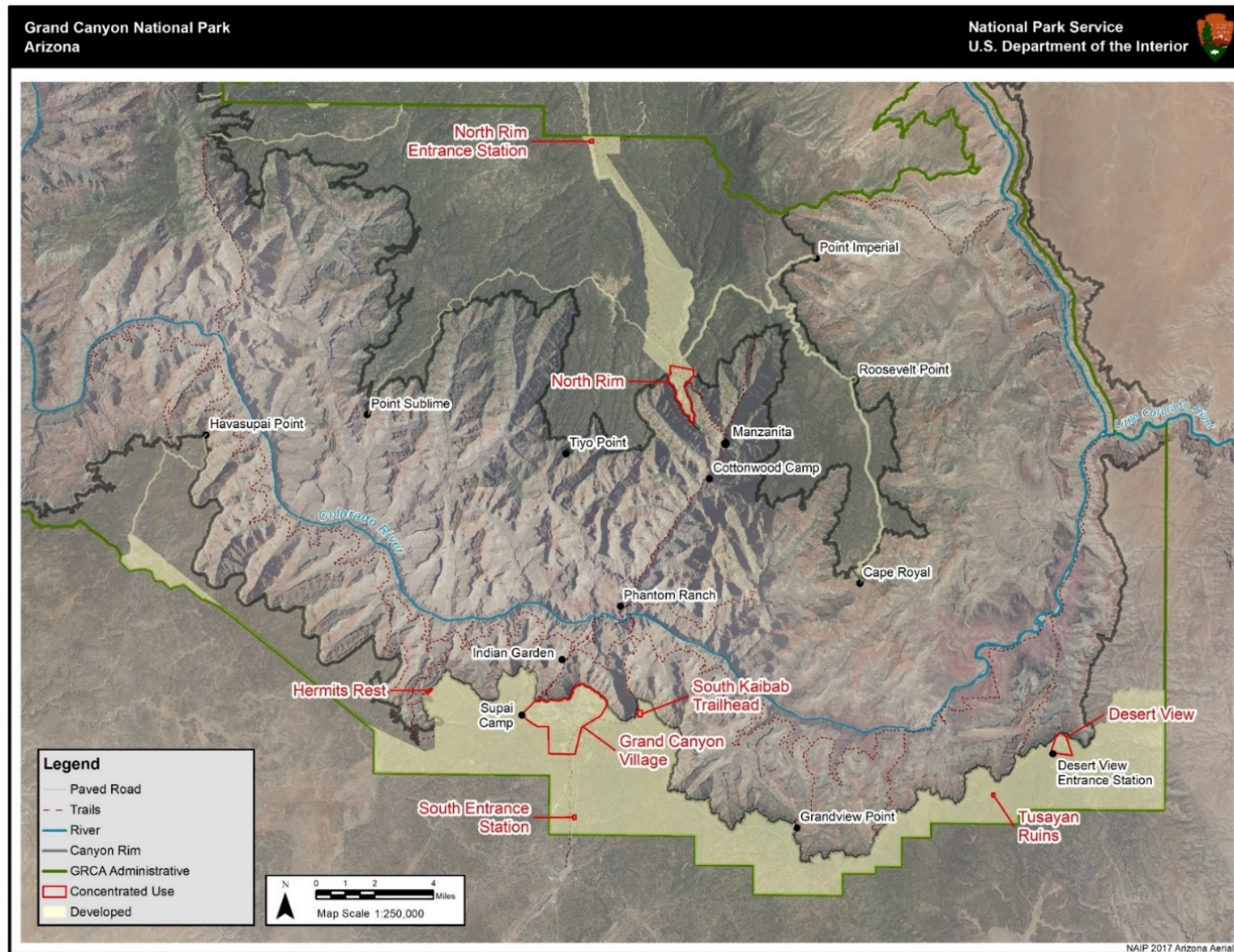


Map of existing towers within and near Grand Canyon National Park (park).



- 1
- 2 Map of Grand Canyon Village showing existing overhead and underground utility lines.

