National Park Service
U.S. Department of the Interior
Carlsbad Caverns National Park
Carlsbad, New Mexico

Finding of No Significant Impact
CAVE Underground Lighting Replacement Project

Background

In compliance with National Environmental Policy Act (NEPA), the National Park Service (NPS) prepared an Environmental Assessment (EA) to examine various alternatives and environmental impacts associated with the proposal to replace the underground lighting system at Carlsbad Caverns National Park.

The proposed action is to replace the park's underground lighting system with an energy-efficient, low maintenance, light-emitting diode (LED) system. The existing system has severely deteriorated over the last several years and is requiring extensive and costly maintenance. Repairing or replacing the lighting is necessary in order to restore permanent, reliable lighting for visitor use and protection, as well to reduce impacts to the natural and cultural resources located underground.

The park receives approximately 400,000 visitors annually, who require reliable lighting during their time underground. Any disruption to the lighting could impact visitor and employee health and safety, as well as their enjoyment of the natural and cultural resources of the park.

Selected Action

Alternative B is the park's selected action. Alternative B is the complete replacement of the existing lighting system. The main distribution cables would be re-routed where possible to minimize construction and maintenance damage to the resources. The new cables would be composed of technologically advanced materials which would help protect the cables from the harsh cave environment. The feature lighting and controls would be a system that uses a mixture of simple, lower cost LED lights, medium cost LED lights, and high-end LED lights. The feature lighting would have dimmable fixtures that would allow visitors to fully experience the cave formations and other significant resources, and would allow the park to highlight the cave's natural hues and colors and control the light intensity and temperature to reduce algal growth. Approximately 30-40 trail lights would be installed. Day labor supervised by Park Resource Division staff would remove the old electrical and lighting system. All of the old cabling and capping material would be removed. All of the old fixtures, associated wiring and mortar, and material created by deterioration (metal flakes, wire scraps, paint chips, etc.) would be removed from the cave using hand tools.

Mitigation Measures

Mitigating measures were developed for the selected action in order to minimize the degree and/or severity of adverse resource impacts of the alternative on park resources and they will be implemented during construction under any of the alternatives, as applicable:

1. All contract employees will participate in a half-day cave resource orientation training to educate these employees in minimum impact and safe caving practices.
2. All footwear worn by project workers will be non-marking to prevent black marks on sensitive cave features.
3. All footwear, clothing, equipment and tools will be clean prior to entering the cave in order to avoid transporting dirt, oils and other contaminants into the cave environment.
4. No anchors, ropes, cables or guys will be temporarily or permanently fastened to the cave without direct supervision by specially trained and designated park personnel.
5. Any permanent anchors will be made of stainless steel so as to prevent corrosion impacts on the cave environment.
6. Vacuum cleaners operated in the cave will have a properly maintained and functioning High Efficiency Particulate Air (HEPA) filter so as to prevent negative impacts to cave air quality.
7. New lighting fixtures and wires will be installed in areas that already have been impacted so as to avoid impacting more sensitive cave geological resources and sediments.
8. Biology: New lighting fixtures will be located and have their beams oriented so as to minimize non-native algae growth and resultant negative impacts. Color temperatures and light intensity will also be optimized to reduce algae growth while at the same time providing safe and pleasant lighting for visitors.
9. Biology: The LED lights should be set to the 4000K setting where possible, where greens are the primary color. Algae and other green plants will be reduced over time as the existing plants are killed off by bleach treatments and new spores will not find good habitat. The converse is true if color temperatures are set to the lower end of the light spectrum. This could potentially create new favorable habitat for algae plant spores to be able to germinate.
10. Biology: After the lighting replacement project has been completed, park resource management staff will work with volunteers to restore areas affected by the lighting system to a more natural state. The last of the algae will be removed from areas where the current lighting system has facilitated growth. These areas may require multiple treatments before all traces have gone. All of this restoration work will be carefully supervised to ensure there are no adverse effects to cave natural and cultural resources.
11. Biology: Noise and light produced during the lighting project installation shall not occur in the Main Corridor, the Underground Lunchroom, the Pump

Room, Bathroom, and the part of the Big Room that connects them, after 6pm and before 8 am. If the park lights have been shut off in these locations, the workers will have to use their headlamps to light their way around and out of the cave.

12. Biology: To minimize disturbance to bats, heavy pounding, heavy drilling, and noise that propagate through bedrock shall only be allowed from November 1 through March 1 anywhere in the Cavern.
13. Biology: To minimize disturbance to bats and cave swallows, there shall be no construction activities from the Natural Entrance to Devil's Spring 24 hours a day from March 1 through November 1. Travel through this area during this time may occur, following cave noise and light reduction protocol only from 8:00 am to 6:00 pm.
14. To minimize disturbance to bats, electric tools, loud voices or other noise, bright lights and cave lights, shall not be used from the Underground Lunchroom through the first part of the Big Room and all the way up to Devil's Spring between the hours of 6:00 pm to 8:00 am from April 1 to November 1. Travel through this area may occur following cave noise and light reduction protocol.
15. Biology: To minimize disturbance to bats roosting in Left Hand Tunnel, there shall be no construction activity from Left Hand Tunnel through the Underground Lunchroom, Grape Arbor, the first part of the Big Room and the entire Main Corridor from6:00 pm to8:00 am April 1 to November 1. During this time, limited travel through this area to access the elevator may occur from King's Palace through Appetite Hill, Big Room Junction, first part of Big Room and Elevator Area and will follow cave noise and light reduction protocol.
16. Biology: All construction activities can take place in the furthest part of the Big Room and the King's Palace 24 hours a day except as noted previously above. This area includes the part of the Big Room past Billing Dove Tunnel and Jim White Tunnel. The King's Palace includes the rooms King's Palace, Queen's Chamber, and Papoose Room.
17. Biology: In order to protect cave invertebrate animals, as well as any other wildlife, food and beverages other than water, shall not be allowed in the cave except at specially designated areas of the Underground Lunchroom, as established by the Contracting Officer. All food scraps and waste by construction personnel shall be immediately disposed of and removed from the cave on a daily basis, or more frequently as required. Gum and tobacco products shall not be allowed in the cave at any time. There shall be no expectorating, defecating or urinating in the cave.
18. Biology: Cave pools are particularly sensitive areas, and contractor's personnel will not be allowed to enter or to place anything in them.
19. No mortar will be installed to mount light fixtures or conceal light fixtures or wires on natural cave surfaces.

20. Removal of the old lighting system and concealment of the new lighting system will be overseen by NPS cave resource specialists in order to minimize impacts caused by these activities.
21. Cave sediments and blast rubble will not be transported from one area of the cave to another section for concealment of lights or wires in order to prevent impacts to cave sediments and cave geological resources.
22. No trenching will take place in natural, undisturbed cave sediments or formations to conceal light fixtures or wires in order to prevent impacts to cave sediments and geological resources.
23. Operation of combustion-engine equipment is ***not allowed at any time***. If applicable, other heavy equipment other than hand tools, shall be inspected prior to use due to the fact some petrochemicals from the equipment could seep into the soil. To minimize this possibility, equipment will be checked frequently to identify and repair any leaks.
24. Cultural Resources: All contract employees will participate in a cultural resources orientation training to educate these employees in minimum impact to, and conservation of, historic landscapes.
25. Cultural Resources: Should construction unearth previously undiscovered archeological resources, work will be stopped in the area of any discovery and the site will be assessed by park cultural resources staff for the appropriate action.
26. Native American Concerns: In the unlikely event that human remains are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (1990) will be followed.
27. Cultural Resources: Contractors will avoid all known and field identified Cultural Resources against destruction, obliteration, removal or damage, in accordance with the requirements of the National Historic Preservation Act of 1966 (36 CFR 800.3).
28. Cultural Resources: Should equipment move accidentally outside the approved work, project inspector will report the incident, and a cultural resource specialist shall conduct a damage assessment, and devise remediation.
29. Cultural Resources: Cultural resource site location information will be kept confidential. All access to information regarding the location of cultural resources will be restricted to those employees on a need to know basis.

Environmentally-Preferable Alternative

Alternative B, the park's Preferred Alternative, is also the park's Environmentally-Preferable Alternative. According to the Council on Environmental Quality (CEQ) regulations implementing NEPA (43 CFR 46.30), the Environmentally-Preferable Alternative is the alternative "that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources. The Environmentally Preferable Alternative is identified upon consideration and weighing by the Responsible Official of long-term environmental impacts against

short-term impacts in evaluating what is the best protection of these resources." Visitor safety and health, and protection of natural and cultural resources are best protected through the Environmentally-Preferable Alternative.

Alternatives That Were Considered

Two alternatives were evaluated in the Environmental Assessment (EA); the Alternative A-No Action Alternative and the Alternative B-Install New Lighting System (the park's Preferred Alternative). Please refer to the Environmental Assessment for complete descriptions of the alternatives.

Alternative A-No Action Alternative

Under the No Action Alternative, the existing power distribution and lighting system will remain. Current repair, replacement, and maintenance practices will continue. None of the existing or abandoned fixtures, wiring, and other supporting infrastructure will be removed from the cave. The No Action Alternative provides a basis for comparing the management direction and environmental consequences of the proposed action. Should the No Action Alternative be selected, the NPS will respond to future needs and conditions without major actions or changes in course. Under the No-Action Alternative further lighting system deterioration (e.g. rusting) would continue to occur.

Alternative B-Install New Lighting System

Alternative B is the park's Preferred Alternative. It is also the Environmentally-Preferable Alternative. The park prefers Alternative B, which is described as follows.

