National Park Service
U.S. Department of the Interior

Golden Gate National
Recreation Area

Fort Mason, Building 201
San Francisco, CA 94123

415-561-2841 phone
415- 441-6538 fax

Memorandum

TO: Project NEPA File

THROUGH: Frank Dean, Acting General Superintendent

FROM: Steve Ortega, Environmental Compliance Specialist

DATE: January 22, 2010

SUBJECT: Categorical Exclusion Approval for Energy Infrastructure Improvements on Alcatraz Island National Historic Landmark, PMIS 150682 (PEPC ~~23440~~ 23349)
Categorical Exclusion Approval

Introduction: This memo, with attachments, documents and completes the environmental compliance requirements for the Energy Infrastructure Improvements on Alcatraz Island NHL. The former title of this project was *Re-Connect Island to Mainland Electrical Supply & Install Photovoltaic System to replace Diesel Generated Power on Alcatraz Island*

Compliance Determination: This project is consistent with the Alcatraz Island Historic Preservation and Safety Construction Program Final EIS (2001), Bird Conservation and Management Strategy for Historic Alcatraz Island (2005), and NPS Management Policies 2006.

This project consists of a set of actions to reduce Alcatraz energy dependence on burning fossil fuel, and with precautionary measures would result in no measurable adverse environmental effects (see the Environmental Screening Analysis and list of Precautionary Measures). The project is therefore categorically excluded from further National Environmental Policy Act analysis under Categorical Exclusion D.O. 12, Section 3.4, C (5) *Installation of signs, displays, kiosks, etc.* and C (18) *Construction of minor structures, including small improved parking lots, in previously disturbed or developed areas.*

The attached document, "*Alcatraz Energy Project ESF and Description*" supports the Categorical Exclusion determination. The attached document contains:

- Purpose and Need
- Project Description
- Precautionary Measures
- Environmental Screening Form
- Project Background
- Environmental Impacts
- Scoping, Coordination, and Consultation
- References

Decision: On the basis of the environmental impact information in the compliance file with which I am familiar, I am categorically excluding the Project from further NEPA analysis. No exceptional circumstances or conditions in Section 3-6 of Director's Order 12 apply.

for Frank Dean, Acting General Superintendent — 01·22·2010 Date

Original: Environmental Compliance Office Project File

Energy Infrastructure Improvements on Alcatraz Island, National Historic Landmark, PMIS 150682
PEPC 23349

Project Description

Environmental Analysis
and
Environmental Screening Form

Project formerly titled:

Re-Connect Island to Mainland Electrical Supply & Install Photovoltaic System to replace Diesel Generated Power on Alcatraz Island, PMIS 150682

[This page was intentionally left blank]

Table of Contents

List of Tables

List of Figures

Acronyms and Abbreviations

AC	alternating current
APE	area of potential effects
BAAQMD	San Francisco Bay Area Air Quality Management District
CLIP	Cultural Leadership in Parks
CO	carbon monoxide
CO_2	carbon dioxide
dBA	decibels
DC	direct current
EPA	U.S. Environmental Protection Agency
GHG	greenhouse gases
GMP	General Management Plan
kV	kilovolt
kW	kilowatt
kWh	kilowatt-hour
lbs	pounds
LTMS	Long-term Management Strategy
NEPA	National Environmental Policy Act of 1969
NO_x	nitrogen oxides
NPS	National Park Service
NRHP	National Register of Historic Places
PEPC	Planning, Environment and Public Comment
$PM_{2.5}$	particulate matter less than 2.5 micrometers
PM_{10}	particulate matter less than 10 micrometers
PV	photovoltaic
SHPO	State Historic Preservation Officer

SIP	state implementation plan
SO_2	sulfur dioxide
TPY	tons per year
VOC	volatile organic compound

PROJECT TITLE: ENERGY INFRASTRUCTURE IMPROVEMENTS ON ALCATRAZ ISLAND,

NATIONAL HISTORIC LANDMARK, PMIS 150682

PEPC 23349

INTRODUCTION

The National Park Service, Golden Gate National Recreation Area (NPS) is proposing to install solar photovoltaic (PV) panels at Alcatraz Island on the Prison Building and New Industries buildings to reduce the island's reliance on diesel-generated power and to help move toward the Park's goal of becoming carbon neutral. This analysis describes:

- Why the project is needed
- Project Description
- Anticipated environmental impacts associated with project implementation and construction

Project Summary

The proposed project would install solar PV panels at Alcatraz Island on the roofs of the Prison Building and New Industries buildings. The initial planning of the PV system estimates the total system nameplate capacity at about 286 kilowatt (kW) of direct current (DC) and the total annual energy production of the arrays on the two buildings at about 330,000 kilowatt-hours (kWh) per year. This would account for approximately 38 percent of the island's estimated existing annual load. The project would also include placing a battery bank in the lower level of the New Industries Building that would provide enough power, to meet the nighttime electrical load on the island or emergency needs, discussed further below. Because the available roof area is not adequate for a PV system that could provide enough electricity to power the island completely, diesel generators (upgraded from Tier 2 to Tier 3 emission standards) would remain in operation to supply supplementary power to meet the full energy load throughout the year..

In addition to installing photovoltaic panels, the full scope of the project includes the installation of power controls, wiring, switch gear, a battery bank, three new diesel power generators, signs and displays for public outreach, the implementation of Energy Conservation Measures on the island, and a comprehensive energy audit for the formulation of an Comprehensive Strategic Energy Conservation Plan to achieve meaningful energy conservation in concert with the conversion from diesel to renewable solar energy sources. A connected action that is separate from this project, is the Replacement of Main Prison

Building Roof, Alcatraz Island, PEPC 29326. This proposed action had to be planned in conjunction with the solar panel installation, and shares a common funding source.

PURPOSE AND NEED

The purpose of the proposed project is to substantially reduce greenhouse gas (GHG) emissions from fossil-fuel based energy production on Alcatraz Island using renewable energy sources in order to meet current and future energy demands while minimizing cultural and natural resource impacts.

Improving Alcatraz Island's energy infrastructure is needed in order to:

- Substantially reduce GHG and other emissions associated with the island's diesel power generators. The emissions from the diesel generators have approached the allowable thresholds regulated by the San Francisco Bay Area Air Quality Management District (BAAQMD). Continued and future use of generators as the main source of power on Alcatraz would require strict regulation and oversight by the BAAQMD for emissions control.

- Reduce the direct and indirect costs related to diesel generation and fuel management, including: expensive and reoccurring diesel generator retrofits that satisfy new, more stringent emission thresholds that go into effect in 2011; handling and hauling large quantities of diesel fuel over land and marine areas; labor-intensive maintenance practices required by diesel generators; and hazardous fuel spill prevention and contingencies.