1

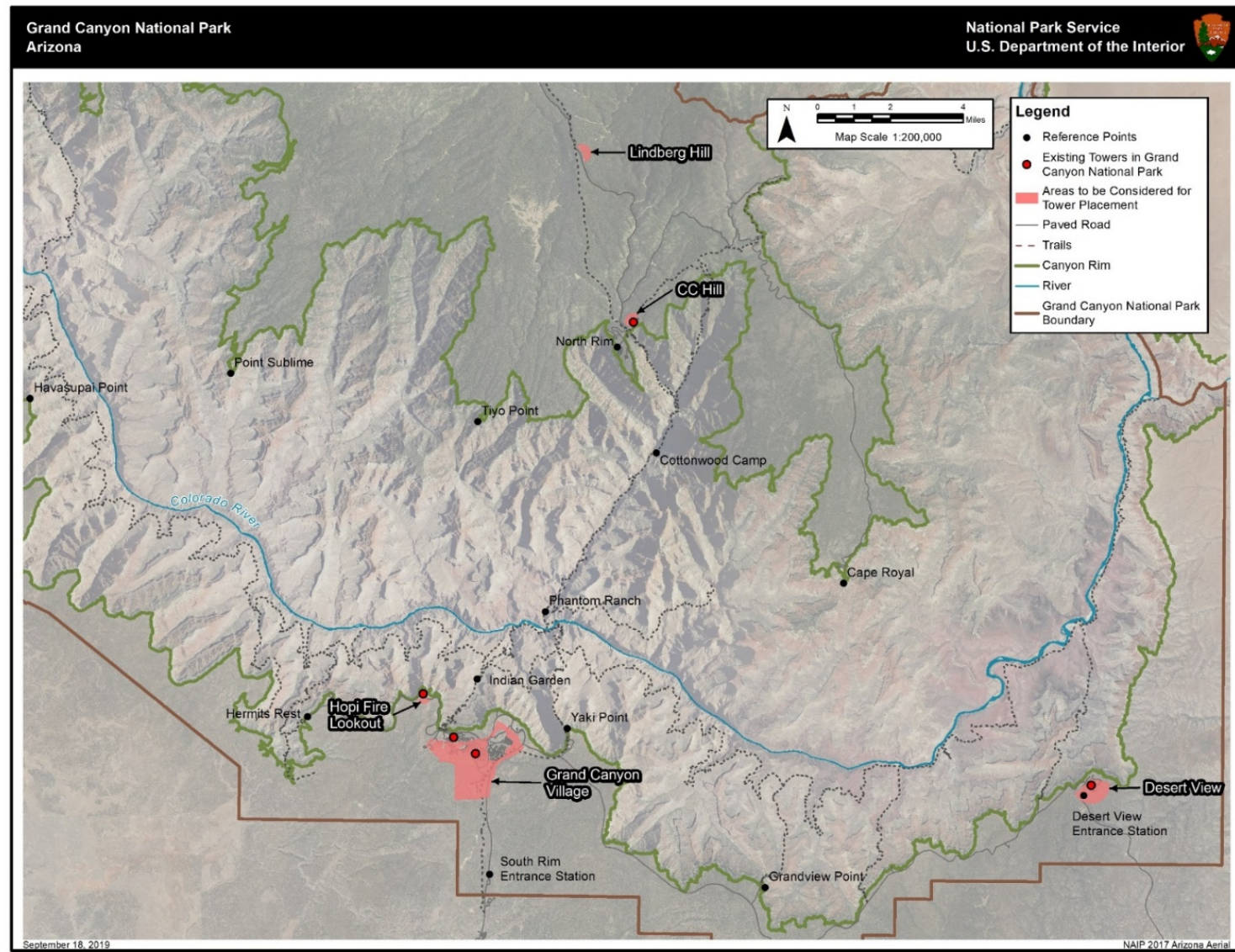


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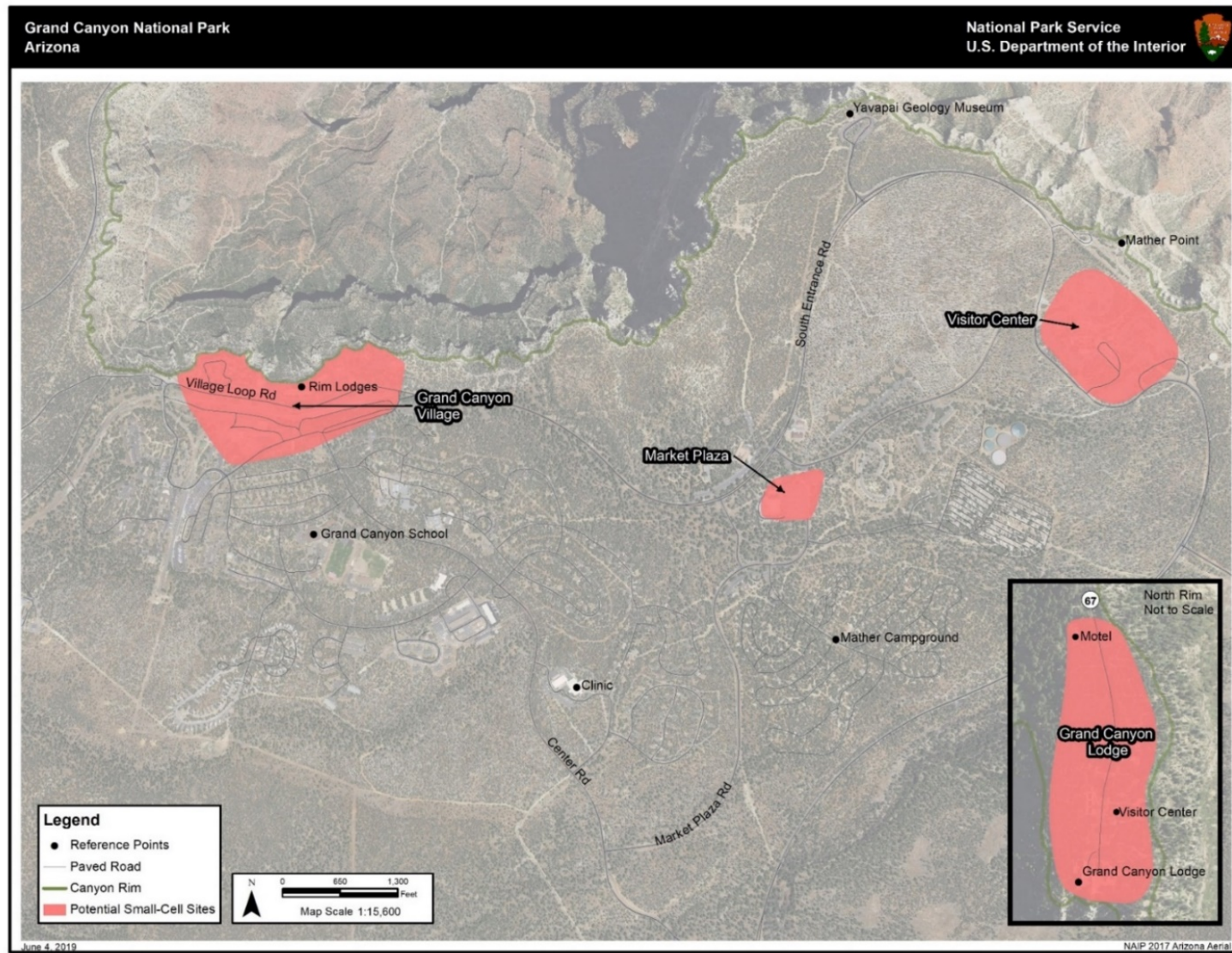
Map of developed areas in park for which improved coverage is needed.

1



Map of potential additional macro sites (telecommunications towers).

1



2

3

Map of potential small-cell sites at the South Rim and North Rim.

Appendix B
Cultural Resources - Telecommunications Infrastructure Guidelines

The following guidelines are based in part on the guidelines in the Telecommunications Plan/EA.

Guidelines for Telecommunications Towers and Associated Facilities

Any new or relocated telecommunications towers within Grand Canyon National Park (park) would adhere to the following guidelines. These guidelines may be modified and additional guidelines may be developed in the future in consultation with SHPO.

Location and Siting Requirements

- Telecommunications towers would be constructed in or immediately adjacent to developed and/or previously disturbed areas that have available power in close proximity and are accessible from existing roads.
- Telecommunications towers would be constructed outside the boundaries of NHL Districts and historic districts, and, to the extent possible, located to minimize impacts to National Register eligible or listed historic properties.
- Telecommunications towers would be located away from prominent views or features, such as ridgelines, to minimize visibility of towers to the greatest extent possible.
- Telecommunications towers and associated facilities would be designed and constructed to avoid or minimize disturbance to and removal of trees.
- All electrical power service, fiber, and other communications lines to new telecommunications towers would be buried, when feasible. Consultation with SHPO will occur for new towers and related electrical service, and fiber and other communication lines.
- Telecommunications towers would be located in close proximity to existing towers as long as the operation of the new tower would not interfere with the existing.
- Towers would be designed to accommodate current or future co-locations in order to minimize the number of additional towers that could be proposed by ROW applicants who would otherwise not be accommodated.