Power Supply Boxes (Alternative B)
The current project proposes to place 299 power supply boxes in Carlsbad Cavern to supply a new system of lighting for the cavern. Approximately 240 of these proposed power supply boxes have been proposed adjacent to the paved visitor trails in Carlsbad Cavern, and about 59 have been proposed out in the resource away from the visitor trails. However, only 200 power supply box locations were found, 156 of which are adjacent to the paved visitor trails and 44 of which are off trail out in the resource. These power supply boxes are to be set up along the Natural Entrance/Main Corridor Trail, the Big Room Trails, and the Kings Palace Trail-a total of about 3 1/2 miles of trail. The power supply boxes are light gray in color and measure 13.56"x13.38"X 6.34."

Park Resource Stewardship and Science Division staff has thoroughly evaluated the proposed locations of the power supply boxes along the Natural Entrance/Main Corridor, Big Room, and Kings Palace trails. Staff has also evaluated optional locations for the 200 power supply boxes to reduce the visibility of the power supply boxes from the paved visitor trails in the cavern. Three primary means of placement of the power supply boxes have been proposed: 1) horizontal placement on a paver that measures slightly larger than the power supply box and 2) vertical placement on or adjacent to the

rock wall that borders most of the paved trails in Carlsbad Cavern, and 3) placement behind rocks or cave features to reduce the impact of the power supply boxes on the park visitor's experience.

Feature Lighting (Alternative B)
The feature lighting and controls will be a system that uses two-color LED lights with a DMX control. DMX is a communication protocol used in theatrical and building systems to control lighting. A mixture of simple, lower cost LED lights, medium cost LED lights, and high-end LED lights will be used. The feature lighting will have dimmable fixtures with two LED color choices (white and warm white) that will allow visitors to experience the resources dynamically and will allow the park to highlight the cave's natural hues and colors and control the light intensity and temperature to reduce algal growth. Dimmable fixtures require less energy and extend the fixture life. This will reduce the number of times that park staff will need to compromise the natural resources by walking off the trail for repairs.

Light color, temperature, and intensity will be balanced digitally through the DMX control at an office control point. Controlling the fixtures with DMX will allow the lighting designers the greatest flexibility when choosing fixtures and control devices. Each fixture could be independently controlled and adjusted and will provide maximum protection of natural and cultural resources and allow for future expansion based on the Park's needs.

Trail Lighting (Alternative B)
Fifteen new LED lights of similar size will replace 15 existing trail lights in the rock wall of the Twilight Zone. There will be no disturbance to the rock walls where these 15 lights are being placed. An additional 12 trail lights will be installed: three lights at the Devil's Den staircase, four lights at the Green Lake staircase, and four lights at the Green Lake tunnel near Iceberg Rock. The lights on the staircase will be about 4"x3"x2" and will be placed on the existing vertical supports for the handrails. These will be new lights; there are currently no lights in these locations. Their purpose is to make climbing the steps more safe.

Removal/Demolition of the Old System (Alternative B)
Day labor supervised by Park Resource Division staff will remove the old electrical system. All of the old cabling will be removed. In places where the cables were capped with concrete or mortar, all of the capping material will be removed. Hand tools will be used to remove as much material from cave floors as possible without causing more damage. In cases where mortar material has been integrated into delicate speleothems, the material will remain in place to prevent further damage.

Where cables have been buried beneath dirt, sediment, or rock, the covering material will be removed, the cable taken out of the cave, and the material will be put back in place.

All of the old fixtures, associated wiring and mortar, and material caused by deterioration (metal flakes, wire scraps, paint chips, etc.) will be removed from the cave using hand tools. In some cases, limited amounts of natural cave sediment and dust may be removed to maximize the amount of contaminating material taken out of the cave environment. Additionally, wire scraps, broken light bulbs, insulation, and other litter related to past maintenance and repair of the old lighting systems will be removed from the cave.

After the lighting replacement project has been completed, Park Resource Division staff will work with volunteers or others to restore areas affected by the lighting system to a more natural state. The last of the algae will be removed from areas where the current lighting system has facilitated growth. These areas may require multiple treatments to remove all traces. The restoration work will be carefully supervised to ensure that there are no adverse impacts to cave resources. Cable, power supply boxes, and panel boards will be camouflaged to the extent feasible.

Why the Selected Action Will Not Have a Significant Effect on the Human Environment

As defined in 40 CFR §1508.27, significance is determined by examining the following criteria:

Impacts that may be both beneficial and adverse; a significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial

Implementation of the Preferred Alternative will result in some adverse impacts; however, the overall benefit of the project, particularly to park operations, visitor use and experience, and energy savings partially outweighs these negative effects. The effects are summarized as follows.

Cultural resources will be adversely impacted by installing the new lighting system and removing the old lighting system. The new lighting system will be located within the Area of Potential Effect (APE) of the proposed designation of Carlsbad Caverns as a Cultural Historic Landscape. The Preferred Alternative will have a short-term, minor adverse impact on Visitor Use and Experience due to noise and dust from construction. Visual resources will be adversely impacted by the addition of new power supply boxes, cables and lights. There were substantial adverse impacts to the visual resources of the cavern from electrical/lighting work done in 2014. However, mitigation measures of the upcoming lighting project will reduce the visual and cultural impacts to moderate. Maintenance costs and energy costs will be lowered dramatically. Geology and Cave/Karst resources will realize moderate adverse impacts for the long-term from the placement of the power supply boxes and cables. Mitigation measures such as camouflaging of the equipment and demolition of old lighting materials will reduce the impacts to the natural resources. The overall benefit of implementing the Preferred Alternative is that park operation costs will be substantially reduced over time. Energy costs will be reduced by utilizing the latest LED technology. Algal growth will be

reduced through the controlled lighting colors and wavelengths. Visitors will experience an enhanced lighting of the cavern splendors. The new lighting system is expected to last 25 years or more before any scheduled maintenance.

The degree to which the proposed action affects public health or safety

The Preferred Alternative will have an overall beneficial effect on public health and safety, particularly for the park's visitors and employees who will be conducting tours in the Cavern, and maintenance crews who do repairs and maintenance on the underground lighting. The new lighting system will reduce the amount of maintenance work and minimize the possibility of lighting failures. Health and safety issues associated with the lack of a dependable lighting system will be greatly improved. Hazards due to old, decadent wiring will be removed, and inefficient incandescent bulbs will be replaced with state of the art technology.

Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas

The unique characteristics of the geographic area include the proximity of the proposed lighting system to the proposed underground historic district and cultural landscape. Additionally, the lighting system will be implemented within the cave/karst system, which is considered an ecologically critical area. There are no other park lands, prime farmlands, wetlands, or wild and scenic rivers that will be affected.

The degree to which the effects on the quality of the human environment are likely to be highly controversial

Five pieces of correspondence were received during public review of the Environmental Assessment (EA). Some were in favor of the project, while others were not. Considering the volume and content of the public responses received, the effects of this project are not considered to be highly controversial.

The degree to which the possible effects on the quality of the human environment are highly uncertain or involve unique or unknown risks

The Environmental Assessment (EA)/analysis process, including the application of mitigation measures, has identified effects that may involve impacts to cave/karst features. Mitigation measures which have been included in the EA, will consequently reduce potential impacts to cave/karst features. Because this work is similar to work the park has done in the past, there are no unique or unknown risks.

The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration

The Preferred Alternative is not expected to set a precedent for future actions with significant effects, nor does it represent a decision in principle about a future consideration. The proposed action is replacement of an existing lighting system. As such, a new precedent will not be established. Upgrading of the lighting system is a project that must be considered every so often as the lighting deteriorates.

Whether the action is related to other actions with individually insignificant but cumulatively significant impacts; significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

Cumulative effects were analyzed in the EA, and no significant cumulative impacts were identified.

The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources

The Area of Potential Effect (APE) consists of the entire trail system within Carlsbad Cavern and visible landscape as seen from the trail. It includes human constructed stonework throughout the cavern that is associated with the trail system as well as the view of the cavern from the trails. The human constructed elements exist in order for the public to experience the cavern. These historic elements have been placed in such a manner that they blend in visibly with the natural stone of the cavern. Therefore, attention is not drawn to these features. Instead, attention is drawn to the spectacular natural wonders of the cavern. Part of the cultural landscape is the view one enjoys from the trail of the natural features. However, there is a traceable history of human development that has facilitated the passage of visitors to the cavern. The stonework is extensive and includes, but is not limited to, large retaining features that support the trail system, and short walls along the trails that can be up to approximately 30 inches in height. The purpose of the short walls lining the sides of the trails is to confine lint to the trail in order to keep it from impacting the natural cavern environment. Within the APE is an historic property, the Carlsbad Caverns Historic District and Cultural Landscape. The impacts to the cultural resources include visual impacts from lighting hardware that is intrusive and any hardware that is attached to the historic stonework. The proposed project will adversely affect the Carlsbad Caverns Historic District and Cultural Landscape. The entire Area of Potential Effect (APE) is within Carlsbad Cavern, and is deemed eligible for inclusion as the Carlsbad Cavern Historic District and Cultural Landscape. As a result, the NPS has determined that this project will result in a finding of Adverse Effect on the historic property of the eligible Carlsbad Cavern Historic District. New Mexico State Historic Preservation Office concurred with this finding on 5/12/15. A Memorandum of Agreement (MOA) was signed between the National Park Service, the New Mexico State Historic Preservation Office, and the Advisory Council on Historic Preservation on October 22, 2015. The MOA outlines additional mitigation that will be carried out in order to reduce adverse effects to the proposed Carlsbad Cavern Underground Historic District and Cultural Landscape.

The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973

The NPS determined there were no endangered or threatened species or its habitat that will be impacted. Additional consultation was conducted with U.S. Fish and Wildlife Service, and the New Mexico Department of Game and Fish. Each of these agencies stated they had no comments with regards to the CAVE Lighting Replacement Project.

Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment

The action will not violate any federal, state, or local environmental protection laws.