- More closely align the cost of electricity for Alcatraz Island to other managed areas of the Park.

- Allow the Park to be a leader in meeting National Park Service (NPS) Directives, Policies, and Federal Executive Orders to conserve energy and reduce GHG emissions.

PROJECT BACKGROUND

The proposed project includes installing solar PV panels on the roofs of the Main Prison Building and New Industries buildings that would generate renewable energy. This supporting document has been prepared in accordance with the requirements of the National Environmental Policy Act of 1969 (NEPA), as amended (42 USC 4321 et seq.).

Providing a reliable energy source on Alcatraz Island is necessary to accommodate visitor and administrative use, as well as to perform various other functions on the island.

Since the electrical cable connecting Alcatraz with San Francisco power was severed more than 50 years ago, Alcatraz operations have relied on electrical power generated from diesel generators on the island.

These generators are operated under a permit from the BAAQMD and are restricted by emissions thresholds for criteria emissions established for the Region. Further, the NPS pays an elevated price per unit of electrical power due to the cost of ferrying and handling the fuel, as well as maintaining the generators on the island.

Additionally, emissions of GHGs from the diesel generators on Alcatraz represent one of the largest point sources of GHGs in the Park and within the NPS's Pacific West Region. The NPS has made carbon management, energy conservation, and renewable energy a major focus for its future. Executive Order 13423, *Strengthening Federal Environmental, Energy, and Transportation Management* (by setting GHG targets) and NPS Pacific West Regional Director's Orders #48 and #69 both direct the NPS to maintain and operate parks in a sustainable manner. Moreover, the Park has adopted its own Climate Change Action Plan (2008) that identifies ceasing to rely on diesel-generated power on Alcatraz as one of the main actions required to reduce emissions within the Park.

Originally, this project consisted of installing a submarine cable to connect Alcatraz Island to the mainland power grid, as well as installation of a PV system to provide a source of green energy and to reduce the island's reliance on diesel generated power to a back-up source only. Due to funding constraints, the installation of a submarine cable has been removed from the project scope, and the revised proposed project includes installing an island system of PV panels to generate renewable solar power, with a battery back-up system, and supplemented with diesel generators. Should installation of the submarine cable become a reasonably foreseeable project, a separate planning effort would be conducted. Installation of the proposed project will be coordinated with the replacement of the Prison Building roof with a new, attached membrane roof to avoid disrupting the panels at a later time when anticipated roof replacement would be performed. The roof replacement project will be addressed under a separate documentation.

Figure 1. Example of a Flat Mounted PV System

PROJECT DESCRIPTION

INSTALLATION OF PV SYSTEM WITH BATTERY BACKUP

The proposed solar PV system would include the following components: PV modules, the PV mounting structure and fastenings as required, mechanical connections of the structure to the building, water supply for maintenance, electrical wiring, conduit, junction boxes, inverter, disconnect switches, circuit breakers, meters, ventilation/mechanical systems for electrical equipment, monitoring and maintenance instruments and equipment, and interpretive displays. Figure 1 shows a typical solar PV system, similar to the one that could be installed on Alcatraz Island.

Based on cultural, environmental, and other factors, the roofs of two buildings on Alcatraz were identified as viable locations for installing the PV panels: the Prison Building and the New Industries Building. Other areas on the island were considered, but deemed not feasible for installing PV systems because of impacts relating to the environment, cultural resources, and visual impacts. Table 1 provides a summary of the locations considered and the reasons for excluding them from further analysis.

Table 1. Areas Considered on Alcatraz for Photovoltaic Array Installation

Building/Location	Reason for Exclusion
Parade Grounds	Historic landscape value, public visibility
Building 64 Barracks/Apartments	Gabled roof-historic landscape value, public visibility
Cistern area near water tower	Bird breeding
Warden's Residence	Historic value, public visibility
Quartermaster	Gabled roof-historic landscape value, public visibility
Historic Concrete Fuel Oil Storage Tanks	Bird nesting
Power House Complex roof	Gabled roof-historic landscape value, public visibility
Model Industries Building	Precarious location on sloped shoreline. Uncertain future of slope stabilization project.

Because space is limited on the Prison Building and New Industries Building roofs, both systems would need to use high-efficiency crystalline silicon PV technology to maximize annual energy production per square foot of the available area. Thin film PV technology is not being considered for this project because of the lower efficiency and resulting higher space requirements.

For the Prison Building, the PV modules could be tilt mounted, and for the New Industries Building, they will likely be flat or barely pitched pending the final design considerations and consultation with the State Historic Preservation Officer (SHPO). Taking into account structural capacity and rooftop protrusions it is estimated that the Prison Building PV system would consist of approximately 900 modules producing an array rating of approximately 190 kW (DC), while the New Industries Building PV system would consist of approximately 460 modules producing an array rating of approximately 100 kW (DC). Electricity generated from the PV modules would be routed to an inverter located in each building and then routed to the Powerhouse using existing utility corridors.

The conceptual designs indicate that the potential solar energy production from the available square footage of the two roofs is 330,000 kWh/yr, which is approximately 38 percent of the estimated annual load for the island. Energy production would fluctuate seasonally, with higher output in the summer and lower output in the winter months.