Design Requirements

- Telecommunications towers would be no higher than the minimum height necessary to provide telecommunications services to developed areas of the park and no higher than the height guidelines identified in Table 2.1 in the plan/EA.
- All tower designs must be self-supporting; no guy lines would be permitted.
- Lattice towers may be necessary to accommodate telecommunications facilities; however, alternative designs, such as trees, could be appropriate if located within a forested area and the height would not greatly exceed the surrounding vegetation. Monopoles would be preferable to lattice towers at locations within 1,500 ft. of the rim unless alternative designs demonstrated better blending with the environment.

Table 2.1: Locations for New Telecommunications Towers, Alternative B

Area	Existing Tower		Additional Tower	
	Height (ft.)	Distance from Rim (ft.)	Max. Height (ft.)	Min. Distance from Rim (ft.)
West Rim Drive (Vicinity of Hopi Fire Lookout Area)	80*	~520	80	500
Grand Canyon Village	107	~800	120	1,500- 6,999
			OR 180	7,000
Desert View	80*	~1,500	80	750
Entrance Station to North Rim (Vicinity of Lindberg Hill)	N/A	N/A	180	> 20,000
Visitor Services Area on North Rim (Vicinity of CC Hill)	180*	~600	180	500
* Existing NPS radio tower				

- Telecommunications towers and associated facilities would be located and designed to blend into the surroundings as much as possible to reduce the effects to National Register eligible or listed historic properties, scenic resources, and other resources.
 - Design and materials would be selected to blend with the existing landscape, for example through selecting appropriate colors, surface treatments, and use of non-reflective coatings to reduce color contrast with the surrounding environment.
 - All antennas would adhere to the United States Department of Interior-Bureau of Land Management (USDOI-BLM) camouflage guidelines to improve aesthetics (for example, two-way radio antennas are often sky blue or white in color to blend in with the skyline). Final colors would be determined on a case-by-case basis as part of permitting and would be dependent on the location.
- Tower lighting would be considered on a case-by-case basis for safety purposes. If lighting is deemed necessary, measures would be identified to ensure the tower is lit only during emergency situations such as when aircraft are needing to access a nearby helibase at night.
- Facilities surrounding the tower would remain unlit except when lighting would be required for safety or security purposes. Lighting would be designed to minimize impacts and would be motion- or heat-sensitive, down-shielded, and of a minimum intensity (lumens and color) to reduce nighttime bird attraction and eliminate constant nighttime illumination. External lighting would meet the standards utilized by the International Dark-Sky Association.

Equipment Requirements

- All new telecommunications towers would be designed to promote facility and site sharing by multiple users. All telecommunications equipment including, but not limited to, towers, equipment shelters, outdoor cabinets, radios, backup power, and fuel supply would be co-located within the telecommunications site.
- The generator at each tower location would operate only during utility power failures and as required for proper maintenance and testing (per manufacture requirements). The generator would be fitted with a muffler, or equivalent, to reduce noise to a level that

does not exceed 60 dBA within 50 ft. of the generator. Diesel tanks would be double walled with leak detection.

- All wires would be contained or cleanly attached and colored to blend in with the surrounding setting.

Guidelines for Small-Cell Nodes, Microwave Antennas, and Associated Facilities

Any new or relocated small-cell nodes and associated facilities within the park would adhere to the following guidelines. These guidelines may be modified and additional guidelines may be developed in the future.

