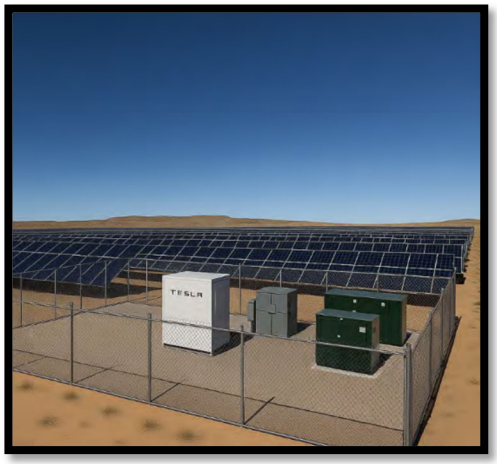
11/2026

DOE/EA-2325

FOA Number: DE-FOA-0002970

Environmental Assessment

Hopi Tribe Turquoise Trail Site Hybrid Microgrid Project
Turquoise Trail Municipal Complex, Navajo County, Arizona



Proposed Project in profile view
(source: Terraphase Engineering 2025)



Overview of Site; Turquoise Trail Municipal Complex in background
(source: Terraphase Engineering 2025)

U.S. Department of Energy
Office of Clean Energy Demonstrations
1000 Independence Ave SW
Washington, D.C. 20585

November 2026

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SUMMARY

DOE Proposed Action:

Under the Proposed Action, the United States (U.S.) Department of Energy (DOE) would authorize the Hopi Tribe to expend federal funding to design, permit, construct, and commission a hybrid microgrid to serve the Turquoise Trail Municipal Complex (TTMC) on Hopi Partitioned Lands.

Type of Document: Environmental Assessment

Lead Agency: U.S. Department of Energy, Office of Clean Energy Demonstrations

Project Location:

Proposed location (physical address or coordinates)	Setting of the proposed location	General description of the proposed activities	Land administration
36.050823, -110.488275	Rural	Construction of hybrid microgrid	Tribal

For Further Information:

U.S. Department of Energy
Office of Clean Energy Demonstrations
1000 Independence Ave SW
Washington, D.C. 20585

Summary:

This Environmental Assessment (EA) provides DOE and other decision-makers with information needed to make an informed decision about authorizing funding for the proposed hybrid microgrid in Navajo County, Arizona. The EA assesses potential direct and indirect impacts of the Proposed Action during construction and operation and maintenance of the system. The EA also evaluates the impacts that could occur if DOE did not provide funding (No-Action Alternative). Under the No-Action Alternative, DOE assumes the Project would not proceed.

Construction would result in negligible to minor impacts to soils, groundwater, wildlife and habitat, air quality, noise, land use and aesthetics, and transportation and traffic. While surveys identified a clan society shrine located approximately 650 feet south of the proposed Project site, there would be no adverse effects on the shrine with implementation of the recommendation that the Proposed Action not include structures taller than existing Turquoise Trail Municipal Complex (TTMC) buildings.

The operation and maintenance phase of the Proposed Action may have negligible impacts on soils during occasional maintenance; otherwise, adverse impacts during operations and maintenance are not anticipated. The Proposed Action is expected to have a moderate beneficial impact on air quality, as well as a minor beneficial impact on noise levels. Air quality improvements would result from a reduction in air emissions related to the switch from diesel-generated power to solar power. Noise levels would also decrease slightly with the reduced operation of diesel generators.

ACRONYMS AND ABBREVIATIONS

BIA	Bureau of Indian Affairs
CFR	Code of Federal Regulations
CO	carbon monoxide
DOE	United States Department of Energy
EA	Environmental Assessment
EIV	Environmental Information Volume
EO	Executive Order
HUC	Hopi Utilities Corporation
IPaC	Information for Planning and Consultation
IT	Information Technology
kW	kilowatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO_2	nitrogen dioxide
NOx	nitrous oxides
O_3	ozone
OCED	Office of Clean Energy Demonstration
O&M	Operation and Maintenance
Pb	lead
$PM_{2.5}$	Particulate Matter less than 2.5 microns in diameter
PM_{10}	Particulate Matter less than 10 microns in diameter
ppb	parts per billion
ppm	parts per million
PV	Photovoltaic
SO_2	sulfur dioxide
SWPPP	Storm Water Pollution Prevention Plan
TTMC	Turquoise Trail Municipal Complex
U.S.	United States
USC	United States Code
USFWS	United States Fish and Wildlife Service
VOC	volatile organic compound

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SECTION 1 INTRODUCTION

1.1. Background

The mission of the United States (U.S.) Department of Energy's (DOE) Office of Clean Energy Demonstrations (OCED) is to deliver clean energy demonstration projects at scale in partnership with the private sector to accelerate deployment and market adoption.. OCED is a multi-technology office with demonstrations that include clean hydrogen, carbon management, industrial decarbonization, demonstrations in rural areas, and more. Most OCED projects are structured with a cost-share agreement where OCED would provide up to 50 percent of the funding.

The Hopi Tribe Turquoise Trail Site Hybrid Microgrid Project was competitively selected for a DOE financial assistance award under the Energy Improvements in Rural or Remote Areas Program. The Project and award would assist with the design, permitting, construction, and commissioning of a hybrid microgrid to serve the Turquoise Trail Municipal Complex (TTMC) on Hopi Partitioned Lands in Navajo County, Arizona (Figure 1). The Project is proposed by the Hopi Tribe (Tribe) in partnership with the Hopi Utilities Corporation (HUC), Arizona State University, and BoxPower. This Environmental Assessment (EA) analyzes the potential effects of the proposed microgrid.

1.2. Purpose and Need for Action

The purpose and need for agency action is to comply with DOE's statutory mandates in the Fiscal Year 2020 Further Consolidated Appropriations Act (H.R. 1685) and the Infrastructure Investment and Jobs Act (H.R. 3684) to select and fund energy projects. OCED's Energy Improvements in Rural or Remote Areas program gives communities with 10,000 or fewer people the tools and resources they need to improve the resilience, reliability, and affordability of their local energy systems. These community-driven projects enable residents to make decisions about their own energy, economic, cultural, and geographic needs. The Hopi Tribe Turquoise Trail Site Hybrid Microgrid Project was competitively selected for DOE financial assistance award under the Energy Improvements in Rural or Remote Areas Program.