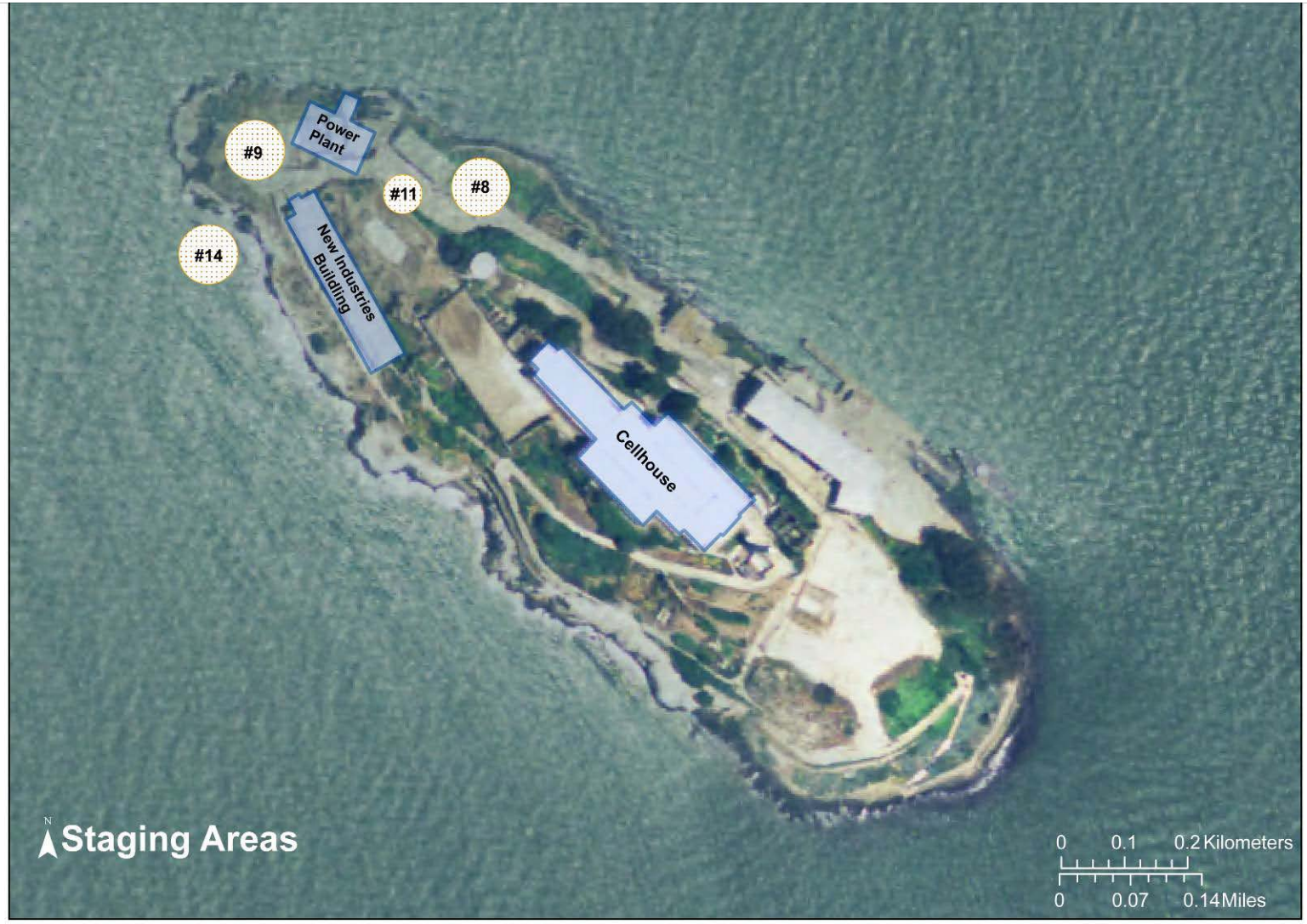
Access for PV Installation

Construction equipment and materials would be off-loaded from a barge at the dock, and walked or driven from the dock up the tram pathway to designated staging areas (Figure 2). Materials would be delivered to the roofs of the buildings via crane during hours when the island is closed to visitors. The crane and construction equipment would be stowed in the designated staging areas during visitor hours.

Access to the New Industries Building roof for installation of the PV system is constrained by bird breeding season and would only occur from September 16 – January 30. Additionally, a permanent ladder accessing the roof would need to be installed for maintenance access.

Staging areas where lift equipment can be located to convey construction materials to the roof would be identified and confirmed, ensuring minimal disruption to cultural and biological resources. Figure 2 shows the range of available staging areas, and likely staging areas to be used would include 8, 9, 11, and 14 with the restrictions described under *Precautionary Measures* later in this document.

Figure 2. Staging Areas for Solar Photovoltaic Array Installation



Dimensional Requirements and/or Limitations

Dimensions of the PV array and the mounting system technology would depend upon the specific PV module selected. The PV array layout would include appropriate number of PV modules in series and parallel to meet inverter requirements. The PV array layout would also meet the *California Department of Forestry and Fire Protection's Office of the Fire Marshall: Solar Photovoltaic Installation Guideline*.

PV modules may be mounted horizontal (flat), or tilted, depending on the technology used. Final design would result in a configuration that maximizes energy production, while minimizing impacts to the island's resources, such as historic structures. Tilted mounting systems can increase annual energy production but can also require additional complexity and cost. The PV array would connect to the electrical distribution system in a new 480 volt (V) alternating current (AC) metering switchboard located at or near the existing Powerhouse. The PV power feed from each building would be individually metered. The switchboard should also have a net meter to measure and record the incoming power from the utility connection or the generator system. Power would then be fed from the new metering switchboard into the existing distribution system at the existing switchboards in the Powerhouse.

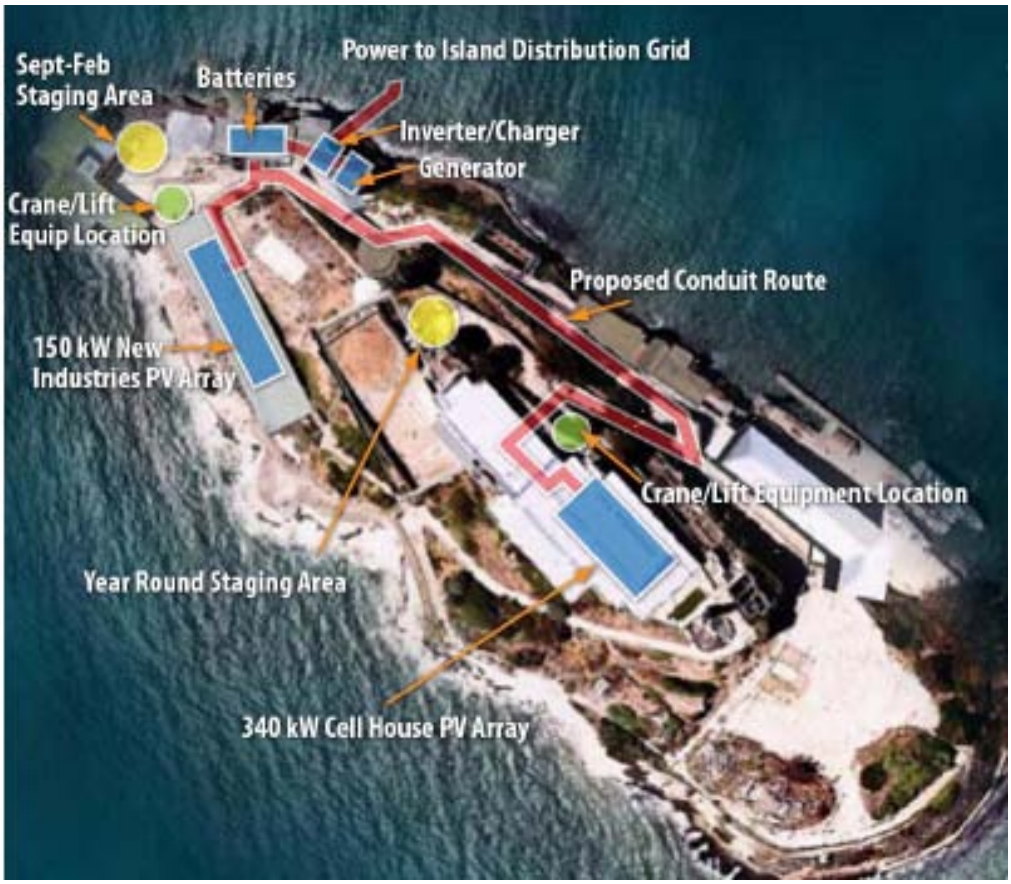
The inverters for this project would range from 150 to 333 kW and would weigh between 4,000 and 8,000 pounds (lbs). The units are typically supported on raised, reinforced concrete housekeeping pads located at the ground floor. Preliminary designs include an inverter in the shower room in the basement level of the Prison Building, as well as one in the west corner of the first floor of the New Industries Building.