Public Involvement

The Environmental Assessment (EA) was made available for public review and comment during a 30-day period ending March 23, 2015. To notify the public of this review period, a letter was mailed to stakeholders, Native American tribes, interested parties, and newspapers. Copies of the document were made available to certain agencies, interested parties, and to the tribes that requested a copy during the scoping period, and a copy was also posted on the NPS Public Environment and Public Comment (PEPC) website at http://parkplanning.nps.gov/. Seven comments were received during this review period. Five comments were from individuals. Some of the comments were substantive others were not. Responses to these comments have been prepared and incorporated into the Finding of No Significant Impact (FONSI) document.

Native American Consultation

Two letters were received from the San Carlos Apache Tribe which concurred with the project and the findings of Environmental Assessment . Copies of the document were made available to certain agencies, interested parties, and to the tribes that requested a copy during the scoping period, and a copy was also posted on the NPS Public Environment and Public Comment (PEPC) website at http://parkplanning.nps.gov/.

Conclusion

As described above, the Preferred Alternative, Alternative B, does not constitute an action meeting the criteria that normally require preparation of an Environmental Impact Statement (EIS). The Preferred Alternative will not have a significant effect on the human environment. Environmental impacts that could occur are limited in context and intensity, with generally adverse and beneficial impacts that are mostly localized, short- to long-term, and negligible to moderate. There are no unmitigated adverse effects on public health, public safety, threatened or endangered species, sites or districts listed in or eligible for listing in the National Register of Historic Places, or other unique characteristics of the

region. No highly uncertain or controversial impacts, unique or unknown risks, significant cumulative effects, or elements of precedence were identified. Implementation of the action will not violate any federal, state, or local environmental protection law.

Based on the foregoing, the NPS has determined that an EIS is not required for this project.

Approved: Sue E. Masica Date: 11/3/15

Sue E. Masica, Regional Director
Intermountain Region
National Park Service

ERRATA SHEETS

TEXT CHANGES

1. Page 15, Alternative B: Install New Lighting System (Park-Preferred Action and Environmentally-Preferable Alternative), 4th paragraph. Delete"In some places, the cable will be shallowly buried in natural cave sediment or other fill material."
2. Page 14, Power Distribution (Alternative A-No Action Alternative), add the following text: the new power distribution system is already in place. It was completed in 2014 under the Phase I project, Categorical Exclusion.
3. Page 15, the Interdisciplinary Team will look for a better location for power supply boxes than under the bench. A hidden location away from the visitor trail may be a better location for this power supply box.
4. Page 32, insert the following text after the first sentence of the section onUnique Ecosystems. "Carlsbad Caverns was selected as the World Heritage Site based on criteria i and iii of the World Heritage Committee Statement of Significance. Criterion (i): Carlsbad Caverns National Park contains portions of the Permian-aged Capitan Reef Complex, one of the best preserved and accessible complexes available for scientific studies. On-going geological processes continue to form rare and unique speleothems in park caves, notably Lechugilla Cave. These include helictites forming underwater and the world's largest and most diverse collection of bacterially assisted "biotherms." Criterion (iii): Park caves, especially Carlsbad Cavern and Lechugilla Cave, are well known for their great natural beauty. The large rooms and passages as well as the ease of access make Carlsbad Cavern unique among world caves. Lechugilla is an immense cave system over 180 kilometers in length and contains a great abundance of unique calcite and gypsum speleothems including the world's largest accumulation of gypsum chandeliers, some over six meters in length. "Special mitigation measures will be employed to reduce adverse impacts to these unique ecosystems. Please refer to pages 17-19 of this Environmental Assessment for a list of mitigation measures."
5. Page 37, the narrative regarding description of 2014 work will be reviewed and revised as necessary. Text will be amended to include the size of the fixtures and add a mitigation to lessen the effects of the green light.
6. Page 50, add additional members of the Interdisciplinary Team: Text will be added to the errata section to amend the Consultation/Coordination section of the Environmental Assessment. The following National Park Service staff participated in the development of the NEPA compliancePaul Burger, Hydrologist; and Dale Pate, Physical Scientist. Several lighting experts were consulted. They include: Mark Rudiger, Senior Lighting Designer, RMH Group; Peter Weinreb, Lighting Consultant, Light Southwest, Inc.; Michael Riotto, Principal Lighting Designer, Michael Riotto Design, LLC; Anjeanette Stokes, Associate Lighting Designer; Michael Riotto Design, LLC, and, Rich Kagiyama, Denver Service Center.

7. Page 50, Federal Agencies Contacted section will be amended to include the U.S. Fish and Wildlife Service, which is located within the Bureau of Land Management office in Carlsbad, NM.
8. Page 51, the List of Preparer's table will be amended to include the Chief of Interpretation Marie Marek.
9. Page 52, add the following references:
   Value Analysis Study 2010-15, Replace Old and Unsafe Lighting and Electrical Systems in Carlsbad Cavern. Project No. CAVE 109360, prepared by Andrews & Anderson Architects, PC, Golden, Colorado.
   Cave/Karst Management Plan, 2006, SOP-13-02.
   Clean Air Act of 1963, as amended.
   Council on Environmental Quality (CEQ) 40 CFR Section 1508.9
   Council on Environmental Quality (CEQ) 43 CFR Section 46.30
   National Environmental Policy Act of 1969 (NEPA).
   National Historic Preservation Act of 1966 (NHPA).
   NPS, Directors Orders #47, Soundscape Preservation and Noise Management, December 1, 2000.
   NPS, Planning, Environment, and Public Comment (PEPC) website: http://parkplanning.nps.gov/.
   San Carlos Apache Tribe Letter of Consultation, 2015. (NPS files).
   Title 50, Code of Federal Regulations, Part 10.

According to NPS policy, substantive comments are those that 1) question the accuracy of the information in the Environmental Assessment, 2) question the adequacy of the environmental analysis, 3) present reasonable alternatives that were not presented in the EA, or 4) cause changes or revisions in the proposal.

Some substantive comments may result in changes to the text of the EA, in which case, they are addressed in the Text Changes section of the Errata Sheets. Other substantive comments may require a more thorough explanatory response and are addressed in the Response to Comments section. The NPS responds to all substantive comments in either or both of these sections.

As stated previously in this document, *Public Involvement and Native American Consultation* sections, a total of four individuals and one Native American Tribe, submitted comments during the public review period of the EA. Four of the responders provided substantive comments. Substantive comments for this EA centered on two topics: mitigation of impacts to natural and cultural resources during construction of the project, and suggestions for revisions to various parts of the Environmental Assessment. In some cases, these comments resulted in changes to the text of the EA and are also explained more thoroughly in the Response to Comments section.

RESPONSE TO COMMENTS

Comment 1: There weren't any cost quotes included with the article. How much are the tax payers going to have to shell out for this project?
NPS Response1: Cost estimates are approximately:

- Electrical backbone replacement ($5.1 million)
- Lighting system controls, fixture installation, and deployment ($2.6 million)
- Demolition of old infrastructure/concealment of new infrastructure ($375 thousand)

Comment 2: Is it cost effective overall? What is the longevity of the lighting system?

NPS Response 2: The NPS believes the project is cost-effective. The latest LED technology will be utilized and is expected to reduce energy costs. The longevity of the system is estimated to be 25+ years before any significant maintenance is expected.

Comment 3: If not too expensive then I'm for a lasting improvement of cost effective (Solar) lighting that will last about 50 years or so.

NPS Response 3: Since 2008, Carlsbad Caverns National Park has operated a 30 X 50-foot solar array, mounted atop the shade structure at the Visitor Center entrance. Instead of storing energy in batteries, this array feeds electricity back onto the power grid in real time. In this manner, we currently do use solar energy indirectly, to operate the underground lighting system. As photovoltaic technology becomes more sophisticated and less expensive to install, Carlsbad Caverns National Park plans to expand its solar power generating capacity.

While energy efficiency improvements were considered and incorporated into the design, they were not the primary driver for the project. The EA document provides a detailed description of the other considerations, summarized here:

- Electrical safety issues with the deteriorating infrastructure.
- Electrical code violations.
- Lighting system reliability and the maintenance cost issues involved with changing light bulbs and ballasts for the 875 light fixtures currently used to light the cavern.
- Impacts to the cavern resources from excessive heat and light generated by the system.
- Improved visitor experience resulting from the ability to precisely control lighting intensity and color at each fixture.

The NPS believes that opportunities for expanding solar power generation should be explored whenever possible. The cavern is located 750 feet below the surface and the underground trail system within it extends for a distance of over two miles. Collecting solar energy at the surface and bringing it down into the cavern exclusively for use by

the lighting system, would require installation of inverters, storage batteries, and other dedicated infrastructure. Other equipment installed in the cavern, including concessions refrigeration and the sewage lift station, require substantial electric power. Constructing a photovoltaic power system that could handle all of the additional electrical requirements down in the cavern would have been cost prohibitive.

Comment 4: Care should be taken to conceal the electric cables that are necessary, which are just as much of the visual impact as the amount, thermal emissions, or spectra of the light, as has been quite apparent in this interim period. They might be concealed beneath some durable, non-reactive, organic-free cover, which could then be coated so as to better blend into the local rocks. Coatings could be based on ordinary white wash (CaO), which combines with CO2 in the presence of water to form calcite. This can be colored by diverse natural earth pigments (raw and burnt ochre; ray and burnt sienna; green earth; naples yellow; lamp black, etc.) in a blotchy fashion, which would visually break up the line of the electric cords, without requiring large amounts or time or expensive or invasive materials. These pigments would not introduce anything into the cave environment unlike the naturally occurring pigments that cause colors in the caves, and nothing that is of health concern to cave organisms, visitors, or staff using the pigments. Wire (cable) covers would have to be treated with care so the white lime coating was not knocked off.

NPS Response 4: Regarding your comments concerning ensuring that the concealment materials are non-reactive and non-organic, any concealment material will be tested in the cave prior to installation in order to ensure that it does not support mold or fungal growths. While final concealment materials are yet to be determined, it seems to be simpler and less likely to harm the cave environment to use concealment materials that have the appropriate colors as part of their design rather than adding a coating after they are constructed.