DOE's purpose is to select projects that accomplish the following:

- Fund Tribal development projects that demonstrate energy efficiency
- Partner with Indian Tribes and Alaska Native Corporations to catalyze Tribal energy development
- Deliver measurable and sustained benefits to people who live in areas with fewer than 10,000 people
- Build energy knowledge, capacity, and self-reliance

DOE's project need is to respond to the request for financial assistance to design, permit, construct, and commission the proposed hybrid microgrid to serve the TTMC, which would provide stable, resilient power and improve air quality on the Hopi Reservation.

The Hopi Tribe's long range vision centers on achieving self-determination and self-sufficiency. This goal is continually challenged by the absence of a reliable power source on the Hopi Reservation. Power outages are frequent and unpredictable, disrupting daily life and economic stability. Families and business owners often face difficult choices about how to use the limited electricity available. Businesses struggle to operate consistently, making it difficult for the Tribe to attract new investment. At the TTMC, the Information Technology (IT) Hub has experienced unexpected server shutdowns, exposing the Tribe to cybersecurity risks. Emergency responses are also affected by intermittent power at the Incident Command Center, delaying first responders and putting lives at risk across the villages. In addition to its lack of reliability, the current system relies on diesel generators, which contribute to air emissions and subsequently decreased air quality.

HUC and the Tribe intend to use DOE funding to build a microgrid and battery storage system that can provide stable, resilient power that additionally supports improved air quality on the Hopi Reservation. The plan is to establish this system at the TTMC and then replicate it in other villages, gradually expanding to a proven, sustainable power network throughout the region. Over time, this would support residential needs, business development, emergency services, and cultural activities in underserved areas of the Southwest.

1.3. DOE's Proposed Action

DOE's Proposed Action is to authorize the expenditure of federal funding for the Tribe to plan, develop, permit, construct, and commission a hybrid microgrid consisting of a 1,250-kilowatt (kW) solar photovoltaic (PV) array, battery storage system, and 130 kW of existing back-up diesel generation. The system also includes a microgrid controller and distribution infrastructure to power the Tribe's administrative center, comprising 21 modular buildings on the TTMC site on the Hopi Reservation.

1.4. Cooperating Agencies

No cooperating agencies are participating.

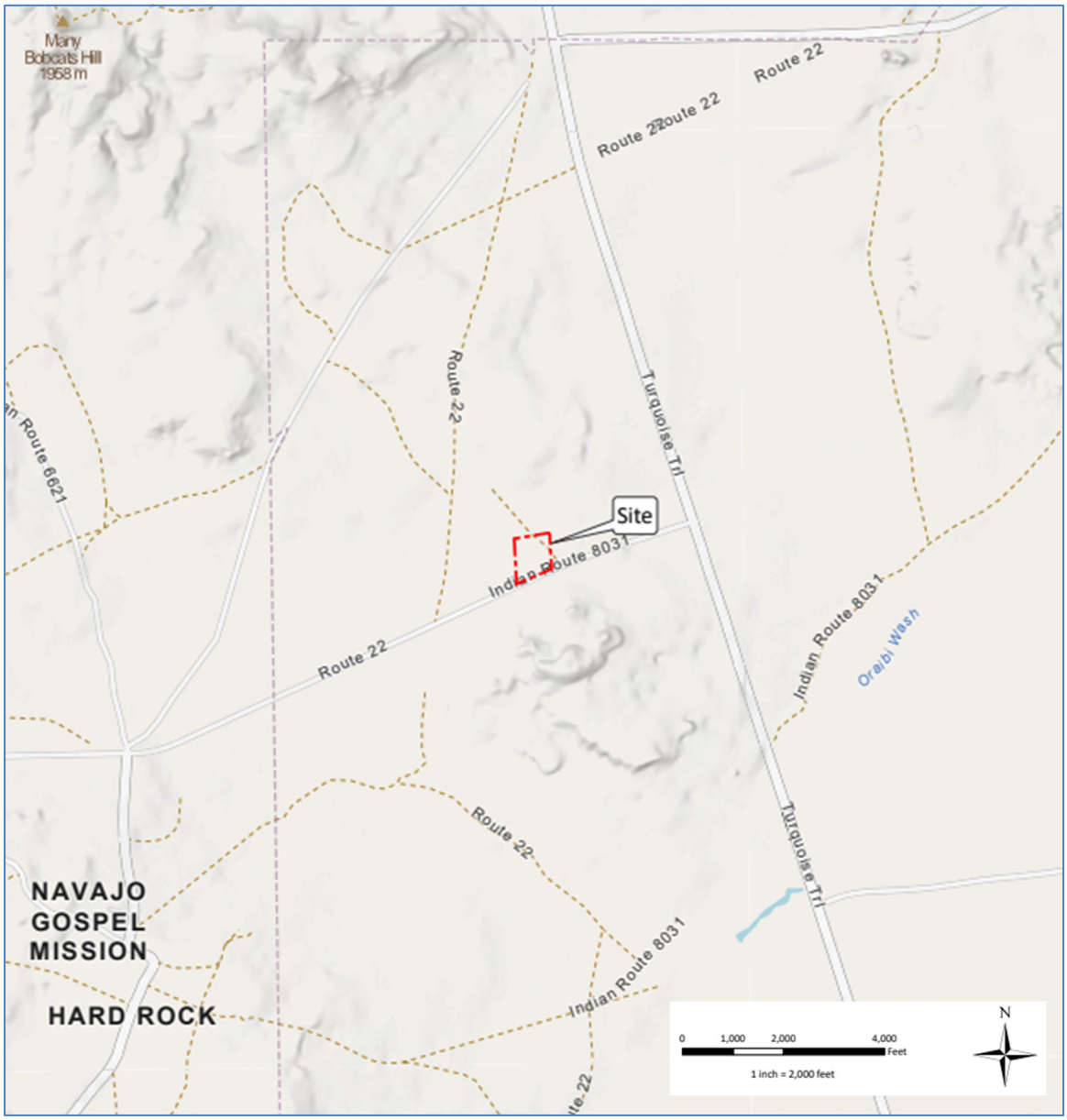


Figure 1: Proposed Project site vicinity in Navajo County, Arizona

1.5. Engagement

The Applicant completed an Environmental Information Volume (EIV) (Terraphase Engineering 2025), which discusses the Project background and Project alternatives, as well as the affected environment and potential impacts

pertaining to the physical, biological, cultural, and human environment. As outlined in DOE's National Environmental Policy Act (NEPA) implementing procedures, DOE may engage in public scoping or public involvement opportunities; however, they are not required. The proposed Project has been approved by the Hopi Tribal Council, which has provided a Special Land Use Assignment for the Project site. The Hopi Tribal Council may review this EA and approval from the council will be required for all construction plans. Additionally, the respective Tribal offices will review any surveys conducted in support of the Project. Tribal community engagement will be ongoing throughout all phases of the Project.