The battery backup system for the PV system would be sized to optimize energy storage capability in concert with PV production, battery life and system performance, while minimizing the amount of time the diesel generators would operate. The battery bank will occupy approximately 600 square feet with batteries stacked two high. Each bay to be 18' x 20' (360 s.f.) . This system would be located in the south end of the ground floor of the New Industries Building.

Conduits with wires connecting the batteries to the PV modules on the roofs of the two buildings and the inverters would be run through existing utility corridors and openings within the buildings and on the island, and a charge controller would govern the interaction of the PV modules, the generator, and the batteries.

Figure 3. Site Concept for PV System

Figure 3 shows the full conceptual plan for the PV system. References to the "Power to Island



Distribution Grid" are not related to the PV system and are not part of this proposed project.

INTERPRETIVE PROGRAM

Real-time displays would be included for the public to understand the PV systems. Displays would be installed in the following locations: the Recreation Yard overlooking the New Industries Building roof, the Dock Area, and near the Powerhouse. Example information to be incorporated in the display may include, but is not limited to: real time instantaneous power, hourly system output (kWh); hourly island energy consumption, ambient temperature, daily and yearly energy totals (kWh), and daily and annual GHG savings (pounds and metric tons carbon dioxide [CO_2]).

Displays would include all design, equipment, accessories, and labor (including, but not limited to, wiring, configuring, and programming) for a complete and functional monitoring system for public display of the data listed above. At a minimum, the following would be included:

- Three (3) computer and monitor displays showing real-time performance and statistics
- Weatherproof enclosures for displays
- Interpretive plaques

CONSERVATION MEASURES

In addition to installation of the PV and battery systems, NPS would continue efforts to reduce energy needs at Alcatraz Island., As part of the planning of this project a preliminary Energy Audit was performed. Results are included in, Alcatraz Island Energy Audit Report, prepared by the Louis Berger Group, Inc., 2009. Some of the Energy Conservation Measures that were identified in the audit will be implemented as part of this project. Also included will the development of a comprehensive strategic energy management plan that will assess how energy is used on the island currently, formulate a more comprehensive list of energy conservation measures including initiatives, and make recommendations for how they should be implemented in the future.

PRECAUTIONARY MEASURES

Table 2 details precautionary measures proposed to ensure that impacts are below minor levels for terrestrial resources, noise, cultural resources, and energy resources. These precautionary measures would be incorporated in the terms and conditions of the contract for the project, and the NPS would oversee implementation of the measures.

Table 2. Precautionary Measures To Be Implemented

Resource	Precautionary Measures
Terrestrial Natural Resources	Park staff will conduct a training session for all contract crews at the beginning of each construction action. At this training, construction workers and supervisors will be informed of the sensitivity of the seabird populations on the Island, NPS standard values and regulations, and appropriate housekeeping practices in order to minimize disturbance to the Islands shorebird populations. Training sessions will also include identification of seabirds, prohibit the feeding of seabirds, and instruction on proper disposal of food waste and garbage techniques as to discourage feeding of wildlife on the Island, which may increase predation on native wildlife, including scavengers such as ravens and the Norway rat. Trainings will have a major focus on waterbird ecology and sensitivity to disturbance. Upon completion of training, employees or contracting crews will sign a form stating they attended the training and understood all of the conservation and protection measures. (TR-1) Prior to implementation of construction on the Island, restricted areas will be identified and mapped by NPS staff. These areas will be delineated with input from resource specialists, interpretative, and maintenance/project management staff to ensure resource protection as well as adequate access for construction and Island operations. The areas will be clearly marked with temporary fencing or other signage prior to the arrival of materials and equipment, and will be enforced (as a contractual requirement) by the construction crew with monitoring by the

Resource	Precautionary Measures
	NPS.(TR-2) Work on the exterior of the New Industries Building will be prohibited during the waterbird breeding season (February 15 to August 15 or as determined by an NPS biologist). (TR-3) To further reduce impacts to waterbirds, the following conditions will be applied to all construction activities occurring during waterbird breeding season (February 1 to September 15) in other areas (TR-4): o No night lighting will occur during waterbird breeding season. o In order to prevent disturbances to gulls, cormorants and Black-crowned night-herons, no maintenance will occur for PV arrays on the New Industries Building during breeding season. Access to the roof of the New Industries Building will not be permitted during bird breeding season. If emergency repairs are needed, access will be minimized as much as possible and those accessing the roof will be accompanied by a NPS biologist versed in minimizing impacts to birds. (TR-5) Annual maintenance of the PV system on the New Industries Building will occur prior to breeding bird season to ensure the systems are functioning properly and to reduce the potential for system failure, and the need to access the roof of the building, during bird breeding season. (TR-6) Precautionary measures for staging areas to address potential impacts to breeding birds will be applied, per the 2001 Alcatraz Island Historic Preservation and Safety Construction Program Final Environmental Impact Statement (NPS 2001). While any of the identified construction staging areas could be used, the most likely areas, and their associated mitigation measures, are described below. These measures will be effective during bird breeding season (February 15 to August 15) (TR-7): o Staging Area 8: If nighttime use is proposed, lighting will be directed toward the work area only and appropriately shielded. Lighting placement will be reviewed and approved by the NPS biologist and maintenance staff during initial staging operations. o Staging Area 9: No access will be provided to this area during breeding season from February 15 till all young in the area have fledged, including the cliffs below the Model Industries and New Industries Buildings, potentially until September 15. Storage area limits will be defined and approved on site by the NPS biologist prior to breeding season use. o Staging Area 11: No nighttime use. Staging area limits and the need to full exclusion measures to prevent gull nesting will be determined by the NPS biologist prior to initial staging operations. o Staging Area 14: No access from February 15 to approximately September 15. Site may be used only during periods when tide height for the duration would be +2.5 feet Mean Sea Level, or higher or the NPS will obtain a permit under the Marine Mammal Protection Act.
Noise	To mitigate daytime noise and potential disturbance to sea birds and visitors due to construction, contractors will muffle or control noise from construction equipment by using the following measures: o Construction vehicles and equipment will be properly maintained and equipped with exhaust mufflers; (NO-1) o The Park's SOP825: Vehicle Idling will be implemented to reduce noise levels, which prohibits all vehicles for idling for more than 30 seconds at a time. ((NO-2) o Impact tools will be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air; (NO-3) o External jackets on tools themselves will be used where feasible; (NO-4); and