Comment 5: What should not be done is to either bring material into the cave that could be used to bury the cables, or remove material from any part of the cave and move it around to bury the cable

NPS Response 5: The NPS will avoid bringing materials from outside of the cave to bury cables or to remove sediment or other cave materials from elsewhere in the cave to bury cables. Cave sediments contain important cultural, climatological, paleontological and geological records that can be irreplaceably damaged by disturbance.

Comment 6: There has been a tendency over the last years to use sediments below flowstone caps in the Big Room and elsewhere to facilitate trail construction. This has been a mixed blessing and curse. On one hand we can better see the geologic relationships involved, which has been valuable in unraveling the complicated late history of the caverns. On the negative side it has been a significant impact to irreparable cave features. Of uncertain impact is the confusion brought to geologists when we find things in one part of the cave that did not naturally occur there before. That being said,

in more recent times, debris generated by trail construction/modification/lighting has been disposed of by putting beneath the flowstone caps that had previously covered in-place stratified sediments mentioned above, which are of considerable rarity and significance. This mixing of materials (i.e. contamination) in crucial outcrops should not occur. It is critical that no debris generated during relighting the cave should be left in the cave except perhaps as base material if new trails are being built.

NPS Response 6: The NPS will not be using clays/sediments from under flowstone caps in Carlsbad Cavern for trail building activities. There will be no new trails built and no deposition of construction materials under flowstone caps as a part of this project. Impacts to irreparable cave features such as flowstone caps will be avoided.

Comment 7: Considering the miles of electric cord that will have to be camouflaged as per suggestions in my first comment above, it might be reasonable to commission the production of plastic (?), rubber (?), covers (perhaps 200-250 cm long and 30 cm wide), with varying degrees of rugosity so as to make disguising the electric lines easier. The covers should be of a surface designed to facilitate the adherence of whitewash. Having these things made could probably be done as cheaply as spending time and materials to cover lines foot by foot. Various rubbers and plastics hold up well in the cave environment, but care should be taken that the substrate selected should not be attractive to insects, mice, or diverse microbes, etc. Molding formed plastic covers is not rocket science and should be neither expensive nor involved.

NPS Response 7: See response to comment 4 above.

Comment 8: The approach to this EA is comparing a "No Action" alternative to an "Install New Lighting System" alternative. Since it has already been determined through the scoping studies (p.50), and the power distribution system has already been installed based on said studies, this comparison is mute, and the "No Action" alternative is a straw man argument. So the "Description of the Problem and Existing Conditions (p.6-9) is the justification for eliminating this alternative (just like the impacts dismissed from further analysis, p.12-13), and no further discussion regarding this alternative is necessary, and is actually fruitless. This EA should be comparing different alternatives to achieving the new installation. Instead, this EA is stating, without professional and scientific substantiation, how the new installation will be performed, when there are different approaches and philosophies to achieving the project objectives, which need to be weighed as alternatives. Each of the 4 issues this EA addresses (mitigation of the power distribution lines, feature lighting, trail lighting, and removal of the old system), needs to have alternatives.

NPS Response 8: The No Action Alternative serves as a baseline from which to compare new impacts. The EA provides one means for mitigating the impact of the power distribution cables. The EA includes LED feature lighting; the lighting system to be installed allows for much variation in lighting color and intensity that will be decided upon when the lighting system is installed in the cavern. The trail lighting system

consists of only 26 lights in very small sections of the cavern, such as tunnels; a trail lighting system for the whole cavern was deemed to be cost prohibitive and unnecessary. The EA provides three options for power supply boxes within the Preferred Alternative.

Comment 9: If different approaches were considered during the value analysis (p. 14) they are not being evaluated in this EA. For example, there has been much discussion about whether the new lighting should be 1) the same color temperature throughout or vary, and 2) be located next to the trail or out in the resource. As another example, this EA only provides one option for the mitigation of the very visible power supply lines, by covering them with camouflage nylon fabric, instead of evaluating other alternatives.

NPS Response 9: The Categorical Exclusion conducted in 2010 and the Value Analysis Study of 2010 evaluated several other approaches for the new lighting and cables. Please refer to pages 25-31 of the Value Analysis Study report (2010). The LED lighting provides for much variation in color temperature and intensity. The setting for each individual light can be determined at the time the lights are installed. Other examples noted are covered in other responses.

Comment 10: Since the power distribution system was installed without a prior EA, and as a result, the impact to the physical and visual resource is majorly adverse, continuing the lighting project prior to mitigating this ruination of the cave is putting the cart before the horse. And the stated mitigation in Alternate B, covering the lines using camouflage nylon fabric, is like putting a band-aid on an infection, instead of curing the infection. This solution is covering up a mistake (literally), not fixing it.

NPS Response 10: The power distribution system was installed under the 2010 Categorical Exclusion. While there were substantial visual impacts in installing the power distribution system in 2014, these impacts will be reduced to moderate under Alternative B.

Comment 11: The Cat Ex for the power distribution system was approved under false pretenses, that the impact would be insignificant because the new cables were going to follow the old ones. However, the old cables are thin Romex cables that were easily hidden, and the visual impact was minor (p.36). As stated on page 37, the new (2014) "large cables have a moderate to major adverse visual impact for the park visitor."

NPS Response 11: The new large cables installed in the cavern in 2014 have a greater impact than the older cables that were used to light the cave. The impacts that the commenter is referring to are included in the CE and these impacts will be reduced with Alternative B mitigations. The new large cables were utilized for safety reasons.

Comment 12: Violations of the Cat Ex occurred at many locations where the new lines crossed new territory because the old lines could not be followed, and where lines connect to all the new panels that did not previously exist. These large cables need to be

relocated in the areas where they are 100% visible from the trail. Had an EA been written for the power distribution system, the best placement of the large cables would have been 1) on the cave floor when they are out of visual range from the trail, and 2) buried, or in a covered channel, in the trail when they would otherwise be visible from the trail. This is in agreement with the Environmentally Preferable Alternative (p.15).

NPS Response 12: The commenter is referring to the 2014 installation of cables done under the Categorical Exclusion. Most of the large cables were installed adjacent to the visitor trails, in order to minimize the impact of the large cables throughout the cavern resource.

Comment 13: As stated on page 36, "there were no electrical/lighting panel boards in Carlsbad Cavern prior to 2014," yet now there are 35 panel boards, most of which are 50-100% visible, having been installed beside the trail. This number of panel boards is an overkill, and the removal of 4 of the original 39 panel boards without any adverse affect indicates that they are not all necessary. The number of panels needs to be reduced further, and they need to be relocated so as to not be visible from the trail.

NPS Response 13: The NPS believes that the 35 panel boards installed under the Categorical Exclusion in 2014 will have an adverse visual impact to some park visitors. The park and the Denver Service Center will look to see if there can be any further reduction in the number of panel boards, particularly those that have the greatest visual impact. It might be possible to relocate a few of the most visible panel boards away from the trail by hiding them behind formations, but this will result in greater physical impact to the cavern floor.

Comment 14: The EA fails to mention (p.37) that of the 22 newly constructed rock walls to support the panel boards, many extend above the railing, blocking the view of the resource behind them, especially for children and the mobility impaired.

NPS Response 14: The commenter refers to work that was conducted under the Categorical Exclusion in 2014. The EA text will add comments that state that portions of the cavern immediately behind the rock walls and panel boards may not be visible for children and mobility impaired. However, in some of these locations, the historic rock walls in place before 2014 were high enough that areas immediately behind the rock walls may not have been visible to a small child or person using a wheelchair. Almost all of the areas immediately behind the rock walls do not have cave formations.

Comment 15: So only after the huge mistake has been fixed, and the visible large cables and panels have been relocated, should an EA address how to best install the new lighting. Let's not make the same mistake twice by putting the cart before the horse. Yes, this EA precedes the installation of the new lighting system, but it wrongly piggy-backs on the mistake of the poorly planned installation of the power distribution system.

NPS Response 15: The EA discusses lighting work to be done in the future and not work that was conducted under previous compliance.

Comment 16: Introduction and Historical Background, p.6, next to last paragraph (see also Power Distribution, p.15 1st paragraph, and Impacts of Alternative A - Visual Resources, p.37, 2nd paragraph). The EA states "None of the transformers and only one of the large panel boards are readily visible from the paved visitor trails in the cavern, due to their distance away from the trails." These statements are not true and are misleading.

NPS Response 16: This quote refers to a part of the project completed in 2014. The authors of this EA believe that the EA quote above is accurate. However, it is true that if you have a flashlight that can cast a long beam into the existing darkness away from the trails, you may be able to spot a transformer in the pool of darkness.

Comment 17: The new transformers were installed on new concrete pads, and as a consequence, the resource has been further impacted, and 5 of the 6 new large panels next to the transformers are visible from the trail with a flashlight (which visitors are allowed to use), which was not the case with all but one of the old transformer locations.

NPS Response 17: Most of the large panel boards installed in 2014 under the Categorical Exclusion are located considerably away from visitor trails in a pool of darkness. However, some of the large panel boards can be seen if someone shines a flashlight directly toward them.

Comment 18: Transformer 1 (the most visible) is in a bad location because it is now closer to, and within the splash zone of, a constantly wet formation, which creates a potentially hazardous and high maintenance scenario.

NPS Response 18: Even with dripping water nearby, the new transformer #1 is much safer than the old transformer, due to improved grounding of the new system. It is possible that increased moisture could increase corrosion and decrease the lifespan of this transformer.

Comment 19: Had an EA been prepared for the power distribution system, the new transformers would have been exchanged, one by one, with the old ones, on the existing pads, out of sight even with a flashlight, after the lines were in place, and the locations of the new large panels associated with the transformers would have been chosen based on visibility from the trail, not close proximity to the transformers.