SECTION 2 PROPOSED ACTION AND NO-ACTION ALTERNATIVE

2.1. Proposed Action

The proposed Project site is located on approximately 5.3 acres (Figure 2) in northern Navajo County in the central portion of the Hopi Reservation, just west of the intersection of Bureau of Indian Affairs (BIA) Route 4 and BIA Route 8 (Hard Rock Road) (approximately 95 miles northeast of Flagstaff, Arizona). The TTMC is located immediately east of the Project site, as can be seen in Figure 2.



Figure 2: Proposed Project site on the Hopi Reservation

The proposed Project is part of a larger master plan area; the Project site is located near the center of the larger master plan design. The proposed Project includes the detailed planning, development, permitting, construction, and commissioning of a hybrid microgrid consisting of a 1,250-kW solar PV array, 4,000/900 kWh/kW battery, and 130 kW of existing back-up diesel generation. It is anticipated that construction would take approximately 260 days. The proposed system includes a microgrid controller and distribution infrastructure to power the Tribe's administrative center, which comprises 21 modular buildings on the TTMC site, located directly adjacent to the proposed Project site (see Figure 2, above). At present, the TTMC is powered by seven 130-kW generators; however, due to the age of the generators, only three have been operational at any given time, which requires restrictions to current building operations. Such restrictions create IT challenges and leave the Tribe vulnerable to emergencies, as the Incident Command Center goes without power half of each day. It is expected that some of the current diesel-fired generators would be repaired and kept onsite temporarily for economic reasons. The microgrid system would be expected to expand over time, and older generators would all eventually be retired (Terraphase Engineering 2025).

The Proposed Action considers two microgrid options. In the first, the microgrid would be electrically isolated (i.e., off-grid) and would function as an auxiliary / onsite power system for the TTMC. In this scenario, the TTMC remains grid-served, and the proposed microgrid provides backup power to the TTMC but does not export power to the grid. Under a second option, the proposed microgrid would be connected to the existing power grid, but only to offload

excess power that is generated. In this scenario, the microgrid would serve the TTMC and could push excess power generation back to the utility, but there would be no new distribution lines. Under both options, the proposed Project footprint and associated impacts would be the same.

Under implementation of the Proposed Action, solar panels would be ground-mounted on top of racking equipment. The distribution network would likely be placed underground to increase reliability and reduce maintenance. Inverters, Li-ion storage batteries, and performance monitoring equipment may be placed underneath the panels of the solar PV array, between its rows, or within the space between the panels and the existing TTMC facilities. Existing generators that are rehabilitated as part of the Proposed Action would remain in-place at the TTMC (Terraphase Engineering 2025).

Construction activities include site preparation (clearing and grading, as needed), trenching for the distribution network, installation of the solar panel racking and battery storage pad, electrical conduit installation, and vehicle trips for delivery and installation of Project components. Overall, minimal grading would be required to prepare the site. Backhoes would be used to excavate footings to a maximum depth of 36 inches for installation of the solar PV panel racks and to create narrow trenches to connect the microgrid to the Li-ion batteries and the batteries to the TTMC, as well as any hardwired control or monitoring system. Within the approximately 5.3-acre Project area, it is anticipated that approximately 3.9 acres would be cleared and graded, as required, during site preparation. Of the 3.9 acres, approximately 1.6 acres would include the operational footprint of the proposed microgrid infrastructure; the remaining, temporarily disturbed land would be restored post-construction through reseeding with perennial, native bunchgrasses suitable for local grazing. Other equipment anticipated to be utilized during the construction phase includes contractor pickup trucks, skid steer, mini excavator, concrete truck, dump truck, boom truck, skip loader, truck-mounted crane, and water buffalo/truck. At peak, a construction crew would include a maximum of ten individuals per day (Terraphase Engineering 2025).

Construction materials would be transported to the Project site via BIA Routes 4 and 8. The Project site or the existing TTMC parking lot would be utilized for laydown. No temporary access roads, laydown areas, or other temporary facilities are required. The battery/batteries and controls would be housed inside a pad-mounted shipping container. The pad would be constructed as part of the Proposed Action, and the shipping container would be delivered to the pad, once constructed. The number of vehicle trips expected would vary depending on the construction phase; however, the following Project totals are anticipated (Terraphase Engineering 2025):

- Clearing and grubbing: Five trips per day to remove organic materials
- Grading: Three vehicles working on site per day, with a maximum of three trips per day for soil import
- Foundations: Six vehicles working on site per day
- Equipment delivery: Six vehicles working on site per day
- Equipment assembly: Six vehicles working on site per day
- Electrical work: Six vehicles working on site per day
- Solid waste removal: Maximum of one trip per week

Water buffalo / trucks used for dust suppression and for wetting surfaces prior to concrete pours would be filled offsite. It is anticipated that cut-and-fill would be utilized to create appropriate pads for placement of the solar PV array; however, it is possible that imported soil would be required for this process and for use as aggregate for finished surfaces. The Hopi Department of Public Works and Transportation provides day-to-day transportation and solid waste management services and public road access to and within the Hopi lands, conveying solid waste to a nearby landfill. As stated, a maximum of one trip per week to the existing landfill is anticipated during construction (Terraphase Engineering 2025).

Final site design would be based on data collection and assessment from early phase planning results. Based on the facility electrical interconnection requirements, a distribution network would be designed to deliver power from the microgrid generation and Li-ion batteries to the load centers. Final design would consider current loading conditions, load growth scenarios, and phased expansion (Terraphase Engineering 2025).

During Project operations, the microgrid is expected to be largely self-sustaining, as much of the infrastructure consists of solar panels with an underground distribution network. No waste materials are expected to be generated during operations. A water buffalo / truck would be required once or twice per year to provide water for solar panel cleaning. Rather than eventual decommissioning of the microgrid, the Proposed Action considers eventual replacement with newer and more efficient systems. As part of this process, it is anticipated that solar panels and/or old mounts would be removed and/or replaced, likely in the same location, and ground disturbance would be limited to the specific footprint where updates are being made. If the Project were to reach an end of its operational life and full decommissioning were to be required, the system would be decommissioned in accordance with Tribal, federal, and state requirements. If there were sufficient surface disturbance, dust suppression would be implemented. It is anticipated that equipment required for decommissioning would be the same as or similar to the equipment anticipated for use during Project construction. Solid waste (i.e., old panels and/or mounts) would be recycled if possible, and the remainder would be disposed of at the Tribal landfill (Terraphase Engineering 2025).