Resource	Precautionary Measures
	o Quieter procedures will be used whenever feasible. (NO-5) In addition, to avoid negatively impacting the island's bird populations, construction and access to the PV system on the New Industries Building will only take place outside of sea bird breeding season (February 1 to September 15). (NO-6) If feasible, construction of the PV on the Prison Building will occur outside the bird breeding season (February 1 to September 15) to minimize impacts to the Islands breeding bird population. If this is not possible, a visual/acoustic barrier (or other device(s) recommended by the NPS biologist) will be established along the western and southern edges of the building. No nighttime lighting or construction will be permitted at the Prison Building. (NO-7) Acoustic barriers could be used to help reduce noise from equipment or generators to further reduce noise impacts (NO-9)
Cultural Resources	Prior to project inception, design drawings will be reviewed by NPS cultural resources specialists and in consultation with the California SHPO to ensure construction is consistent with Secretary of the Interior's Standards regarding new additions to historic buildings. The PV installation would be designed so that there is the least possible loss of historic materials and so that character-defining features are not obscured, damaged, or destroyed. The PV system would be designed to be as inconspicuous as possible, would be compatible with the industrial character of the building architecture, and in a manner that makes clear what is historic and what is new. (CR-1) With the exception of a single prehistoric artifact, no prehistoric sites are known to be present on Alcatraz Island. The island does have some sensitivity for historic archeological resources, however ground disturbing activity would be minimal because NPS expects to use existing utility corridors and equipment chases. NPS does not anticipate any impact to archeological resources; however archeologists meeting Secretary of the Interior's qualification standards will monitor ground disturbing activities in areas with potential for archeological sensitivity. In the event of unanticipated discovery work will stop in that area until a qualified archeologist can identify and evaluate any historic properties. In addition, NPS will provide training for all personnel involved with ground disturbance activities to facilitate recognition of potential archeological materials and to avoid impacts to resources.(CR-2) If buried cultural resources are inadvertently discovered during ground-disturbing activities on land, work will stop in that area and within a 100-foot radius of the find until a qualified archeologist can assess the significance of the find. (CR-3) If human skeletal remains are encountered, all work will stop in the vicinity of the discovery, and the find would be secured and protected in place. The San Francisco County coroner and Park Archeologist will both be immediately notified. If a determination finds that the remains are Native American, and that no further coroner investigation of the cause of death is required, they will be treated in accordance with the Native American Graves Protection and Repatriation Regulations at 43 CFR 10.4 (Inadvertent discoveries). The coroner would also contact the NAHC pursuant to Section7050.5[c] of the California Health and Safety Code) and the County Coordinator of Indian Affairs. (CR-4)
Energy Resources	An Energy Conservation Program will be developed for Alcatraz Island in the form of a Comprehensive Strategic Energy Management Plan. This plan will include a comprehensive audit of current energy use based on measurements, and formulate a program to reduce energy consumption on the Island, , This plan would be developed to address the Park's goal of becoming carbon neutral by 2016 (ER-1).\ The Alcatraz Esland Energy Audit Report, December 2009, identified a set of energy conservation measures (ECMs) that could easily and expeditiously be implemented to realize reduction in energy use in the near term. Several of these recommended ECMs will be designed and implemented as part of this project (ER-2) Additional actions to reduce GHG emissions and inform the public on climate change will be identified (ER-3)

ENVIRONMENTAL IMPACTS

The following discussion of impacts was guided by the NPS's Environmental Screening Form, as well as discussions of the interdisciplinary team during internal scoping and the value analysis process. These impact descriptions, arranged by impact topic, are intended to provide a more detailed description of potential impacts beyond the summary allowed in the Environmental Screening Form. The NPS's Environmental Screening Form can be found beginning on page 50.

GENERAL METHODOLOGY FOR ESTABLISHING IMPACT THRESHOLDS AND MEASURING EFFECTS

This section addresses the potential impacts to each resource area (i.e., impact topics) for each alternative. In the absence of quantitative data, best professional judgment is used. In general, impacts are determined through consultation and collaboration of the interdisciplinary team, NPS, and professional staff., Data sources such as the studies on energy usage, California SHPO, transportation volume and safety studies, and park planning documents were also used to assess the potential impact of the proposed project.

Impacts are classified as either direct or indirect. A direct impact is an impact that occurs as a result of the proposal or alternative in the same place and at the same time as the action. An indirect impact is any reasonably foreseeable impact that occurs as a result of, and after, the proposed project.

Potential impacts of all alternatives are described in terms of type (beneficial or adverse), context, duration (short- or long-term), and intensity (negligible, minor, moderate, or major). Definitions of these descriptors are as follows:

Beneficial: A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.

Adverse: A change that declines, degrades, and/or moves the resource away from a desired condition or detracts from its appearance or condition.

Context: Context is the affected environment within which an impact would occur, such as local, park-wide, regional, global, affected interests, society as a whole, or any combination of these. Context is variable and depends on the circumstances involved with each impact topic. As such, the impact analysis determines the context.

Duration: The duration of the effect is described as short-term or long-term. Duration is variable with each impact topic.

Intensity: Because definitions of impact intensity (negligible, minor, moderate, and major) vary by impact topic, intensity definitions are provided separately for each impact topic analyzed.

IMPAIRMENT ANALYSIS

In addition to determining the environmental consequences of the alternatives under consideration, the NPS *2006 Management Policies 2006* and Director's Order #12 require analysis of potential effects to determine if actions would impair park resources and values. The fundamental purpose of the national park system as established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. These laws give the NPS 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. NPS managers must always seek ways to avoid or minimize, to the greatest degree practicable, adversely impacting park resources and values.