NPS Response 19: The power distribution system was installed in 2014 under the Categorical Exclusion.

Comment 20: Feature Lighting, p.9, 1st paragraph.
The EA states "..., so maintenance and replacement requires traveling across delicate

cave floors and causes damage to speleothems." This statement is not true and is misleading, and contradicts the 7th mitigation measure listed on page 17. There are established trails to all the fixtures, which have impacted the cave floor to the extent that they cannot be impacted further. Cave sediment, like all dry sediment, can only be compacted to a certain point, such that additional traveling on these sediments will have no further impact.

NPS Response 20: Maintenance and replacement of feature lighting currently requires traveling across delicate cave floors and does cause damage to speleothems. There are not established trails to all fixtures. Accessing some fixtures require walking, crawling and climbing on delicate formations. In some cases vertical caving techniques on formations are required to access fixtures. While some routes to lighting fixtures are on compacted sediment, some routes are on non-compacted sediment. The mitigation measure located on page 3, item 5, describes the special treatment that will be implemented in order to reduce impacts to cave floors.

Comment 21: Only if the electrician/maintenance worker, who is supposed to be trained in how to minimize their impact (p.17), steps off these trails, would there be damage to speleothems. This is why the 7th mitigation measure, "New lighting fixtures and wires will be installed in areas that already have been impacted..." is sound and should be upheld whenever possible.

NPS Response 21: The NPS believes the statement is correct.

Comment 22: Relationship of the Proposed Action to Other Plans and Policies, p.11, a quote from the Carlsbad Caverns General Management Plan (1996), last paragraph. The EA states that "the park's lighting system will be redesigned by professional cave lighting engineers..." To my knowledge, no cave lighting experts, nor other cave park personnel with knowledge of cave lighting issues (e.g., Mammoth Cave, Wind Cave, etc.) were consulted for this project.

NPS Response 22: The Park worked closely with the staff of Mammoth Cave National Park and Wind Cave National Park prior to designing the lighting system. Both parks have recent experience and expertise with installing efficient LED cave lighting systems. Michael Riotto Designs, a lighting design company, was also involved in the initial planning and development of the lighting system. Mark Rudiger, a lighting designer, was a contractor for that portion of the Cavern Electrical/Lighting project that was completed in 2014. The References section of the EA will be revised to indicate that professional lighting design experts, not cave lighting engineers, have participated and will participate in the Electrical/Lighting project.

Comment 23: This is why the installation of the power distribution system (and potentially the new lighting installation) has permanently ruined this World Heritage Site, unless steps are taken to properly mitigate what has been done, and properly plan for the new lighting.

NPS Response 23: Mitigation measures for the new lighting system are found in the EA. Please refer to pages 17-19.

Comment 24: Alternative B, Power Distribution, p.15, last paragraph.
The EA states: "Having panel boards closer to the electrical loads in the cave allows maintenance activities to be closer to the trail, increasing staff safety and reducing impact to natural cave floors and other resources." Maintenance activities, which will be very infrequent due to the state-of-the-art technologies (50-year life expectancy) and over-engineering, should not take precedence over the continual visual impact to the resource when it comes to locating the new panel boards (large and small). Any maintenance worker/electrician working in Carlsbad Cavern should be trained and have the skills to traverse the natural cave floors off-trail (1st mitigation measure, p.17), which is a better alternative to opposing the philosophy stated in the Management Policies (2006) "that scenic views and visual resources are considered highly valued characteristics that the NPS should strive to protect" (p.28), as well as the philosophy of the current lighting system, which "was designed and laid out with concealment in mind, so as not to draw attention away from the cavern's natural features" (p.43). The truth is that there is no accessible part of the cave that visitors can see that has not already been impacted by foot traffic.

NPS Response 24: The NPS believes that views of the cavern from the visitor trails are very important in the assessment of the impacts of the Lighting project. The EA gives great attention to assessing the visual impact of power supply boxes and other elements of the lighting project. The lighting panel boards were erected under the Categorical Exclusion for the Electrical Distribution portion of the project that was completed in 2014. The NPS believes that there are accessible parts of the cavern which have not been impacted by foot traffic.

Comment 25: Finding locations for these panels that would not involve difficult access or impact to delicate cave floors (e.g., popcorn crusts, flowstone, etc.) must be considered, but can be accomplished, given the size of the cave. Therefore, all visible panels should be relocated off-trail to locations that conceal them from the visitor's view from the trail, taking access and impact into consideration.

NPS Response 25: The commenter's statement refers to a part of the project that was completed in 2014. Panel location decisions were made based on both visual impacts and impacts to the cave's natural resources. In some cases, it was possible to locate the panel boards in an area that was not visible and did not cause additional resource damage. In some cases, this was not possible and visual impact was chosen over resource impact. In the future, it might be possible to reduce the size of some panels to decrease their visual impact, or to relocate or remove some panels. The concealment phase of the project will also reduce the visual impact of the panel boards.

Comment 26: Mitigation Measures, p.18
The EA text states: "No mortar will be installed to mount light fixtures or conceal light

fixtures or wires on natural cave surfaces." There is no justification for this edict. Mortar has served the park well in concealing the current lighting fixtures and cables, as well as in the construction of the trail system, so why is it not viable today? The fact is, mortar is the most natural material, outside of existing cave sediment and loose rocks, to use for concealment, since it is composed of limestone and water, which is not foreign to a limestone cave, and can be made to look like the cave floor and walls.

*NPS Response 26:*The NPS believes that it is simpler and less likely to harm the cave environment to use camouflage material than it will be to add new mortar to the cave.

Comment 27: Mitigation Measures, p.18
The text states: "Cave sediments and blast rubble will not be transported from one area of the cave to another section for concealment of lights or wires in order to prevent impacts to cave sediments and cave geological resources." While this edict is very understandable in regards to blast rubble, which was used in the past to conceal cables (Boneyard) and was approved by a recent former Cave Resources employee, there needs to be some qualification regarding cave sediment. The qualification should allow cave sediment to be used that is within 20 feet of the cables to be concealed, as opposed to sediment from a different part of the cave (e.g., the quarry in LHT). There is no scientific evidence that our cave sediments would be impacted any more than they already are (see argument under Unique Ecosystems).

NPS Response 27: There are still many cave sediments in the developed area of Carlsbad Cavern that have not been disturbed. Significant paleontological resources have been discovered in these sediments including Shasta Ground Sloth bones and bat bones. These sediments also contain important geological records of material such as stream cobbles and clays that are critical to understanding the geologic history of Carlsbad Cavern. In some areas the sediments include clays that are magnetically reversed. Because of the important information that undisturbed cave sediments contain, it is important that they not be disturbed.

Comment 28: Mitigation Measures, p.18
The text states: "No trenching will take place in natural, undisturbed cave sediments or formations to conceal light fixtures or wires in order to prevent impacts to cave sediments and geological resources." To not allow shallow trenching in cave sediments (not through formations, of course) to bury cables or to conceal lights or power supply boxes is unjustified without scientific proof of negative impact. Just saying there would be adverse impact does not make it true (see argument under Unique Ecosystems). This edict is a contradiction to the Park-Preferred Alternative (p.15), "in some places, the cable would be shallowly buried in natural cave sediment or other fill material."

NPS Response 28: The commenter's statement is correct. Since cave sediments are important resources it is critical that no trenching will take place in natural, undisturbed cave sediments. The Park's Preferred Alternative has been modified to remove the

following text "in some places, the cable will be shallowly buried in natural cave sediment or other fill material."

Comment 29: The use of this nylon cover, on the other hand, does have scientific support that indicates it will create a vapor barrier, where acidic moisture will collect and decompose calcite formations underneath (see Pat Jablonski's study of the damage from lint mats on formations). Such a cover will also cover the resource on both sides of the cables and impact a wider footprint than burying the cables or covering them with mortar. On steep slopes or uneven ground, the cover will move if not held down with rocks and cave sediment, which is a violation of the edit previously discussed. Such a cover will also be obvious if not in darkness, and will look unprofessional and amateur.

NPS Response 29: The proposed nylon material used to conceal cables will be tested in both dry and wet areas of the caves prior to installation to insure that it does not support mold growth or damage cave formations. Nylon does allow air and moisture to move back and forth. As with any woven fabric, the breathability and resistance to airflow of a fabric is determined by the weave of the fabric (the size and number of holes). Even a woven fabric made of rubber strands will breathe. Based upon your comments, perhaps a nylon fabric with a very loose weave should be selected in order to maximize the breathability of the nylon.

Comment 30: Preferred Alternative, p.20
Was owners/managers of show caves, both in the private sector and on federal lands, deliberately sought out for consultation, or was a comment period to some brief proposal statements the only effort made to seek expertise in cave lighting? If not, then due diligence was not implemented. Carlsbad Caverns is a World Heritage Site and one of the premier caves in the world, and as such deserves the best cave lighting that money and expertise can buy. This cave lighting should be a model for other cave managers to emulate. Cave lighting is an art, and should not be the work of novices.

NPS Response 30: See previous response to comment 22. The Park worked closely with the staff of Mammoth Cave National Park and Wind Cave National Park prior to designing the lighting system. Both parks have recent experience and expertise with installing efficient LED cave lighting systems.

Comment 31: Impacts to Alternative B, Cave and karst, etc., p.30
The EA text states: "With fixtures and distribution panels located closer to the trail and the use of longer-lasting LED lights, the number of maintenance trips across the delicate cave floors would be dramatically reduced." If less maintenance trips across delicate cave floors is the only justification provided for placing fixtures and panels next to the trail, then this justification does not outweigh the major impact to the visual resource of a show cave. As mentioned before, the over-engineered cables and panels will need minimal maintenance, and this infrastructure can be strategically placed in the resource where impact to cave formations will not occur, and there is no scientific evidence that further foot traffic will impact the cave floor more than has already occurred. This

location strategy also contradicts the mitigation edict on page 17, that fixtures and wires will be installed in areas that already have been impacted (i.e., where fixtures and wires already exist, which in many places is not next to the trail). This philosophy, placing the lighting infrastructure next to the trail, should have been an alternative weighed against others with less visual impact.