2.2. Alternatives Carried Forward for Detailed Analysis

The only action alternative carried forward for detailed analysis in this EA is the Proposed Action, as presented in Section 2.1. As stated, this alternative considers two options in how the microgrid would be connected to the existing utility (off-grid, serving only the TTMC with no ability to off-load excess power into the grid, or grid connected, which would provide the ability to off-load excess power into the larger power grid. Under both options, the microgrid would serve only the TTMC and would not require new distribution infrastructure; the difference relates solely to electrical interconnection, control, and switching capabilities).

2.3. Alternatives Considered but Eliminated for Further Analysis

One additional location was considered, north of the proposed site. However, the distance to the TTMC would have required additional costs; this location was therefore dismissed from consideration due to being economically infeasible. The only other alternative to the proposed Project that was considered was the acquisition of new generators at the TTMC; however, the cost of this alternative would not be economically feasible for the Tribe (Terraphase Engineering 2025).

2.4. No-Action Alternative

An evaluation of a No-Action Alternative is required as a base for comparison under DOE's NEPA Implementing Procedures. Under the No-Action Alternative, DOE would not authorize expenditure of federal funds for the design, permitting, construction, and commissioning of the proposed hybrid microgrid for the TTMC. Any potential beneficial or adverse effects to the physical, biological, cultural, or socioeconomic environment from the Proposed Action would not be realized.

DOE has assumed, for the purposes of comparison in this EA, that the Project would not proceed without its assistance. If the Project proceeded without DOE assistance, it can be assumed that the potential impacts would be the same as those identified under implementation of the Proposed Action.

2.5. Permitting and Authorization Summary

DOE must comply with NEPA and related requirements prior to authorizing the use of federal funds. DOE recipients are required to comply with all applicable federal and state environmental and other statutes. Applicable federal and state-issued licenses, permits, and/or other approvals required for a project depend on the proposed activities. It is assumed that HUC and the Hopi Tribe's Tribal Employment Rights Office will issue permits as needed and based on construction drawings issued during the next phase of project development.

The Hopi Tribal Council has provided a Special Land Use Assignment for the Project site. The Hopi Tribal Council may review this EA and approval from the council will be required for all construction plans. Additionally, all site surveys will be reviewed by the appropriate Tribal office (e.g., the Hopi Department of Natural Resources and the Hopi Cultural Preservation Office) prior to construction. An Arizona Department of Environmental Quality Construction Activity General Permit for Stormwater may be required. No other permits are anticipated (Terraphase Engineering 2025).

2.6. Applicant Voluntary Measures

This section summarizes the voluntary commitments made by the Tribe to mitigate potential impacts that were identified during initial development, permitting, and consultation for the Proposed Action. For purposes of this EA, the term mitigation measure is broadly defined. The measures summarized below were not necessarily included to decrease the level of impact below significant (i.e., the impacts may have been less than significant with or without the measures).

Voluntary mitigation commitments focus on minimizing ground disturbance and erosion, protecting water quality, and safeguarding biological resources during construction. Work would stay within designated areas, with vegetation clearing limited to the minimum required for the Project. A stormwater pollution prevention plan (SWPPP) would be implemented, to include protections such as erosion-control structures, compliance with permitting requirements, and avoiding work during major storms. Any requirements in the Arizona Department of Environmental Quality Construction Activity General Permit for Stormwater permit, if required, would be followed. Measures to prevent the spread of invasive species, including equipment cleaning and a formal weed-management plan, would also be implemented. In the event of eventual decommissioning of the Project, invasive species monitoring and removal would be conducted during the first two years post-decommissioning to prevent spread of Russian thistle, Halogeton, and other invasive plants observed during the baseline surveys. Impacts to a nearby shrine would be avoided by adhering to the recommendation that the Project does not include structures taller than existing TTMC buildings.

Biological resource protections include pre-construction surveys for nesting birds, avoidance of active nests, and strict procedures if California condors are present, including halting work and preventing attractants like trash or spills. Temporarily disturbed areas would be restored with native perennial grasses post-construction and monitored to ensure successful establishment and weed control.

SECTION 3 AFFECTED ENVIRONMENT AND IMPACTS ANALYSIS

3.1. Background

This section discusses the existing conditions of the physical, biological, cultural, and human environment (affected environment) that could be affected by the alternatives described in Section 2. Following the description of the affected environment, potential direct and indirect impacts from each alternative are analyzed.

The identification and description of activities that have the potential to create impacts on natural and human resources in areas proposed for use by the Proposed Action have been divided into two phases: (1) construction and (2) operations and maintenance (O&M) of the proposed microgrid. The activities occurring during each phase were considered, as appropriate, to evaluate resource-specific impacts.

The following terms were used to characterize adverse impacts from the Proposed Action:

(1) Negligible:

- Impacts would be at the lowest levels of detection, barely or not measurable, with no perceptible consequences.

(2) Minor:

- Impacts would result in a detectable change, but the change would be slight or could be avoided with proper mitigation, or
- Impacts would not disrupt normal or routine functions of the affected resource, or
- Once the impacting agent is eliminated (i.e., construction activity), the affected resource would return to a condition with no measurable effects from the Proposed Action without requirement for any mitigation.

(3) Moderate:

- Unavoidable impacts would result in a detectable change with measurable effects and proper mitigation would reduce impact substantially during the life of the Proposed Action, or
- The affected resource would have to adjust somewhat to account for disruptions due to impacts of the Proposed Action, or
- Once the impacting agent is eliminated, the affected resource would return to a condition with no

measurable effects from the Proposed Action if proper remedial action is taken.

(4) Major:

- Impacts would be unavoidable with substantial consequences, or
- Proper mitigation would reduce impacts somewhat during the life of the Proposed Action, or
- The affected resource would experience unavoidable disruptions to a degree beyond what is normally acceptable, and once the impacting agent is eliminated, the affected activity or community may retain measurable effects of the Proposed Action indefinitely, even if remedial action is taken.

