

Appendix B – Mitigation Measures and Best Management Practices

The following mitigation measures and best management practices would be implemented to minimize the degree or severity of effects.

Acoustic Environment

For additional information, see this reference on protecting park soundscapes from National Academy of Engineers and the National Park Service: <https://www.nap.edu/catalog/18336/protecting-national-park-soundscapes>.

- Whenever feasible, permittee(s) would select and utilize construction equipment that has the lowest possible noise emissions. For example, hydraulically or electrically powered impact tools and chainsaws would be used instead of traditional gas-powered equipment when feasible. The use of high efficiency mufflers on construction equipment would be considered.
- Use of equipment such as backhoes, jackhammers, augers, and loaders would be minimized to the greatest extent possible during construction activities.
- All construction equipment would be kept in proper operating condition and the location of stationary, noise emitting equipment would be strategically placed and covered with a noise dampening enclosure when possible to reduce noise emissions.
- Construction equipment would be turned off, rather than allowed to idle, when not in operation.
- Construction and maintenance work would not occur during acoustically sensitive times of day (dawn/dusk).
- Wherever feasible, vehicles requiring backup alarms would be outfitted with broadband backup alarms.
- New generators would utilize the best available (quietest) technology and would be internally sheltered and covered with noise dampening enclosures to protect park resources. For example, acoustical (noise attenuating) louvers and sound absorbing wall treatments could be installed on the building interior.
- Generator noise levels would be measured and compared to NPS thresholds (e.g., 60 dBA at 50 ft or noise which is considered unreasonable (36 CFR 2.12) by a qualified acoustical consultant or certified noise control engineer after generator installation and prior to completion of construction, so that any noise control recommendations can be implemented before on-site construction efforts are completed. The goal of the measurements would be to ensure that generator noise would not interfere with park visitor activities or be objectionable to park visitors or staff working at the site. Grand Canyon National Park would provide a minimum of two (2) on-site observers at the time of measurement to make subjective assessments of noise reasonableness (36 CFR 2.12) and provide input to the acoustical consultant on generator noise with respect to park visitor or interpretive activity that may occur at key measurement locations and other surrounding areas. If noise levels are found to exceed thresholds or are otherwise found by NPS on-site observers to be objectionable, additional noise mitigation options could be considered.
- Generators would be tested for the shortest duration necessary; testing would not occur during acoustically sensitive times of day (5:00pm to 8:00am). Should a generator be in close proximity to another telecommunications tower and associated generator, the testing of the two generators would be scheduled to occur at different times of the day so that the two are not intentionally operated at the same time.

Cultural Resources

- All mitigation measures developed as part of the Programmatic Agreement with the Arizona State Historic Preservation Officer (SHPO) and Tribes to guide project implementation would be followed in coordination with the park Section 106 Coordinator, Cultural Resources Program Manager, and the park Tribal Program Manager.
- The NPS would seek to avoid adverse effects to all types of historic properties, with input from consulting parties. Avoidance measures for historic properties could include (but would not be limited to) redesigning project elements, fencing sites during construction, monitoring construction near site areas within a buffer zone, or placing infrastructure outside of site boundaries.
- All cultural resources identified during site-specific analysis would be evaluated for eligibility for National Register listing, in consultation with the consulting parties.
- For any activity that involves work in NHLs, historic districts, cultural landscapes, or on or by historic buildings or structures, the *Secretary of the Interior's Standards for the Treatment of Historic Properties* and *Director's Order 28, Cultural Resources Management*, would be followed.
- Areas selected for staging equipment and materials would be expected to be located in existing disturbed areas where there is no potential for archaeological resource disturbance. The park's Cultural Resources Program Manager would be contacted and consulted before creating/utilizing any staging areas not previously addressed or reviewed for this project.
- If not previously surveyed or in areas that do not have not been previously surveyed to current professional standards, any proposed location for telecommunications infrastructure would be surveyed for archaeological resources before work begins, and project-specific mitigations would be identified to avoid archaeological resources, if present, to the extent possible. If archaeological resources are identified in the immediate project area and could not be entirely avoided during construction, maintenance, and ongoing operations at the site, additional compliance with NHPA and other applicable laws would be required.
- If an adverse effect to archaeological sites is unavoidable, the NPS would minimize or mitigate adverse effects to historic properties through the development and implementation of a Historic Properties Treatment Plan (HPTP), which would be developed in consultation with the parties to the Programmatic Agreement and would specify a program of measures to minimize and/or mitigate adverse effects. The NPS would ensure that the HPTP is consistent with the *Secretary of the Interior's Standards and Guidelines for Archaeological Documentation* (48 FR 44734-44737). A Memorandum of Agreement (MOA) would not be needed.
- NPS, in consultation with SHPO and the Tribes, would prepare a monitoring and discovery plan (MDP) before ground-disturbing activities. The MDP would minimally include all locations and situations when monitoring is required, evaluation criteria for determining the presence of isolated occurrences versus archaeological sites, how to document findings, and how to protect, document, and consult on discoveries of human remains.
- Ground disturbance activities would be monitored by an NPS archaeologist (this would be scheduled with the park's Cultural Resources Program Manager at least two weeks prior to activity) when the disturbance lends itself to detection of archaeological materials, including excavation or grading. Such work would not proceed without a cultural resource specialist present.
- Per any tribe's request, a tribal resource monitor would be invited to be on-site when ground disturbing work is occurring.
- If previously unrecorded and/or buried cultural resources are discovered during any portion of the project, work at that location would immediately cease, and an assessment made by a qualified cultural resource specialist. The NPS would notify SHPO. If American Indian-associated resources are discovered the Tribes would also be notified. Work in that area would not resume until the resources could be identified and documented, and an appropriate