The impairment prohibited by the Organic Act and the General Authorities Act is an impact, in the professional judgment of the responsible NPS manager, that harms the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. Whether an impact meets this definition depends on the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts. An impact to any park resource or value may constitute impairment, but an impact would more likely constitute impairment if it has a major or severe adverse effect upon 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 to opportunities for enjoyment of the park
- identified as a goal in the park's General Management Plan (GMP) or other relevant NPS planning documents

An impairment determination is included in the conclusion statement of cultural and natural resource topics for the proposed project. Impairment determinations are not made for visitor use and experience or park operations and management because impairment findings relate to park resources and values; these impact areas are not generally considered to be park resources or values. Impairment determinations are not made for visitor use and experience because, according to the Organic Act, enjoyment cannot be impaired in the same way an action can impair park resources and values.

TERRESTRIAL RESOURCES

GENERAL METHODOLOGIES FOR ANALYZING IMPACTS

This terrestrial and biological resources assessment is designed to assess the impacts of the proposed project on terrestrial resources within the study area. Impacts to terrestrial resources were determined by considering the effects of the existing conditions and the proposed PV panel installations.

IMPACT THRESHOLDS

Negligible: No measurable or perceptible changes would occur to the amount, distribution, connectivity, or integrity of terrestrial and biological resources or populations.

Minor: Changes to the amount of terrestrial and biological resources would be localized and would not affect the overall connectivity or integrity of habitat in the study area. Disturbance and loss of relatively few individuals of terrestrial and biological resources could occur, but would not affect the overall size or integrity of a local terrestrial and biological population.

Moderate: Effects would be measureable and perceptible over a larger area and could affect the overall amount, integrity, and connectivity of habitat in the study area. Habitat changes and disturbance and loss of individuals could affect the overall size of terrestrial and biological populations, but reductions in population size would not be permanent and would not threaten the continued existence of a species within the park. Impacts could mitigated by implementation of impact avoidance/minimization measure and/or restoration or enhancement of previously lost or degraded terrestrial and biological habitat within the park.

Major: Effects would be permanent over a relatively large area and would have drastic consequences to the amount, integrity, or connectivity of terrestrial and biological habitat. Changes in the size and integrity of terrestrial and biological populations could threaten the continued existence of species within the park. Impacts to terrestrial habitats and populations could not be mitigated.

Duration: Short-term impacts would occur sporadically throughout the course of a year. Long-term impacts would last more than one year.

STUDY AREA

The study area for terrestrial resources includes all of Alcatraz Island, specifically breeding bird areas found in the vicinity of the proposed project.

IMPACT ANALYSIS

Proposed construction activities for PV and battery backup installation could disturb habitats that may be used by common wildlife species on Alcatraz Island, including, but not limited to, California slender salamander, deer mouse, and colonial waterbirds. California slender salamanders and other additional wildlife use vegetated areas. The majority of natural habitat for these species is remote from staging and project areas and would not be affected by the proposed project.

Prison Building

The Prison Building is located on the upper terrace in the center of the island and is the main visitor attraction. Some exterior lighting is present at the south end of the building and along the main walkway to the Prison Building. The area is used year-round by visitors. Black-crowned night-herons nest along the steep slope below the Prison Building between the visitor path and the Recreation Yard, on the western side of the building. There have been up to three night-heron sub-colonies nesting at the Prison Building. The Alcatraz Island population of night-herons represents up to 40 percent of the San Francisco Bay's population. In a 2006 western gull nest count, there were six reported nests scattered around and on the roof of the Prison Building. The Cistern sub-colony located north of the Prison Building is the second largest gull concentration on Alcatraz with 124 nests counted in 2007 (National Parks Conservation Association 2008). The Alcatraz Island population of western gulls is considered to be approximately one-fourth of the nesting population in the San Francisco Bay.

Installation of the PV panels, and any other work on the Prison Building roof would be restricted during the breeding season to portions of the roof where activities would not be visible to the cormorant colonies along the western cliffs of the island or as adequately screened from those areas. The work area limits and methods delineating them would be reviewed and approved by the NPS biologist prior to work on the Prison Building roof (see Table 1, mitigation measure TR-2) and contractor staff working on the project would undergo training to be able to identify and avoid sensitive resources (see TR-1). Although there would be habitat disruption under the proposed project, the mitigation measures that would be applied (TR-1, TR-2, TR-4, and TR-7) would ensure that any impacts to terrestrial resources on and around the Prison Building during PV array installation would be short-term minor adverse.

There are several potential staging areas surrounding the Prison Building. The first is the staging area immediately north of the Prison Building. Prior to use, this site would be inspected by an NPS biologist to ensure that it is not being used as habitat by any sensitive species. Up to three night-heron nests have been identified in this area (NPS 2005). If nests are found, protective screening would be installed. Table 1 shows mitigation measures for each staging area (see mitigation measure TR-7). The second staging area is located immediately south of the Prison Building. Access and construction work from February 15 through August 15 would be limited to those activities that would be accomplished behind screening material (installed prior to the start of the breeding season), which would be reviewed and approved by the NPS biologist. These construction staging areas are already disturbed and do not contain habitat for terrestrial species on the island. There would be negligible impacts because the screening would minimize impacts.

The New Industries Building

The New Industries Building is located atop the western cliffs on the northern portion of Alcatraz Island. Currently the only approved activities in the building during the waterbird breeding season are ranger patrol and monitoring of nesting waterbirds. Any required construction activities at this location would occur outside of breeding season.

The New Industries Building is located near nesting sites for seven of the eight waterbird species that breed on the island and is one of the island's most sensitive locations for waterbirds. Approximately 25 percent of the island and San Francisco Bay populations of pigeon guillemots nest in this location. The night-heron sub-colonies represent approximately 15 percent of the total island population, and the Foghorn sub-colony of snowy egrets is approximately 13 percent of the total population. Snowy egrets have increased since 2001. Alcatraz is now one of the largest breeding colonies of the species in the Bay, with 85 nests counted in 2008. More than 19 percent of the island's western gulls nest in the immediate vicinity of the building or on the roof of the New Industries Building. Alcatraz Island populations represent at least 90 percent of Brandt's and pelagic cormorants nesting in the San Francisco Bay and the only pigeon guillemots.

Small terrestrial mammals, such as the deer mouse, would not be expected to be displaced during the installation of the PV arrays. During installation of the PV arrays, birds on the New Industries Building would be permanently displaced from their location atop the building, but these activities would occur outside of sensitive life stages (breeding) (see Table 1, mitigation measures TR-3, TR-4, TR-5 and TR-7). If this location was a preferred nesting location, this would result in the birds having to re-nest in another location on or off the island. These factors would result in short-term negligible to minor adverse impacts to surrounding terrestrial resources from the installation of PV arrays on the New Industries Building as the mitigation measures would restrict disturbance during breeding season. Further, maintenance of the PV system would only occur outside breeding bird season, with large annual maintenance projects occurring prior to breeding season to reduce the chances of system failure, and need to access the rooftop, during this sensitive life stage (see mitigation measure TR-6).