3.2. Identification of Resources and Affects

Table 1 presents a research-based, sliding-scale analysis of which resources are not present in the Project area, which resources are present but not likely to be affected, and which resources are present and potentially affected. For those resources that are present and potentially affected, the table includes information on effects that are readily determined as negligible or minor. For resources that require more discussion to determine the significance of the impact, additional discussion is provided in Section 3.3. Where not otherwise cited, information provided in Table 1 was acquired from the EIV (Terraphase Engineering 2025), which is incorporated by reference into this EA as appropriate.

Table 1: Project Site Resources Not Present; Present, Not Affected; and Present, Potentially Affected

Impact Topic	Not Present	Present		Rationale
		Not Affected	Potentially Affected	
Geology / Seismic		X		The Project area is located within an area of moderate earthquake hazard (USGS 2024a). The areas at highest risk for earthquake damage in the State of Arizona are located in the Northern Arizona Seismic Belt, which includes areas west of the Project site. Fault lines were not identified near the Project area. Ground disturbance associated with the Proposed Action would be minimal, comprising excavation of the footings for the solar panel platforms as well as excavation for connections between equipment. Depth to bedrock in this area averages over 6 feet; excavation would not be expected to encounter bedrock and impacts to geology would not occur. The Proposed Action would have no impact on seismic potential in the Project area during construction or the O&M phase. This resource is not discussed further in this EA.
Soils			X	Soils within the Project area consist of Penistaja-Begay complex with 1 to 8 percent slopes. This soil type is a deep, well-drained soil that is not classified as prime or unique farmland. Construction activities would be expected to result in vegetation removal, loosening of soil, compaction from heavy equipment, and increased soil erosion. Temporary disturbance is estimated at up to 3.9 acres and long-term disturbance (footprint of proposed microgrid) is estimated at 1.6 acres. As the site is relatively level and is adjacent to the TTMC, materials would be imported along existing roads and laydown areas, and other construction stockpiles would be placed onsite or on paved surfaces at the adjacent municipal facility, which would limit erosion and runoff potential during construction. Due to the nature of the site and with the assumption that erosion control

Table 1: Project Site Resources Not Present; Present, Not Affected; and Present, Potentially Affected				
Impact Topic	**Not Present**	**Present**		**Rationale**
		Not Affected	**Potentially Affected**	
				measures would be used during construction, impacts to soils would be negligible. Likewise, any impacts to soils during the O&M phase would be negligible, consisting of occasional maintenance access within the permanent facility footprint. This resource is not discussed further in this EA.
Groundwater			X	Water use would be minimal, related to dust suppression and wetting surfaces before concrete pours. Maximum total water use for construction is estimated at 2,164,500 gallons, which could be supplied by a nearby water tower (approximately 0.16 mile south of the Project area) or the First Mesa and Second Mesa public water systems, which would not affect any groundwater resources present. If shallow groundwater sources are present, there is potential for construction-related contaminant exposure; however, the nearest groundwater well available through the Arizona Groundwater Explorer (approximately 2.5 miles southwest of the Project area) measures depth to groundwater at approximately 400 feet below land surface, indicating that shallow groundwater sources are not likely to be present (USGS 2024b). A SWPPP would be implemented to mitigate risks associated with inadvertent spills or leaks of construction contaminants that may infiltrate runoff. Overall, potential impacts to groundwater would be negligible. Additional impacts during the O&M phase would not be anticipated. Occasional water use may be required for panel washing; water would be acquired from the aforementioned sources. This resource is not discussed further in this EA.
Wetlands	X			No wetlands are present in the Project area.
Surface Waters	X			No surface waters are present in the Project Area. Surface runoff follows local topography, generally southeast towards Oraibi Wash. Erosion control measures and a SWPPP would be implemented during construction to prevent potential impacts to downstream surface waters. If required, an Arizona Department of Environmental Quality Construction Activity General Permit for Stormwater would be obtained. This resource is not discussed further in this EA.
Floodplains	X			There are no floodplains mapped in the Project area.
Oceanic resources and coastal zones	X			The Project area is not located along the ocean or a coastal area.
Wildlife & Habitat			X	The Project area and adjacent lands are located within the Great Basin Grassland biotic community, historically dominated by perennial grasses with scattered low shrubs; however, vegetation in the Project area has been modified by livestock grazing,

Table 1: Project Site Resources Not Present; Present, Not Affected; and Present, Potentially Affected				
Impact Topic	**Not Present**	**Present**		**Rationale**
		Not Affected	**Potentially Affected**	
				resulting in low species diversity, reduced shrub cover, and limited wildlife habitat. Construction would result in temporary disturbance of up to 3.9 acres and permanent conversion of approximately 1.6 acres of land from grazed grassland habitat to developed land. Given the absence of quality wildlife habitat for most regional species, the Proposed Action primarily has potential to impact migratory birds during the breeding season. Additionally, there is potential for the Proposed Action to introduce non-native and invasive species to the Project area. This topic is discussed in more detail in Section 3.3.1.
Threatened and Endangered Species	X			Four species of concern were identified utilizing the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) web application: California condor (federally listed endangered), yellow-billed cuckoo (federally listed threatened), monarch butterfly (federally proposed threatened), and Suckley's cuckoo bumble bee (federally proposed endangered). Surveys conducted by the Applicant did not identify suitable habitat for any of the above species; therefore, there would be no impact to federally protected species. Potential impacts to wildlife and habitat in general are discussed in more detail in Section 3.3.1.
Cultural Resources		X		An archaeological survey of the Project area was completed in 2011. Eight sites were identified in the larger Turquoise Trail master plan area (seven of which were found to be eligible for the National Register of Historic Places); however, a finding of No Historic Properties Affected was recommended by BIA and the Arizona State Historic Preservation Office, as all sites would be avoided. A Project-specific survey was completed in 2025, which identified the presence of a clan society shrine located approximately 650 feet south of the Project site. To avoid adverse effects, it was recommended that the Proposed Action not include structures taller than the existing TTMC buildings. With implementation of this recommendation, there would be no adverse effects to cultural resources.
Air Quality			X	The Project area is located in Navajo County, which has been classified as an unclassifiable/attainment area (USEPA 2026). The General Conformity review (40 Code of Federal Regulations [CFR] Part 51 and 93) only applies to non-attainment and maintenance areas and is therefore not applicable to this Project. Additional information on the Proposed Action's potential for impact on air quality is provided in Section 3.3.2.