mitigation strategy developed and implemented in consultation with SHPO and, as appropriate, Tribes.

- In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during any portion of the project, provisions outlined in the Native American Graves Protection and Repatriation Act and *GCNP's Memorandum of Agreement Regarding Collections, Inadvertent Discovery, and Intentional Excavation of Native American Human Remains, Funerary Objects, Sacred Objects, and Objects of Cultural Patrimony* (NPS 2007) would be followed.

Vegetation

- Proposed tower locations and conduit alignments would be provided to the park's Vegetation Program Manager for review prior to approval and the area surveyed for sensitive species. Areas of sensitive species, if identified, would be avoided, particularly near the rim.
- Pruning necessary for the project, and for any future periodic maintenance in the area, would adhere to the park's pruning guidelines with the goal of retaining health and integrity of trees and shrubs treated.
- Damage to trees or roots in or adjacent to project areas during construction would be avoided as much as possible. If avoidance is not possible, root pruning guidelines would be followed.
- All vehicular access on non-paved roads would avoid any woody vegetation and brush.
- Care would be taken to avoid operating equipment, staging equipment and supplies, and disturbing soils, biotic crusts, natural surfaces, grasses, forbs, shrubs and other natural materials.
- All construction equipment used would be pressure cleaned and free of weeds, seed, debris, and mud to prevent the introduction and/or spread of exotic, invasive plants.
- Disturbed areas would be revegetated following construction. Only native and local (when possible) seed stock would be used for all temporary and permanent vegetation establishment.

Soils

- Construction activities on un-paved surfaces would be restricted during saturated soil conditions or severe weather conditions to avoid damage to soils and vegetation.
- If boring is not feasible for the installation of fiber and conduit, a "micro trencher" or equivalent would be utilized to bury the fiber and conduit to minimize the disturbed footprint as much as possible.
- After any ground disturbance is complete, bedding material would be placed and compacted in the trench bottom. Backfilling and compaction would begin immediately after trenching, and the trench surface would be returned to pre-construction contours. All trenching restoration operations would follow guidelines approved by park staff. Compacted soils would be scarified, and original contours reestablished.

Wildlife

General

- Wildlife would not be fed or approached.
- Biodegradable matting with a large-diameter natural fiber would be used to prevent entrapment of wildlife, if erosion netting is necessary. When used, erosion netting would be removed by contractor at project completion.
- Care would be taken not to disturb any wildlife species (reptiles, migratory birds, raptors, or bats) found nesting, hibernating, estivating, or otherwise living in, or immediately nearby, worksites.

- The park's Wildlife Program would be notified/consulted when any wildlife must be disturbed or handled. They would be available to assist with moving/relocating wildlife, when necessary; and/or to make recommendations for relocating any disturbed animals.
- For any projects involving trenching or digging holes, provisions (generally in the form of ramps; with a slope < 45°) would be made every 20-50 ft to allow for the escape of animals that may fall into these recesses, and/or they would be covered in such a way as to prevent animals from falling in the trench.

Bats

- The park's Wildlife Program would survey areas prior to installation of telecommunications infrastructure. Measures would be implemented to avoid any damage to existing bat roosts and no action would occur that could obstruct access points to existing roosts.
- Measures would be implemented to reduce the possibility of disturbing or harming tree-associated bats, such as timing tree removals for the colder months of the year and/or performing roost surveys and delaying tree removals if bat roosts are present.
- If bats are encountered on buildings, activity would cease and the park's Wildlife Program would be contacted for assistance and/or advice in removing them safely.