- Small-cell nodes would be considered only when there is a demonstrated need for additional capacity on the network.
- All small-cell nodes would be able to accommodate multiple wireless telecommunications carriers.
- All small-cell nodes, microwave antennas, and equipment would be mounted to existing buildings or features (such as a light pole) and would be sited to reduce their visibility when possible.
- No small-cell nodes, microwave antennas, or equipment would be placed on the roofs of historic structures that have no other modern equipment to the extent possible. Should a historic structure have existing modern equipment on the roof, small-cell antenna, microwave antenna, and equipment would be placed in close proximity to this other equipment.
- If located within NHL Districts or historic districts, small-cell node, microwave antennas, and equipment would be located to avoid or minimize physical and visual effects. Wireless carriers would be required to make installations blend with existing architecture or background.
- All small-cell antennas would be backhauled by high capacity fiber, or other technology such as T-1 lines or copper, that would be buried in conduit to the extent feasible. Any boring or trenching to install fiber and conduit in areas where it does not currently exist would adhere to the description outlined in Guidelines for Fiber Optic Communications Cable.
- Power would be fed from a connected building or facility (such as a light pole). Solar could also be used if installed out of sight and on an existing structure (like a roof).
- All wires would be contained or cleanly attached and colored similarly to blend in with the setting.
- Exterior equipment would be painted to blend into the environment.
- Any exterior support equipment such as cabinets or electronics would be sited close to the ground and adjacent to the small-cell nodes and microwave antennas unless the equipment is placed on top of a building. Exterior support equipment would need to be located to minimize the visual effects to historic properties.

Guidelines for Fiber Optic Communications Cable

- Fiber optic cable would be installed along existing trails or within rights-of-way for roads, railways, and utility lines, when possible.

- 1 • Buried fiber optic cable routes would be placed in previously disturbed ground to the
- 2 extent possible and designed to avoid archaeological sites.
- 3 • Fiber optic cable that would be hung from utility poles would utilize existing utility poles
- 4 when possible.
- 5

Appendix C
Definitions from Telecommunications Plan/EA

Antenna: A device for transmitting and receiving radio frequency (RF) signals. Often camouflaged on existing buildings, trees, water towers, or other tall structures, the size and shape of antennas are generally determined by the frequency of the signal they manage.

Backhaul: The physical way a core network is connected to edge networks. The core network can be thought of as a backbone, the edge network can be thought of as hands and feet, and the backhaul can be thought of as the arms and legs that connects the backbone to hands and feet.

Bandwidth: The transmission capacity of a communications pathway. It is expressed in bits per second, bytes per second, or in hertz (cycles per second).

Capacity (related to telecommunications): The measurement of the maximum amount of data (includes voice) that may be transferred between network locations over a link or network path in a given time period.

Carrier (related to telecommunications): Also known as service provider or operator, a carrier is the communications company that provides customers service (including airtime) for their wireless phones.

Cell: The basic geographic unit of wireless coverage. Also, shorthand for generic industry term "cellular." A region is divided into smaller "cells," each equipped with a low-powered radio transmitter/receiver. The radio frequencies assigned to one cell can be limited to the boundaries of that cell. As a wireless call moves from one cell to another, a computer at the Mobile Telephone Switching Office (MTSO) monitors the call and at the proper time, transfers the phone call to the new cell and new radio frequency. The handoff is performed so quickly that it's not noticeable to the callers.

Cell Site: The location where a wireless antenna and network communications equipment is placed in order to provide wireless service in a geographic area.

Cellular: A mobile communications system that achieves enhanced system capacity by dividing up a coverage area into regions called cells, then reusing the available spectrum from cell to cell (Frequency Reuse). When a mobile user moves from a cell to an adjacent cell, a hand-off must be performed to ensure uninterrupted service.

Commercial (related to telecommunications): Services available to the general public for a fee provided by CLEC (Competitive Local Exchange Carrier), ILEC (Incumbent Local Exchange Carrier), or wireless carrier.

Co-Location: Placement of multiple antennas at a common site.

Coverage (related to telecommunications): The extent of the area to which the cellular or other wireless signals are transmitted to and received.

Coverage/Service Area (related to telecommunications): The geographic area within which wireless signals are transmitted to and received by mobile devices.

Data: Information in digital form that can be transmitted or processed.

Equipment (related to telecommunications): Refers to hardware used mainly for telecommunications such as transmission lines, multiplexers, and base transceiver stations. It encompasses different types of communication technologies including telephones, radios, and even computers. Since the early 1990s, the line between telecommunications equipment and IT equipment (like routers and switches) has started to blur as the growth of the Internet has resulted in the increasing importance of telecommunications infrastructure for data transfer.

Facility (related to telecommunications): A fixed, mobile, or transportable structure, including (a) all installed electrical and electronic wiring, cabling, and equipment and (b) all supporting structures, such as utility, ground network, and electrical supporting structures.

Fiber optic communications cable (fiber): Thin glass or silica strands used to carry data signals from pulsed laser or light emitting diode transmitters.