Table 1: Project Site Resources Not Present; Present, Not Affected; and Present, Potentially Affected				
Impact Topic	**Not Present**	**Present**		**Rationale**
		Not Affected	**Potentially Affected**	
Socioeconomics		X		No displacements would occur. No change in social cohesion (i.e., the community would not be divided by any infrastructure) and no adverse impact to any community facilities would occur. There would be no adverse impacts to socioeconomics. The Proposed Action would result in more reliable and lower-cost energy, which would result in a moderate to major beneficial impact. This resource is not discussed further in this EA.
Environmental Contamination and Waste Management		X		Based on information provided by the Applicant, no areas of known contamination exist in the Project area or within the larger Tawa'ovi Community Master Plan area. The nearest regional site subject to management under the Comprehensive Environmental Response, Contamination, and Liability Act is the McGee Trading Post, located approximately 20 miles to the east. Eventual decommissioning of the microgrid, if required, would be completed in accordance with Tribal, federal, and state requirements, and would include recycling or reusing equipment as appropriate, and restoration of the disturbed area. This resource is not discussed further in this EA.
Public and Occupational Health and Safety			X	With adherence to basic safety precautions as well as Occupational Safety and Health Administration standards that address hazards specific to construction, short-term impacts on health and safety would be less than significant. The potential for impacts associated with air quality is discussed further in Section 3.3.2.
Noise and Vibration	X			The maximum anticipated noise level during construction would be approximately 85 decibels (A-weighted) at 50 feet (Terraphase Engineering 2025). According to information provided by the Applicant, no sensitive receptors (e.g., hospitals, schools, daycare facilities, elderly housing, etc.) are located in close proximity to the proposed site. Based on a review of aerial imagery, the only buildings within 1,000 feet of the Project site are associated with the TTMC, which is not a noise or vibration-sensitive receptor. Construction activities would result in noise that might temporarily displace wildlife and birds, resulting in a negligible temporary impact. As discussed in Section 3.3.1.2, species would be expected to return once construction is completed. Vibration impacts during construction are not anticipated due to the type of work proposed. O&M activities would not result in noise or vibration impacts. The reduced use of diesel generators as a result of the Project could reduce noise levels,

Table 1: Project Site Resources Not Present; Present, Not Affected; and Present, Potentially Affected				
Impact Topic	**Not Present**	**Present**		**Rationale**
		Not Affected	**Potentially Affected**	
				resulting in a beneficial impact. This resource is not discussed further in this EA.
Recreation	X			No recreational resources exist in the Project area, which has primarily been used for livestock grazing.
Land Use and Aesthetics			X	The Project area consists of undeveloped, open, and minimally vegetated land that has primarily been used for livestock grazing. The Proposed Action would convert approximately 1.6 acres of vegetated land into a developed microgrid, representing a negligible change to land use (impacts to vegetation are discussed further in Section 3.3.1). There are no zoning restrictions for development of the Proposed Action, and the Project has been approved by the Hopi Tribal Council. Minor impacts to aesthetics would be anticipated during construction, primarily associated with vegetation clearing, construction noise, and dust; however, impacts would be temporary and the completed microgrid would not contrast greatly with adjacent infrastructure. The potential for impacts associated with land use and aesthetics is discussed further in Section 3.3.3.
Utilities and Infrastructure			X	No offsite infrastructure would be required other than internal connections to the TTMC. Under the Proposed Action, the microgrid would either be electrically isolated (off-grid) or would be connected to the existing power grid, but only to offload excess power to the broader utility grid. Any exported power would be small in volume, intermittent, and would not be anticipated to materially affect utility operations or capacity. Under both options, the Project footprint and potential impacts would be the same. No new distribution infrastructure would be required; the difference relates solely to electrical interconnection, control, and switching capabilities. The Proposed Action would have a moderate to major beneficial impact due to providing a more reliable and less expensive energy source. This resource is not discussed further in this EA.
Transportation and traffic			X	Traffic impacts may occur during construction due to employee commuting and material deliveries. Maximum trips per day associated with construction are estimated to be 34 trips per day. It is assumed that traffic surrounding the Project area is relatively minimal as there are few residences or facilities nearby. Any potential increase in traffic and traffic-related accidents would be negligible to minor. During the O&M phase, traffic would not increase significantly beyond what is already generated by operation of the TTMC. This resource is not discussed further in this EA.
Potential environmental impacts of intentional destructive acts (i.e. acts of sabotage or terrorism)	N/A			Due to the remote nature of the Project area, an intentional destructive act by actors outside of the community is highly unlikely. Because the Proposed Action is intended to highly benefit the community,

Table 1: Project Site Resources Not Present; Present, Not Affected; and Present, Potentially Affected				
Impact Topic	**Not Present**	**Present**		**Rationale**
		Not Affected	**Potentially Affected**	
per DOE policy dated December 1, 2006[1].				an intentional destructive act by a community member is also unlikely. Should an intentional or unintentional act of destruction occur, the village power plant would be able to revert to diesel-generated power until the solar PV array and associated infrastructure could be repaired. There is a negligible likelihood of an intentional or accidental act of destruction related to the Proposed Action. If an act did occur, any impact would be mitigated to a minor level through switching back to diesel-generated power.

3.3. Affected Environment and Impacts Analysis

This section describes the affected environment for those resources identified in Table 1 as needing additional analyses, including Wildlife and Habitat and Air Quality. This section documents anticipated impacts to those resources from the Proposed Action.

3.3.1. Wildlife and Habitat

3.3.1.1. Description of the Affected Environment

The Hopi Reservation generally contains three biotic communities: Great Basin Desertscrub, Great Basin Grassland, and Great Basin Conifer Woodland. The proposed Project site and adjacent lands occur within the Great Basin Grassland biotic community, which is historically dominated by perennial grasses with scattered low shrubs; however, vegetation within the Project area has been modified by years of livestock grazing. Vegetation onsite is characterized by low species diversity and reduced shrub cover. A biological survey conducted by the Applicant on August 9, 2025, identified Indian rice grass (*Achnatherum hymenoides*), alkali sacaton (*Sporobolus airoides*), and blue grama (*Bouteloua gracilis*) as the dominant perennial grasses, and identified the following shrubs as being present: big sagebrush (*Artemisia tridentata*), sand sagebrush (*Artemisia filifolia*), snakeweed (*Gutierrezia sarothrae*), fourwing saltbush (*Atriplex canescens*), and winterfat (*Krascheninnikovia l*anata). Invasive and non-native species observed included Russian thistle (*Salsola tragus*), Halogeton (*Halogeton glomeratus*), and two young Utah juniper (*Juniperus osteosperma*) individuals. Vegetation condition was noted to be generally poor, and the Project area and surrounding lands exhibited evidence of disturbance from cattle, sheep, and horse grazing (Terraphase Engineering 2025).