During monitoring of waterbird behavior for the 1996 "The Rock" movie premiere, which included crane use, noise, and night lighting, and extensive human activity over a period of 10 days in early June, night-heron adults and chicks were observed in alert postures, "chattering," and alert calling. As activity, noise, and lighting increased in this area, the night-herons retreated into the vegetation. After lights were turned off and activity stopped, the night-herons appeared to return to normal activity. The two closest night-heron sub-colonies also declined in size the following year for unknown reasons. Based off of these past records of bird disturbance, the installation of PV arrays on both the Prison Building and the New

Industries Building may lead to short and long-term minor adverse impacts as disturbance would likely result in decreased reproductive success and population size or abandonment of individual sub-colonies.

Battery Backup

The battery backup located in the Powerhouse would require minimal construction work outside of the Powerhouse, mainly just transporting the batteries from the dock to the installation site. It is expected that this transport would occur on already disturbed surfaces and would not occur within habitat on the island. Once installed, the battery backup would not disturb terrestrial resources on the island. The continued use of one generator to charge the batteries would continue to impact terrestrial resources from sounds and emissions, but these impacts would be reduced as the amount of time the generator runs is reduced and will result in long-term negligible impacts.

Conclusion

The PV array installation on the Prison Building would be short-term negligible adverse while the New Industries Building results in short-term negligible to minor adverse impacts. The associated battery backup system would have long-term negligible adverse impacts. Based on this impact analysis, the proposed project is not likely to result in any impacts that would constitute impairment of the terrestrial resources.

AIR QUALITY

GENERAL METHODOLOGIES FOR ANALYZING IMPACTS

Impacts to air quality were qualitatively assessed using current air quality information obtained through a review of the literature and pertinent laws, guidance and regulations, professional judgment, and experience with comparable actions.

To regulate the emission levels resulting from a project, federal actions located in non-attainment areas are required to demonstrate compliance with the general conformity guidelines established in 40 CFR Part 93 Determining Conformity of Federal Actions to State or Federal Implementation Plans (the Rule). Alcatraz Island is located within an area designated by the EPA as in marginal non-attainment for ozone and as in non-attainment for $PM_{2.5}$; a General Conformity Rule applicability analysis is warranted. To provide a basis for comparison for what would be considered a major impact, projects in a non-attainment zone are allowed to emit 25 to 100 tons per year (TPY) of any given pollutant, depending on the severity of non-attainment, and still be in conformity. The Bay Area was previously in non-attainment for CO, but was classified as in attainment in 1998. In addition to the federal classifications, under the California Ambient Air Quality Standards (CAAQS), the Bay Area is in non-attainment for both $PM_{2.5}$ and PM_{10} (California EPA 2009).

During operation, impacts to air quality usually come from the heating and daily use of new facilities. For this proposed project, operational emissions would be expected from the use of a generator to provide 38 percent of the energy necessary to power the island.

Impact Thresholds

Negligible: There would be no net increase or decrease in emissions from current levels either on a localized or regional level.

Minor: Emissions would be greater than 0 TPY and below 5 TPY. Emissions would be increased in localized areas where there are currently little to no emissions sources, but would not have a large impact regionally.

Moderate: Emissions would be greater than 5 TPY and less than conformity de minimus levels (100 TPY NOx, sulfur dioxide (SO2), PM2.5, volatile organic compound [VOC]). Emissions would increase on both a localized and regional scale.

Major: Emissions would be equal to or greater than conformity de minimus levels (100 TPY NOx, SO2, PM2.5, VOC) on both a localized and regional scale.

Duration: Short-term impacts would occur during the construction period. Long-term impacts would result from operational emissions.

Study Area

The area of analysis for air quality is the expanded area of analysis, including the San Francisco Bay Area airshed, which includes Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma counties.

Impact Analysis

Solar PV arrays would be installed on the roof of two existing structures on the island. These arrays would produce 38 percent of the energy required to power the island. A battery backup along with two Tier 3 generators would be used to power the remaining 62 percent of energy needs. Emissions resulting from construction would be negligible localized and short-term, occurring only during the installation period. Air pollutants from construction would contain mobile source emissions from construction equipment and worker and delivery vehicles, including the related carbon monoxide, PM_{10} or $PM_{2.5}$, NO_x, VOCs, SO_2, and fugitive dust. Examples of fugitive dust include windborne particulate matter from earth-moving and material handling during construction activities on the island. These impacts would be minimized through implementation of best management practices during construction activities and environmental compliance critical to mitigate potential air impacts. Such mitigation measures include using water or appropriate liquids for dust control during demolition, land clearing, grading, and other activities as well as covering open-body trucks when transporting materials. With implementation of these measures, impacts to air quality from construction or demolition would be short-term negligible and adverse.

An air quality conformity applicability analysis was conducted to identify potential increases or decreases in non-attainment air pollutant emissions associated with the proposed project. Table 3 summarizes the total ozone precursor (NO_x and VOC) and $PM_{2.5}$ precursor ($PM_{2.5}$ and SO_2) emissions associated with the installation and operation of PV cells under the proposed project. Construction-related emissions would be temporary and would only occur during installation of the cells. Operations emissions would occur throughout the life of the energy infrastructure. When compared to the *de minimis* values for this non-attainment area of 100 TPY for NO_x, VOC, $PM_{2.5}$ and SO_2, the emissions associated with construction and operation fall below the *de minimis* values. As a result the energy infrastructure improvements are not subject to the General Conformity Rule requirements.

Table 3. Total Emissions from Construction Activities Related to the Installation of Solar PV Cells

Activity	Operation Emissions (tons)		
	NO_x	VOC	PM
Generator Usage	2.72	0.20	0.16

As a result of the proposed project, there would be a reduction in emissions, however, generators would still be needed to supplement energy from the PV system and to charge the battery backup.

Emissions from the reduced operation of generators represent a large drop in criteria pollutant emissions, most notably from NO_x. NO_x emissions would be expected to drop from 14.63 TPY (existing conditions) to 2.72 TPY. The installation of PV cells would result in an 11.91 TPY drop in NO_x emissions from generator usage. Emissions from VOCs, PM, and SO_2 would also be reduced. Additional emissions reductions would result from the reduced frequency of weekly fuel deliveries to the island. With the operation of Tier 3 generators, the BAAQMD would issue a revised air permit for Alcatraz Island, and the island would no longer be near the threshold for exceeding the existing permit.