Migratory Birds

- All vegetation removal and maintenance activities should be scheduled outside of the peak bird breeding season to reduce impacts to birds.
 - When vegetation removal activities cannot avoid the bird breeding season, nest clearance surveys would be conducted no more than five days prior to the scheduled activity to ensure recently constructed nests are identified.
 - The timing and dimensions of the area to be surveyed vary and would depend on the nature of the project, location, and expected level of vegetation disturbance.
 - If active nests are identified within or in the vicinity of the project site, the site would be avoided until nestlings have fledged or the nest fails. If the activity must occur, a buffer zone would be established around the nest and no activities would occur within that zone until nestlings have fledged. The dimension of the buffer zone would depend on the proposed activity, habitat type, and species present. The buffer should be a distance that does not elicit a flight response by the adult birds; for example, this buffer can be 0.5 – 1 mile for hawks and eagles.
- All wiring on towers and other infrastructure would be securely attached to the structure to reduce the likelihood of birds becoming entangled.
- Bird nest exclusion devices would be installed on any new or relocated towers.
- Anti-perching devices would be installed on any new or relocated towers and any antenna large enough to support the weight of a condor.
- If birds are nesting on communication towers that require maintenance activities, the park's Wildlife Program would be contacted, and if necessary, park personnel would contact the USFWS for permits, recommendations, and requirements.
- Monitoring of mortality strikes at towers may be completed. If it is discovered that bat and bird mortalities are occurring and there are ways in which these can be avoided, modifications to the towers could be made in the future to avoid these impacts.
- Representatives from the NPS, USFWS, or researchers would be allowed access to telecommunications sites to evaluate bird use, conduct dead-bird searches, and conduct other research, as necessary.

Species of Special Concern

- GRCA's Wildlife Program Manager would be contacted a minimum of two weeks prior to project implementation to verify locations of sensitive species.
 - If condor nesting activity is known within 0.5 miles of the project area, light and heavy construction in the project area would not occur during the active nesting season of February 1- September 30. Active nesting season dates may be modified based on the most current information after consultation with a park Wildlife Biologist and Section 7 Coordinator. For cyclic maintenance projects that will occur within 0.5 miles of condor nesting activity, a GRCA Wildlife Biologist would be contacted to determine whether the maintenance can occur during the nesting season.
 - For projects within Grand Canyon Village, light and heavy construction equipment would not be used within 0.25 miles of Mexican spotted owl Protected Activity Center boundaries during the breeding season (March 1 – August 31).
 - For projects outside Grand Canyon Village, light and heavy construction equipment would not be used within 0.5 miles of Mexican spotted owl Protected Activity Center boundaries during the breeding season (March 1 – August 31).
- Project staff would avoid interaction with condors and would immediately contact the park's Wildlife Program or park dispatch if and when a condor(s) visits a project site.
- If condors visit a project site, project activities would cease until the condors leave on their own or until permitted personnel use approved techniques that result in condors leaving the area.
- The project site would be cleaned up at the end of each day the work is being conducted (e.g., trash disposed of/secured appropriately, scrap materials picked up) to minimize the likelihood of condors visiting the site. Park wildlife program staff may conduct periodic spot checks to ensure adequate project clean-up measures are being appropriately undertaken.
- Removal of trees and snags larger than 18 inches dbh would be minimized; no trees or snags larger than 24 inches dbh would be cut. Should the removal of trees larger than 24 inches dbh be necessary on a case-by-case basis, the park's Wildlife Program Manager and Section 7 Coordinator would be contacted, and additional consultation with the USFWS may be necessary if trees are located within critical habitat of Mexican spotted owl.

Visitor Use and Experience

- To the extent practical, work would be scheduled to avoid construction activity and construction related delays during peak visitation times. No night time work would be allowed. Holiday and weekend work (Saturday and Sunday) would not be allowed unless authorized in writing by the park.
- Any disturbed paved areas would be restored to pre-project conditions.
- In areas where wireless service (particularly cellular—voice and data) may be available, GCNP would provide guidance to visitors on usage of personal electronic devices within the park to minimize impacts from the use of these devices on visitor experiences and to encourage visitors to connect directly with park resources. This guidance could include suggestions such as limiting use of nonessential electronic devices, silencing ringers, avoiding the streaming of music or videos in public, avoiding the use of these devices within the backcountry, and tips for increasing awareness of one's surroundings. This guidance would also remind visitors about the dangers (and legal implications) of distracted driving. This information could be shared via brochures, information on the park's website and/or app, and/or signage within the park.

Human Health and Safety

- Wireless telecommunications infrastructure is required to meet all applicable standards related to radio frequency emissions in order to be considered within the park. All telecommunications infrastructure would be constructed in a manner that meets, if not exceeds, the minimum

requirements and standards of the Standard Building Code, the National Electrical Code, National Fire Protection Association code, and the Standard Mechanical Code.

- The FCC and NTIA have established electromagnetic field safety standards and extensive domestic and international research has not determined any hazard from wireless telecommunications infrastructure operating at regulated power levels. No single wireless telecommunications facility or combination of wireless telecommunications infrastructure would be permitted that exceed the FCC standards for human exposure at the point of closest public access.
- Signage would be installed where necessary to inform the public and employees of radio frequency exposure near telecommunications towers.
- NPS employees or others who are tasked with working in close proximity to the facilities or for long periods of time would be trained to minimize potential radio frequency exposure and ensure that exposure is within the occupational limits.
- Any ROW permittee(s) would develop site-specific safety plans for any construction.
- NPS Aviation crews would be consulted and notified prior to construction of any telecommunications tower within the park. The NPS would notify all EMS cooperators/flight crews of the specific locations of these towers as they relate to landing zones.