Due to low vegetative diversity, sparse cover, and proximity to existing municipal facilities, the Project area supports limited wildlife habitat. Wildlife that may utilize the Project area include grassland-adapted species such as horned lark (*Eremophila alpestris*), western meadowlark (*Sturnella neglecta*), pronghorn (*Antilocapra americana*), and small mammals such as deer mice (*Peromyscus maniculatus*). Surveys conducted onsite did not identify raptor nests or indications that large mammals would be present (Terraphase Engineering 2025).

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 United States Code [USC] 668-668d). Additionally, migratory birds are protected under the Migratory Bird Treaty Act (16 USC 703-711). Executive Order (EO) 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (66 Federal Register 3853), directs federal agencies to identify where an unintentional taking is likely to have a measurable negative effect on migratory bird populations and to avoid or minimize adverse impacts through enhanced collaboration with USFWS. EO 13186 was issued in part to ensure that environmental analyses of federal actions assess the impacts of these actions on migratory birds. It also states that emphasis should be placed on species of concern, priority habitats, and key risk factors, and it prohibits the taking of any migratory bird without authorization from USFWS. While surveys did not identify federally protected bird species, it is possible that

[1] Need to Consider International Destructive Acts in NEPA Documents (energy.gov)

migratory birds may forage in the area or use scattered shrubs for perching during seasonal movements (Terraphase Engineering 2025).

As stated in Table 1, the USFWS IPaC web application identified four species of concern as potentially occurring in this area: California condor (federally endangered), yellow-billed cuckoo (federally threatened), monarch butterfly (federally proposed threatened), and Suckley's cuckoo bumble bee (federally proposed endangered). Onsite surveys determined that suitable habitat for each species is not present onsite (Terraphase Engineering 2025).

3.3.1.2. Impact Analysis of the Proposed Action

Construction of the proposed Project would result in temporary disturbance of up to 3.9 acres and permanent conversion of approximately 1.6 acres from grazed grassland to solar and battery infrastructure. All ground disturbance and associated vegetation clearing would occur within grazed grassland, which does not provide high quality wildlife habitat. Equipment staging and laydown areas would be confined to designated, predetermined locations to avoid unnecessary disturbance and to protect vegetation adjacent to the Project site. Additionally, construction access routes would be identified in advance and maintained throughout the construction phase to minimize potential erosion and habitat disturbance. Overall, impacts on vegetation and wildlife habitat would be negligible.

While construction is ongoing, wildlife that is present onsite would be displaced, and wildlife in the vicinity may be temporarily disturbed by construction noise and the presence of construction equipment and personnel. While there is the potential for migratory birds to collide with tall equipment (such as a truck-mounted crane), it is anticipated that in general, wildlife, including birds, would avoid the area during construction and seek refuge in similar, nearby habitat. If work is planned during nesting season (generally between March 1st and August 31st), migratory bird surveys would be conducted by a qualified biologist 7 to 10 days prior to vegetation removal. If active nests are identified within the Project area, disturbance in the area of the nest would be avoided until no juveniles remain dependent on the nest for survival. Although habitat suitable for the California condor was not identified during onsite surveys, if a condor were to be observed within the Project area, the Hopi Tribe Wildlife and Ecosystem Management Program or Peregrine Fund personnel would be contacted, and construction activities would halt until the condor leaves or is moved by permitted personnel. Trash and debris would be removed from the construction site daily to avoid attracting condors and other wildlife, and a vehicle fluid-leakage and spill plan would be implemented to prevent contamination that could harm condors or other wildlife.

Construction activities risk introducing non-native and invasive species to a site. During construction, all equipment would be inspected and cleaned prior to entering and leaving the site to remove soil, mud, and plant material with potential to spread invasive species. Additionally, a noxious weed management plan would be developed and implemented, which would identify responsibilities, monitoring, and control methods to prevent the introduction and spread of non-native and invasive species.

Following construction, temporarily disturbed areas that are outside the required operational footprint of the proposed microgrid infrastructure would be reseeded with perennial native bunchgrasses suitable for local grazing. Reseeded areas would be monitored to ensure establishment is successful and to manage weeds, as needed. During the O&M phase of the Project, wildlife, including birds, would be expected to adjust to the presence of the solar PV array and no impact on wildlife would be anticipated. It is noted that solar PV panels have been of concern related to migrating birds and bats, including concerns over glare and potential disruption to wildlife flight patterns (Hathcock 2018); however, more recent research has shown that birds use solar fields for habitat and do not seem to be impacted by the presence of solar panels (DOE SETO 2024). While research is ongoing, it appears that the presence of the solar PV array would have a negligible impact on birds.

As stated in Section 2.1, replacement with newer systems is anticipated instead of full decommissioning of the Project; however, if the Project were to reach the end of its operational life and decommissioning were required, decommissioning of the microgrid would involve removal of infrastructure and restoration of the land. Disturbed areas would be regraded to approximate pre-construction contours, uncompacted and seeded with a native perennial grass mix appropriate to the Great Basin Grassland community. Restoration would aim to reestablish a

vegetative cover of at least 70 percent of reference site conditions within three growing seasons. Invasive species monitoring and removal would be conducted during the first two years post-decommissioning to prevent spread of Russian thistle, Halogeton, and other invasive plants observed during pre-construction baseline surveys.

3.3.1.3. Impact Analysis of No-Action Alternative

The No-Action Alternative would result in no change from existing conditions and would not contribute to any impacts to wildlife or wildlife habitat.

3.3.2. Air Quality

3.3.2.1. Description of the Affected Environment

The National Ambient Air Quality Standards (NAAQS), shown in Table 2, set ambient concentration limits for criteria pollutants to protect public health and welfare. Areas that meet these standards are designated as attainment. As noted in Table 1, the Project area is currently designated as attainment or unclassifiable for all criteria pollutants, and a Conformity Analysis is not required. As stated in Section 1.2, the current source of electric power for the TTMC is diesel fuel generation, which produces air emissions. Currently, three 130-kW diesel generators operate at the TTMC for 12 hours per day, 5 days per week. This current usage could result in yearly emissions of approximately 973 metric tons of carbon dioxide, 1,663 kilograms of volatile organic compounds (VOC), 7,300 kilograms of nitrous oxides (NO_x), and 1,630 kilograms of particulate matter ($PM_{2.5}$ and PM_{10}).