Frequency: Describes the number of waves that pass a fixed place in a given amount of time. So, if the time it takes for a wave to pass is 1/2 second, the frequency is 2 per second. If it takes 1/100 of an hour, the frequency is 100 per hour. Frequency in terms of wireless use is the electromagnetic waves in a frequency range (i.e., 30 Hz to 300 GHz).

Infrastructure (related to telecommunications): The basic facilities, equipment, and installations needed for the functioning of a system. When related to telecommunications, infrastructure typically refers to equipment such as antennas, but can include all facilities, equipment, and other installations related to a telecommunications site.

Internet: Global computer network providing a variety of information and communication facilities, consisting of interconnected networks using standardized communication protocols.

Lattice tower: Three or four-legged tower and interconnected support bracing. Uses thinner individual support members than a single monopole to support the same weight.

Microwave antennas: A physical transmission device used to broadcast microwave radio transmissions between two or more locations.

Microwave equipment: System of equipment used for microwave RF data transmission typically in a point-to-point or point-to-multipoint system.

Microwave relay: A site for the sole purpose of receiving and re-transmitting microwave signals. Usually the systems “clean up” the signal and remove any acquired noise before re-transmitting and to increase distances for microwave links.

1 Monopole tower: A single legged structure, usually round, for supporting microwave, cellular,
2 and two-way radio antenna.

4 Network: A group or system of interconnected people or things. In this plan, “network” often
5 refers to a data network that transfers data over a system.

7 Right-of-way permits (ROW): A permit that can be issued by the NPS to allow a utility to pass
8 over, under, or through NPS property. The permit may be issued only pursuant to specific
9 statutory authority and generally if there is no practicable alternative to the use of NPS lands,
10 regardless of whether the equipment is serving the NPS and its visitors or crossing the park to
11 reach other communities. Examples of utilities and other uses that could be authorized by an
12 NPS ROW permit include electrical power lines, telephone lines, water conduits, canals, and
13 communications infrastructure including radio, television, and telecommunications
14 infrastructure. The ROW permit is a revocable license and does not give permittees an estate in
15 fee, limited estate, or any property interest or ownership in the land; it is not exclusive, and the
16 NPS reserves the right to allow visitor use of the land where appropriate.

18 Satellite: An artificial object placed in Earth’s orbit that is used for communication, television,
19 espionage, weather, or military purposes.

21 Service(s) (related to telecommunications): The offering of telecommunications such as voice
22 and data and may include Internet, television, or networking for businesses and homes.

24 Shielding (related to telecommunications): Techniques and methods to prevent interference or
25 transmission of telecommunications signals.

27 Small-cell site: A telecommunications site designed to enhance cellular system coverage and/or
28 provide more capacity of users to a cellular system. A small-cell site consists of an antenna panel
29 and associated equipment that is, within the context of this plan, mounted on or within existing
30 infrastructure such as streetlights or buildings, generally at some elevation. A typical antenna
31 panel could be three to four feet tall, about six inches wide, and four to six inches thick, with two
32 to four of these mounted on a light pole, wrapping the pole (visually similar to having three
33 power transformers that are wrapped on top of a power pole). In some cases, the antennas are
34 placed within a larger diameter monopole and are not visible.

36 Small-cell antenna: A physical transmission device used to broadcast low-powered cellular radio
37 frequencies between a fixed sites and mobile devices.

39 Telecommunications: Communication of signs, signals, messages, words, writings, images and
40 sounds or information of any nature by cable, telegraph, telephone, or broadcasting.

42 Tower (related to telecommunications): Free-standing or guy-wired masts or towers built to hold
43 telecommunications antennas such as two-way radio, microwave, and cellular antennas.

45 Two-way radio: Radio that can both transmit and receive a signal (a transceiver). Also referred to
46 as Land Mobile Radio (LMR).

1
2 Wireless: Radio-based systems that allow transmission of voice and/or data signals through the
3 air without a physical connection, such as a metal wire or fiber-optic cable.
4

5 Wireless Internet: A general term for using wireless services to access the Internet, e-mail and/or
6 the World Wide Web.
7

8 Wireless Services: Any of a number of technologies or services “typically electronic” that allow
9 the transfer of information over a distance without the use of electrical conductors’ “wires” using
10 various radio frequencies without being physically wired together.
11