NPS Response 31: Many areas of the cave floor of Carlsbad Cavern are extremely delicate. Further foot traffic will cause impacts to these extremely delicate floors.

Comment 32: Impact of Alternative B - Groundwater Resources, p.31, same sentence quoted above.
Please explain how maintenance trips off-trail could negatively impact groundwater resources. Maintenance workers would have to have contamination on their shoes and walk through wet ground due to dripping water. However, if the 3rd mitigation measure (p.17) is exercised, then this scenario will not occur. Furthermore, there is no mitigation in place to capture the drip water that becomes highly contaminated after landing on and migrating down the trail and is directed off-trail via drains. The trail is more of a biohazard than a maintenance worker's decontaminated shoes!

NPS Response 32: Off-trail maintenance trips will likely have negligible negative impacts on groundwater resources.

Comment 33: Unique Ecosystems, Intensity Level Definitions, p.33
The helping verb, "would", in all the definitions needs to be changed to "may" to be more correct, as these definitions cannot be substantiated without scientific testing of the sediment along the off-trail trails leading to light fixtures and electrical panels. Diane Northup (cave microbiologist) has shown that the area within 20 feet distance from both sides of the trail in a show cave with high visitation is no longer a viable environment for cave microbial ecosystems. One has to question the cave management philosophy that considers cave microbial ecosystem protection within areas impacted by humans in a show cave to be more important than the visual resource, which is what the visitors come to see and experience. While this philosophy is viable for a wilderness cave like Lechuguilla, it does not make logical sense for a show cave.

NPS Response 33: While researchers such as Dr. Diana Northup have documented that the microbiological diversity of cave passage decreases with the increase of human activity, there is no scientific evidence that areas within 20 feet of a show cave trail are no longer a viable environment for cave microbial ecosystems. Dr. Hazel Barton has documented significant microbes within a few feet of the tour trails of Carlsbad Cavern. All of the uses of "would" on page 33 are appropriate and changing them to "may" will change the intended meaning of these sentences. All cave natural resources including microbes have to be considered in conjunction with visual resources when making determinations concerning the location of cave lighting infrastructure.

Comment 34: Impacts of Alternative B - Visual Resources, Visual Impact of Power Supply Boxes, p.37-41
A lot of this difficult-to-follow verbiage can be reduced to one paragraph that explains that these boxes were not in mind (or even considered) when the temporary GFI terminations were placed along the trail during the installation of the power distribution system. So there is no reason to keep these locations for the power supply boxes, especially if concealing them from the visitor's view has any merit. The only significance to the GFI locations is their proximity to light fixture groupings. Some of the GFI locations are an impossible location for a power supply box. This being the case, and because there is no good reason to keep the location of the boxes close to the trail (at least for one alternative), then every attempt should be made to conceal them behind cave features. This eliminates the need to provide useless statistics of how many boxes will be hid vs visible. They are all subject to moving prior to installation, based on concealment and close proximity to the light fixtures they will power. There is no reason why all the power supply boxes could not be hidden from view from the trail, but some cables may need to be lengthened or shortened to make this happen.

NPS Response 34: The purpose of the Visual Impact Assessment is to do a thorough visual assessment of the impact of up to 299 power supply boxes being placed into the cave, which have the potential to be one of the largest adverse impacts of the Lighting Project. The visual impact of the power supply boxes has been a key issue for the park, the Intermountain Region Cultural Resource Office, and the state historical agency. The park evaluated evaluated three alternatives/options for placement of the power supply boxes: 1) horizontal placement on the cave floor, 2) vertical placement on the rock walls bordering the trail, and 3) moving the boxes away from the cave trails to locations where they are not visible, where possible. Approximately 17 power supply boxes could not be hidden from visitors walking the cave trails.

Comment 35: This brings up a philosophy concerning the power supply boxes that should be one of the alternatives under this category. Each box will have one 5/8" power cable entering the box, and as many as 6 smaller cables exiting the box to feed the fixtures it powers. This being the case, there is less impact to the resource if the power box is close to the fixtures, out in the resource, than if it is close to the trail. There is less concealment involved, and therefore less impact to the resource (both physically and visually) to cover one power cable from the trail to the box out in the resource than it is to cover 6 fixture cables from a box next to the trail to the fixtures out in the resource.

NPS Response 35: This recommendation will be taken into consideration during the placement of the power supply boxes in the cavern. The NPS agrees there will be less concealment needed.

Comment 36: Boxes next to the trail can be tampered with, which decreases the safety of the visitors. For example, a suggested location for 2 boxes is under a bench seat, where they can be kicked, tampered with, and damaged, not to mention creating a potential hazard to the visitors. As many as 12 cables will extend from the bench to the fixtures up

on a high ledge. If the power boxes are on the ledge with the fixtures, then they are out of sight without concealment, and only one cable, which should replace the existing one, has to be concealed.

NPS Response 36: Regarding the comment that the power supply box under a bench along the trail could be subject to kicking by park visitors who use the bench, the Interdisciplinary Team will look for a better location for power supply boxes than under the bench. A hidden location away from the visitor trail may be a better location for this power supply box. The text on EA page 15 will be modified to describe this alternative location. Please see Errata section in FONSI, item #3.

Comment 37: Camouflage and Other Methods to Hide the New Electrical and Lighting System, p.42, 1st paragraph. Covering cables with a fabric is not mitigation, it's covering up the resource, both under and beside the cables. You can't just envelop the cables with the fabric, which will look like a tan-colored tube lying on the cave floor, but you have to cover the resource on both sides of the cables some distance to smooth out the bump, which in many places would cover cave formations (popcorn crusts, flowstone, etc.). This would increase the footprint of the cables, and therefore the area of impact. The fabric would be a vapor barrier that would shorten the life of the cables, and ruin any covered formations, not to mention look very ghetto. A better alternative would be to bury the cables in cave sediment, or cover them with mortar or rocks on hard surfaces. Using the fabric to cover the power supply boxes is more appropriate than the cables or panels.

NPS Response 37: The NPS believes that covering cables with fabric is a good mitigation measure. The NPS will not use fabric to cover any cave formations; the fabric will be used to cover the cables. The NPS believe that the fabric will not be a vapor barrier or shorten the life of the cables.

Comment 38: Impacts of Alternative B - Cultural Resources, p.45, last paragraph
There is no beneficial impact of the rock wall extensions, as the degree to which they screen the panels, they also screen the resource behind the walls from view by the visitors, especially when they extend above the railing.

NPS Response 38: In most cases the rock wall extensions help to reduce the visual impact of the panel boards.

Comment 39: Alternative A: Power Distribution, p.14
This is a fictitious no-action alternative, as the new power distribution system is already in place and paid for, and is operational (both the main power lines and new transformers). This paragraph needs to be rewritten to state that this issue is no longer applicable since the new power distribution is in place and operational.

NPS Response 39: The text will be modified to indicate that the new power distribution system is already in place. Please see Errata section in FONSI.

Comment 40: Alternatives considered and dismissed, p.19. The process of developing and evaluating the alternatives to produce the one Environmentally Preferred Alternative (the Park-Preferred Action) was not in compliance with the NEPA process, and needs to be included in this EA to allow public opinion to weigh in on the evaluation of this Environmentally Preferred Alternative.

NPS Response 40: There were two comment periods available to the public on the Electrical/Lighting Project. Public scoping was conducted from March 10th to April 10th, 2010, and then again December 17th, 2014 to January 2nd, 2015 to identify potential issues that will need to be addressed. An additional comment period was conducted for public review of the Draft Environmental Assessment, from February 21st to March 23rd, 2015. Per the Council on Environmental Quality (CEQ) regulations, the Environmentally-Preferable Alternative is the alternative that "causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources.

Comment 41: Furthermore, who were the experts that developed and evaluated and dismissed the alternatives to produce the Environmentally Preferred Alternative?

NPS Response 41: Text will be added to the errata section to amend the Consultation/Coordination section of the Environmental Assessment. The following National Park Service staff participated in the development of the NEPA compliance: Luis Florez, Compliance Officer; Renee West, Supervisory Biologist; Samuel Denman, Museum Technician; Stan Allison, Cave Technician; Kent Schwarzkopf, Chief of the Resource Stewardship and Science Division; Chuck Burton, Facilities Management Division Chief; Paul Burger, Hydrologist; and Dale Pate, Physical Scientist. Additional internal IDT scoping meetings were held on November 6, 2014, and on December 4, 2014, to facilitate the development of the Environmental Assessment. Several lighting experts were consulted. They include: Mark Rudiger, Senior Lighting Designer, RMH Group; Peter Weinreb, Lighting Consultant, Light Southwest, Inc.; Michael Riotto, Principal Lighting Designer, Michael Riotto Design, LLC; Anjeanette Stokes, Associate Lighting Designer; Michael Riotto Design, LLC, and, Rich Kagiyama, Denver Service Center.

Comment 42: What scientific data (not cited) was used to make these decisions? Analysis of Environmental Impacts, p.27

NPS Response 42: A Value-Analysis Study was conducted in 2010 by the NPS Denver Service Center. A copy of the Value Analysis Study will be placed in the NPS Planning Environment and Public Comment website (PEPC). A citation will be added to the CAVE Lighting EA References Section.

Comment 43: The decisions of the degree of intensity (negligible, minor, moderate, and major) for each of the environmental issues do not appear to be based on any studies, literature, or expert opinions, but on opinions of park staff, who have no expertise in

cave lighting.