Table 2: National Ambient Air Quality Standards

Pollutant		Averaging Time	Level	Form
Carbon Monoxide (CO)		8 hours	9 ppm	Not to be exceeded more than once per year
		1 hour	35 ppm	
Lead (Pb)		Rolling 3 month average	0.15 µg/m^3	Maximum arithmetic mean of 3 consecutive monthly means in a 3-year period
Nitrogen Dioxide (NO2)		1 hour	100 ppb	Annual 98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		1 year	53 ppb	Annual Mean
Ozone (O3)		8 hours	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	1 year	9.0 µg/m^3	Annual mean, averaged over 3 years
		1 year	15.0 µg/m^3	Annual mean, averaged over 3 years
	PM_{10}	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
		24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO2)		1 hour	75 ppb	Annual 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		1 year	10 ppb	Annual mean, averaged over 3 years

Source: USEPA 2025

3.3.2.2. Impact Analysis of the Proposed Action

During construction of the Proposed Action, the operation of construction equipment (as described in Section 2.1) would have a temporary, negligible impact on air quality due to emissions of criteria pollutants, as well as the generation of fugitive dust, which would return to no measurable adverse effects following completion of construction. Anticipated construction equipment includes a skid steer, mini excavator, concrete truck, dump truck, boom truck, skip loader, truck-mounted crane, water buffalo/truck, and contractor pickup trucks. The contractor should ensure that construction equipment is fitted with properly functioning emissions controls and limit vehicle idling to the extent possible.

The following assumptions were made in consideration of potential air quality impacts during construction:

- Construction worker commute trips were estimated at 2,600 trips (ten round trips per day x 260 days).
- Delivery truck trips were estimated at 1,820 trips (six to eight trips per day x 260 days)
- Passenger vehicles emit approximately 0.9 gram/mile NOx, 0.6 grams/mile VOC, 1.0 gram/mile CO
- Heavy-duty trucks emit approximately 5.0 grams/mile NOx, 0.7 gram/mile VOC, 2.2 gram/mile CO
- Average trip length is assumed to be approximately 30 miles roundtrip for workers and 60 miles roundtrip for trucks
- Anticipated construction equipment includes a skid steer, mini excavator, concrete truck, dump truck, boom truck, skip loader, truck-mounted crane, water buffalo/truck, and contractor pickup trucks

Table 3 presents estimated construction emissions from on-road/off-road vehicles and construction equipment.

Table 3: Estimated Annual Construction Emissions

Pollutant	Estimated Annual Emissions (tons)
NOx	approximately 1.1
VOC	approximately 0.3
CO	approximately 0.8
PM_{10}	approximately 0.15
$PM_{2.5}$	approximately 0.12
SO_2	approximately 0.01

Source: Terraphase Engineering 2025

Fugitive dust from grading and onsite travel would also occur during construction. With implementation of dust control best management practices (e.g., water application), fugitive dust emissions are estimated at approximately 1.5 tons/year of PM_{10} and 0.3 tons/year of $PM_{2.5}$. When combined with the exhaust-related particulate emissions shown in Table 3, total construction-period particulate emissions are approximately 1.65 tons/year PM_{10} and 0.42 tons/year $PM_{2.5}$.

Construction emissions would be temporary and localized, and dust suppression best management practices would be implemented to minimize particulate matter. Following construction, Project operations would reduce reliance on diesel generation, resulting in a beneficial effect on air emissions.

The NAAQS presented in Table 2 are expressed as ambient concentration levels (ppb, ppm, or µg/m³) for specific averaging times (e.g., 1-hour, 24-hour, annual). The construction estimates above are emissions mass (tons/year). A direct numerical comparison of emissions mass to ambient concentration standards is not possible without air dispersion modeling; however, such modeling is not warranted for this Project given the temporary, short-term nature of construction emissions, the absence of ongoing emission sources, and the Project's location in an attainment or unclassifiable area. The proposed short-term construction emissions would not affect the project area air quality long-term.

Following construction, during the O&M phase, operation of the Proposed Action would reduce reliance on the existing diesel generators described in the affected environment (Section 3.3.2.1). As electricity demand at the TTMC would be met primarily through solar generation and battery storage, diesel generators would be used less frequently and for shorter durations, resulting in corresponding reductions in emissions of carbon dioxide, nitrogen oxides, particulate matter, and other combustion-related pollutants compared to existing conditions. A moderate beneficial impact on air emissions and subsequent air quality would result.

3.3.2.3. Impact Analysis of No-Action Alternative

The No-Action Alternative would result in continued use of diesel fuel to produce electrical power for the TTMC. No reduction in air emissions would result and baseline conditions would not change.

3.4. Relationship of Short-Term Uses and Long-Term Productivity

Short-term use of the environment, as the term is used in this document, is during construction of the Project, whereas long-term productivity refers to when the solar PV array and associated infrastructure are operational and in use. The short-term use of the Project site for the Proposed Action would not affect the long-term productivity of the Project area.

SECTION 4 LIST OF AGENCIES AND PERSONS CONSULTED AND PREPARERS

List of Agencies and Persons Consulted

Name	Title	Organization
Edison Tu'tsi	Program Manager	Office of Hopi Lands Administration, The Hopi Tribe

List of Preparers

Name	Title	Organization	Role	Document Section(s)	Qualifications
Dawn Schilling, PE, AICP	Senior NEPA Project Manager / Program Manager	Potomac-Hudson Engineering	NEPA Document Manager / QA/QC	Environmental Assessment	B.S. Civil Engineering M.A. Communications 33+ years NEPA experience
Virginia Boone	Environmental Scientist	Potomac-Hudson Engineering	Assistant Author	Environmental Assessment	B.A. English 14 years NEPA/environmental consulting experience
Joanna Salvucci	Environmental Scientist	Potomac-Hudson Engineering	Assistant Author	Environmental Assessment	B.S. Environmental Geoscience 5 years of experience
Gretchen Applegate	NEPA Specialist	DOE	NEPA Document Manager	Environmental Assessment	B.S. Environmental Studies 15+ years of NEPA experience

SECTION 5 APPENDICES

Appendix A - References

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