NPS Response 43: Park employees who were involved in the preparation of this EA are well-trained and experienced in the evaluation of environmental impacts. Based upon the directives of the Director's Orders #12 Handbook (Section 4.5 (g), National Park Service units are directed to assess the extent of impacts on park resources as defined by the context, duration, and intensity of the effect. The degree of intensity terms (negligible, minor, moderate, and major) are based on an understanding and interpretation by resource professionals and specialists. Each alternative was compared to a baseline to determine the context, duration, and intensity of resource impacts. For the analysis, the baseline is the continuation of current management projected over the next several years. In the absence of quantitative data, best professional judgment was used to determine impacts.

Comment 44: Camouflage and Other Methods to Hide the New Electrical and Lighting System, p.42. 1st paragraph.
Where is the environmental impact study that shows that placing 1000s of linear feet of this synthetic fiber in the cave will have no adverse impact to the biology and hydrology of the cave environment, that the breakdown products are not going to contaminate the cave environment and groundwater, and that no mold, fungus, or algae will grow on this material when wet?

NPS Response 44: The proposed nylon material used to conceal cables will be tested in both dry and wet areas of the caves prior to installation to insure that it does not support mold growth or damage cave formations. An Environmental Impact Study is not required to place synthetic material in Carlsbad Cavern. This Environmental Assessment is the appropriate assessment level for this project.

Comment 45: The approach the NPS has taken with this project is unacceptable because it is not apparent that it is in compliance with the National Environmental Policy Act (NEPA). This Environmental Assessment (EA) should be required to take the "No Action" alternative, because in my opinion, this EA is not in compliance with NEPA, which requires a decision-making framework that 1) analyzes a reasonable range of alternatives to meet the objectives of the proposal, 2) evaluates potential issues and impacts to the park's resources and values, and 3) identifies mitigation measures to lesson the degree or extent of these impacts. This document fails to satisfy each of the 3 NEPA requirements. Furthermore, due to possible NEPA violations with Phase I of this project and lack of sufficient evidence and alternatives to address the magnitude and complexity of this project the Park should consider hiring an outside consultant to conduct or be required to conduct an Environmental Impact Statement (EIS) to guide the future management decisions related to the project. In the event an in depth EIS is not prepared, I think it will be reasonable to expect an appeal to this process by the public.

NPS Response 45: The draft Environmental Assessment (EA) was prepared in accordance with NEPA, the CEQ regulations for NEPA, and DOI-12.

Comment 46: First, this document clearly establishes a false argument, "No Action" action alternative to "Install New Lighting System" as a solution "unsafe" conditions, as found through several studies and fanciful stated design meetings that took place from 2009 - 2014, before this EA (p.50).

NPS Response 46: The No Action Alternative serves as a baseline from which to compare new impacts. The No Action Alternative describes the current and future conditions if proposed action is not implemented.

Comment 47: Because the authors of this EA effectively provide only one action alternative and because NEPA requires a decision-making framework that analyzes a reasonable range of alternatives to meet the objectives of the proposal, this EA clearly does not provide a range of alternatives and therefore is not in NEPA compliance.

NPS Response 47: Several alternatives were considered and dismissed during the Value Analysis Study in 2010. Page 19, Alternatives Considered and Dismissed section of the EA will be revised to add information from the Value Analysis Study.

Comment 48: Furthermore, these actions bypass public input, violating NEPA practices and procedures.

NPS Response 48: See response to Comment 45.

Comment 49: Secondly, this project's team lacks the professional experience needed to properly evaluate and recognize potential issues and impacts to park's resources and values. This is evidenced throughout the document but not as strongly as the Parks decision to embark on such a large project without assembling the most qualified and diversified team, conducting studies to affirm the use of a Categorical Exclusion (CX) for this project.

NPS Response 49: The following National Park Service staff participated in the development of the NEPA compliance: Luis Florez, Compliance Officer; Renee West, Supervisory Biologist; Samuel Denman, Museum Technician; Stan Allison, Cave Technician; Kent Schwarzkopf, Resources Division Chief; Chuck Burton, Facilities Management Division Chief; Paul Burger, Hydrologist; and Dale Pate, Physical Scientist. Several lighting experts were consulted. They include: Mark Rudiger, Senior Lighting Designer, RMH Group; Peter Weinreb, Lighting Consultant, Light Southwest, Inc.; Michael Riotto, Principal Lighting Designer, Michael Riotto Design, LLC; Anjeanette Stokes, Associate Lighting Designer; Michael Riotto Design, LLC, and, Rich Kagiyama, Denver Service Center. Additional internal IDT scoping meetings were held on November 6, 2014, and on December 4, 2014, to facilitate the development of the Environmental Assessment.

Comment 50: Also, the team admits to conducting work outside of the scope of the CX, without proper documentation of an amendment process to the existing CX. This action is evidenced by lack of evidence in text or in the resources used to prepare this EA and is not in compliance with NEPA.

NPS Response 50: The draft Environmental Assessment (EA) was prepared in accordance with NEPA, the CEQ regulations for NEPA, and DOI-12.

Comment 51: The document does state that many different people were contacted, but fails to indicate what information was gained from these contacts and how the information was implemented.

NPS Response 51: See Comment 56. The Interdisciplinary Team contacted staff at Wind Cave National Park and Mammoth Cave National Park. The Team used this information to design the proposed lighting system for Carlsbad Caverns National Park.

Comment 52: This document states that a lighting design team would be used for this project, in agreement with the Park's Cave Management Plan, "Carlsbad Caverns General Management Plan (1996) which describes planned action under the Subsurface Resources section, page 15, that... "the park's lighting system will be re-designed by professional cave lighting engineers to make it more efficient and easier to maintain, and to ensure that lights are positioned to minimize associated algae growth." yet there is lack of evidence to show the team actually contacted or consulted a lighting designer as there is no mention of contacting either entity in the list of people/organizations contacted...

NPS Response 52: See NPS Response to Comment 56. Text will be added to the errata section to amend the Consultation/Coordination section of the Environmental Assessment.

Comment 53: There are multiple references to impacts and mitigation without proper reference in the references sited to prepare this document, indicating that all mitigation decisions are based on opinion not science.

NPS Response 53: The EA text will be modified to include citations for the mitigation measures in the References Section. Please see Errata section in FONSI.

Comment 54: Even more troubling, without a proper plan in place, identifying the types of materials/lights to be used, how did this team evaluate the impact from said materials?

NPS Response 54: The Environmental Assessment (EA) draft was prepared in accordance with Director's Orders #12. The types and materials of the lights to be used are provided in the EA. Please refer to pages 37 to 42 of the Environmental Assessment.

Comment 55: Phase I work of this project was included within the 2009-2014 meetings, yet work was completed on Phase I without an EA. Legally the only way this work could be conducted would be through a CX that is tied to an existing EA.

NPS Response 55: It is not necessary that a Categorical Exclusion be tied to an existing Environmental Assessment. Please refer to Director's Order #12 for information regarding the use of Categorical Exclusions.

Comment 56: This is problematic for many reasons but none so troubling as the fact that if the Cat-X was sufficient for Phase I, when the resource was most vulnerable to adverse impact, it should be sufficient for the remaining Phases. It is concluded that the CX was not sufficient and determined as a poor management decision evidenced by the fact that an EA is now required.

NPS Response 56: The draft Environmental Assessment (EA) was prepared in accordance with NEPA, the CEQ regulations for NEPA, and DOI-12.

Comment 57: As stated in this EA on page 4, the last re-lighting project was conducted in 1975, which presumably is the benchmark EA that the CX is tied too, which is the prior to the Cave Protection Act of 1988 and the Native American Grave Protection and Repatriation Act of 1990, meaning the CX for Phase I of this project would have been tied to an EA that was conducted prior to both of these laws being written.

NPS Response 57: At the time Phase I was proposed, the Categorical Exclusion (CE) was determined to be the adequate NEPA compliance method. Please refer to the D.O. 12 for a list of approved categorical exclusion actions.

Comment 58: Given the emergence of new laws, determination of public safety, significance of this cave and cave critical resources, possible impact to the groundwater (the aquifer for the town of Carlsbad), the emergence of White Nose Syndrome, and the historical precedent of finding human remains in this cave; given the magnitude, scope, and complexity of issues of this project, I am befuddled as to how this planning team arrived at consciences to forgo to produce an EIS, or at a minimum conduct an EA, at the onset of this project.

NPS Response 58: The Environmental Assessment pertains to the proposed Lighting project. The draft Environmental Assessment (EA) was prepared in accordance with NEPA, the CEQ regulations for NEPA, and DOI-12.

Comment 59: The Cat-X clearly placed little importance on cultural, historical, visual, and cave resources. This is evidenced by the impact that has been placed on the historic route taken by the Cave's original explorer, Jim White, damage to secondary rock formations like popcorn and flowstone, and visual impact with the installation of multiple transformer boxes.

NPS Response 59: This comment refers to a previous phase of the project that was completed in 2014. The Environmental Assessment covers those parts of the Lighting project still to be completed.

Comment 60: Visual and cultural resources were not taken into consideration evidenced by the placement of a transformer boxes obstructing the view of the hill in which Jim White discovered the Big Room and obstructing the view of the historical Colonel Bowles photographic location along the trail in the Big Room.

NPS Response 60: Transformer boxes were installed in 2014 during Phase I of the Electrical/Lighting project. The Environmental Assessment pertains to the proposed future phases of the Lighting project. Please refer to page 36-41 of the Environmental Assessment for discussion of visual resources.

Comment 61: Furthermore, during 2009-2014 the Park had a Chief of Interpretation on staff, it is evidenced in the contact list and by the team members listed that the Chief of Interpretation was not consulted.

NPS Response 61: The Chief of Interpretation was involved in consultations on the project into 2014. The EA will be revised to include the Chief of Interpretation's name and title. The List of Preparers table on page 51 of the EA will be amended to include the Chief of Interpretation Marie Marek.

Comment 62: Also, the change in the emergency lighting fixtures was omitted from the CX summary. The new fixtures are larger in size and are more noticeable than the old fixture. In addition the green light on the new fixture, to indicate the fixture is working – is also distracting to the visual landscape of the cave. I am curious as to why the mention of these fixtures was omitted from the CX summary description.

NPS Response 62: Page 37 of the EA will be reviewed and revised as necessary to correct this omission. Text will be amended to include the size of the fixtures and a mitigation to lessen the effects of the green light.

Comment 63: Lastly, this EA does not identify mitigation measures to lesson the degree or extent of impacts to resources across the spectrum for resource considerations.

NPS Response 63: The commenter is incorrect. Mitigation measures to lessen the degree or extent of impacts are included in the EA. Please refer to pages17-19 of the EA.

Comment 64: The most incriminating piece of evidence to support non-compliance for this initiative is the lack of a lighting design plan and the evidence produced that this team has not consulted a lighting design team, cave lighting professionals, or conducted a literature review on the subject.

NPS Response 64: Commenter is incorrect. The NPS relied on the expertise of Mark Rudiger, Senior Lighting Designer, RMH Group; Peter Weinreb, Lighting Consultant, Light Southwest, Inc.; Michael Riotto, Principal Lighting Designer, Michael Riotto Design, LLC; Anjeanette Stokes, Associate Lighting Designer; Michael Riotto Design, LLC, and, Rich Kagiyama, Denver Service Center. A Values Analysis Study was prepared. The park consulted other NPS cave parks regarding their cave lighting systems.

Comment 65: The most important piece of information in this EA, which I commend the team for considering is the groundwater resources. What is not described is that Carlsbad Caverns National Park and Carlsbad Cavern lies within the recharge zone for the Capitan Reef Aquifer, which supplies drinking water to the City of Carlsbad and Eddy County residents relying on well water in the vicinity of the park. Making the groundwater resources critical to the surrounding populous. In the past, with the remediation of the surface drainage of Bat Cave Draw, the Park recognized the potential for groundwater contamination through the cave system to the Capitan Reef, in the 2007 EA on Wastewater System Rehabilitation. This team is disregarding the potential for groundwater contamination to critical resources by introducing new materials (the groundcover to hide the lighting cable) without proper research on the impact to critical groundwater resources. The idea of this project is sound and is needed, the approach and disregard for resources is questionable. The immediate questions that are raised in my mind that are generated from the introduction of a foreign fabric to the cave system, is will this fabric cause more damage or environmental problems than it is proposing to solve? Because it is a plastic, it will create a moisture barrier, will this moister barrier harbor an environment that will yield the growth of mold, black mold, will it cause an airborne mold spore that could cause lung damage to the 400,000 visitors... could this mold get into the drinking water? Will the fabric become a food source for insects or microbial colonies? Will the fabric become a nesting material for vertebrate animals, attracting them into the cave? What is the byproduct of this material when it breaks down? What are the impacts this material to the cave resources when it breaks down?

NPS Response 65: Any fabric or material used to camouflage the lighting infrastructure will be tested in different areas of the cave prior to installation.

Comment 66: This project is billed as a replacement project, however it calls for the addition of 425 lighting fixtures. Without a plan in place to determine what specific light fixture, the footprint of the light fixture and the sound frequency the light will produce, how does the team plan for mitigation?
The project calls for up to 425 additional light fixtures; the actual number of additional light fixtures needed may be much less than 425. The footprint of the light fixtures are identified and illustrated in the EA.

NPS Response 66: Mitigation measures were included in the EA. Please refer to pages 17-19 of the EA.

Comment 67: The most pressing question is will the light fixture, that is yet to be determined, produce a sound frequency that will disturb or disrupt bat populations within the cave? The park identifies in the Superintendent's Compendium that cameras are not to be used during the bat flight program because of the sounds emitted from cameras will disrupt the bats.

NPS Response 67: The Contracting Engineer for the Lighting project has stated that the lighting fixtures will not emit any sound frequencies.

Appendix – Non-Impairment Finding

The National Park Service's Management Policies, 2006 requires analysis of potential effects to determine whether or not actions will impair park resources. The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid or to minimize, to the greatest degree practicable, adversely impacting park resources and values.

However, the laws do give the National Park Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the National Park Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible National Park Service manager, will harm the integrity of park resources or values, including the opportunities that otherwise will be present for the enjoyment of those resources or values. An impact to any park resource or value may, but does not necessarily, constitute an impairment. An impact will be more likely to constitute an impairment to the extent that it affects a resource or value whose conservation is: necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park; key to the natural or cultural integrity of the park; or identified as a goal in the park's General Management Plan or other relevant NPS planning documents. An impact will be less likely to constitute an impairment if it is an unavoidable result of an action necessary to pursue or restore the integrity of park resources or values and it cannot be further mitigated.

The park resources and values that are subject to the no-impairment standard include: the park's scenery; natural and historic objects, and wildlife, and the processes and conditions that sustain them; including to the extent present in the park, the ecological, biological, and physical processes that created the park and continue to act upon it; scenic features; natural visibility, both in daytime and at night; natural landscapes; natural soundscapes and smells; water and air resources; soils; geological resources; paleontological resources; archeological resources; cultural landscapes; ethnographic resources; historic and prehistoric sites, structures, and objects; museum collections; and native plants and animals; appropriate opportunities to experience enjoyment of the above resources, to the extent that can be done without impairing them; the park's role in contributing to the national dignity, the high public value and integrity, and the superlative environmental quality of the national park system, and the benefit and inspiration provided to the American people by the national park system; and any additional attributes encompassed by the specific values and purposes for which the park was established.

Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park. The NPS's threshold for considering whether there could be an impairment is based on whether an action will have significant effects.

Impairment findings are not necessary for visitor use and experience, socioeconomics, public health and safety, environmental justice, land use, and park operations, because impairment findings relates back to park resources and values, and these impact areas are not generally considered park resources or values according to the Organic Act, and cannot be impaired in the same way that an action can impair park resources and values. After dismissing the above topics, the remaining topics to be evaluated for impairment include Cultural Resources, Cave/Karst Resources, Native American Concerns, Vegetation, Wildlife, Threatened and Endangered Species, Visual Resources, Air Quality and Soundscape Management.

Fundamental resources and values for Carlsbad Caverns National Park are identified in the General Management Plan (1996). According to that document, of the impact topics carried forward in this Environmental Assessment (EA), Cultural Resources, Cave/Karst Resources, Native American Concerns, Unique Wildlife, Threatened and Endangered Species, Visual Resources, Air Quality, and Soundscape Management are considered necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park; are key to the natural or cultural integrity of the park; and/or are identified as a goal in the park's General Management Plan or other relevant NPS planning document.

Cultural Resources – The project location is eligible for listing as Historic District and Cultural Landscape. Impacts to cultural resources from installation of the Lighting project will be long-term and moderately adverse, since the visual intrusion of the new lighting system is expected to affect the visual and historic resources of the underground trail. Mitigation measures, which are included in the Environmental Assessment, will reduce the impacts.

Cave/Karst Resources – Carlsbad Caverns National Park is located within a subsurface cave/karst system. There will be a minor adverse impact to cave/karst resources from construction for the short-term. For the long-term, the new lighting system and sensitive placement of lights, will cause a beneficial effect to the resources due to the reduced amount of maintenance staff traffic on delicate resource as repairs are performed.

Native American Concerns – There were no Native-American Concerns identified during the Environmental Assessment. Fourteen Native American Tribes were contacted. One Tribe responded with concurrence for the project and no further comments. Therefore, there will be no impairment to Native American Concerns.

Unique Wildlife – Impacts to unique wildlife such as bats, cave swallows, and invertebrates, will be minor and adverse for the short-term, as a result of the construction activities, including human traffic. Invertebrates may suffer impacts from trampling over the short-term. Mitigation measures included with the Environmental Assessment will reduce the impacts over time. Wildlife may be displaced in localized areas as a result of the construction. Long-term impacts will be negligible and adverse. Therefore, there will be no impairment to Unique Wildlife.

Threatened and Endangered Species – NPS resource staff inspected the project site for the presence of threatened and endangered (T&E) animal species. No T&E animal species were found. Therefore, there will be no impairment to Threatened and Endangered Species.

Visual Resources – Scenic views are one of the assets of many national parks. For the short-term, the viewshed from the underground trail will be adversely impacted in a minor to moderate degree during and after construction of Lighting project. Once completed, over the long-term the new Lighting system will have a beneficial effect upon the visitor's vistas as the cave speleothems are displayed in their spectacular splendor. Therefore, there will be no impairment to Visual Resources.

Air Quality – Carlsbad Caverns National Park is a mandatory Class I area. For the short-term, impacts will be minor adverse, due to airborne soil particulates generated by the construction equipment and crews. Long-term impacts will be minor beneficial impacts as the new lighting system requires less maintenance, less particulates released into the air from the previous, old decomposing cable and boxes. Over the long-term, air quality will return to what it was prior to construction. Therefore, there will be no impairment to Air Quality.

Soundscape Management – For the short-term, there will be moderate, adverse impacts, due to noise from construction activities. Mitigation measures will be employed to protect bats which may be utilizing the area. Work will occur during daylight hours only. Work hours will be allowed only between ½ hour after sunrise to ½ hour before sunset, which will reduce noise impacts to the bats to negligible levels. This is because bats will be inside caves during daylight hours. The soundscape management will return to levels that existed prior to project construction. Therefore, there will be no impairment to Soundscape Management.

Conclusion for Non-Impairment Finding

In conclusion, as guided by this analysis, good science and scholarship, advice from subject matter experts and others who have relevant knowledge and experience, and public involvement, it is the Superintendent's professional judgment that there will be no impairment of park resources and values from implementation of the Preferred Alternative.