Air emissions were also evaluated to determine regional impact. The *Revised San Francisco Bay Area Ozone Attainment Plan for the 1-Hour National Ozone Standard* (BAAQMD 2001) sets forth 2006 projections for daily target levels using control measures for construction equipment and external combustion stationary sources. The 1-hour ozone standard has been revoked; however the 1-hour state implementation plans (SIPs) are still valid until an 8-hour SIP can be approved by the EPA. Under the San Francisco Bay Area SIP, the 2006 target level for construction equipment is 81.5 tons per day of NO_x and 9.0 tons per day of VOC. The 2006 target level for external combustion stationary sources (including generators) is 16.7 tons per day of NO_x and 0.9 tons per day of VOC. Under the proposed project, the increase in annual emissions from the construction activities would not make up 10 percent or more of the available regional emission inventory for VOC or NO_x and would not have a regional impact. There

would be a decrease expected for operational emissions due to the reduction in generator emissions (to under 0.001 TPY for each pollutant). The operation of the PV cells would not result in any daily emissions. As a result, there would be short-term negligible adverse impacts during installation and long-term beneficial impacts to air quality.

Since the regulations for $PM_{2.5}$ were promulgated in 2006, the San Francisco Bay Area does not yet have an approved SIP for this criteria pollutant. Emissions from the proposed project would not be expected to have a regional impact as it would represent a large decrease in this criteria pollutant from the existing condition.

Conclusion

Under the proposed project, electricity to Alcatraz Island would be provided by installing solar PV arrays on existing structures on the island. There would be localized short term negligible impacts during construction and long-term beneficial impacts due to a reduction of operational emissions, including reduced generator use and the reduction of weekly boat trips to deliver diesel fuel.

There would be no impairment to air quality under the proposed project as impacts would be long-term beneficial, and provide an enhancement in air quality at the Park, rather than adverse impacts.

NOISE

GENERAL METHODOLOGY FOR ANALYZING IMPACTS

The purpose of this impact analysis is to assess the effects of the proposed project on the ambient noise level in the areas that would be affected by the solar PV panel installations. To determine impacts, the current ambient noise level of the area was considered, and the potential effects of the proposed construction and installation on the level were analyzed. Beneficial noise impacts would reduce decibel levels, while adverse impacts would increase levels.

IMPACT THRESHOLDS

Negligible: The change in sound levels would not be perceptible to island visitors and would have no discernible effect.

Minor: The change in sound levels would be slightly detectable to island visitors, but would not be expected to have an overall effect.

Moderate: The change in sound levels would be clearly detectable and could have an appreciable effect to island visitors.

Major: The change in sound levels would have a substantial, highly noticeable effect to *island visitors.*

Duration: Short-term impacts would occur sporadically throughout the course of a year. Long-term impacts would last more than one year.

Study Area

The study area for noise includes Alcatraz Island.

Impact Analysis

During installation of the PV system, construction materials would arrive at the dock where they would be hauled up the slope to the staging areas. The PV array equipment would then be transported to the building roofs by a crane that would only operate during non-visitor hours. Noise levels of typical construction equipment range from approximately 65 to 95 decibels (dBA) at 50 feet from the source with an average of 89 dBA (EPA 1971). However, much of the equipment used for PV system installation is smaller, handheld equipment that produces less noise than larger equipment. Therefore the average construction noise level for the action alternative can be expected to be below 89 dBA. Although these levels may exceed state or local standards, the activities would occur on Alcatraz Island, removed from the population center or other sensitive receptors, and would not have an impact on these areas. There would be short-term minor adverse impacts on the island to staff and visitors because of added noise resulting from the transportation of construction materials and construction activities that could be noticeable, but would end after the short construction period.

To mitigate daytime noise and potential disturbance to wildlife species and visitors due to construction, and to reduce short-term moderate adverse impacts to levels minor or below, contractors would muffle or control noise from construction equipment by using the following measures (see mitigation measures NO-1, NO-2, NO-3, NO-4, NO-5):

- Construction vehicles and equipment would be properly maintained and equipped with exhaust mufflers;
- Construction equipment and vehicles would not be permitted to idle for greater than 30 seconds;
- Impact tools would be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air;
- External jackets on the tools themselves would be used where feasible; and
- Quieter procedures would be used whenever feasible. (NPS 2009a)

In addition, to avoid construction noise from negatively impacting the island's bird populations, construction of the PV system on the New Industries Building would only take place outside of the birds' breeding season (see mitigation measure NO-6).

Other mitigations during construction would include conducting construction on the Prison Building outside of bird breeding season, if possible (see mitigation measure NO-7), installing acoustic barriers to

further reduce sound if needed (see mitigation measure NO-8) and following the Park's Standard Operating Procedure 825, that restricts vehicle idling to 30 seconds in order to reduce noise sources.

During operation, the PV panels would not create a new source of noise. The inverters associated with the PV system, as well as the fans in the equipment vaults would produce noise, but this noise would be expected to be less than that of the existing generator operation. The generators would continue to emit noise in the range of 71 to 83 dBA, with the noise being muffled to a certain degree by their location inside the Powerhouse. The noise level would be reduced due to the containment of the generators and the generators are located outside of a visitor use area so visitors cannot hear their operation; therefore, impacts would be long-term negligible to minor adverse.

Daily operation of the PV system and associated generator would result in long-term negligible to minor adverse impacts to the ambient noise levels on the island as the low level of noise associated with these operations would not be noticeable to staff or visitors.

Conclusion.

On Alcatraz Island, there would be short-term minor adverse impacts resulting from the installation of the PV system during construction primarily from the hauling of equipment and general construction noise and the ability for staff and visitors to hear construction noise. Throughout the project area, there would be long-term negligible adverse impacts to the ambient noise level from daily operations of the PV system, generators, and battery backup.

From this analysis, the proposed project would not likely result in any impacts that would constitute impairment to the ambient sound or vibration level as no Park resources or values necessary to fulfill the purpose of the Park would be impacted beyond a short-term minor to moderate adverse level, with these impacts ceasing after the short (one month) construction period.

CULTURAL RESOURCES

SECTION 106 COMPLIANCE

This cultural resource analysis is intended to comply with the requirements of both NEPA and Section 106 of the National Historic Preservation Act (36 CFR Part 800, Protection of Historic Properties). A Section 106 finding of effects follows the conclusion statement for each alternative.

The Advisory Council on Historic Preservation's regulations for implementation of Section 106 require that impacts to historic resources be identified and evaluated by determining: (1) the area of potential effects (APE); the area of geographic study); (2) identifying cultural resources present in the APE that are

either listed on or eligible for listing on the National Register of Historic Places (NRHP); (3) applying the criteria of adverse effect (see below) to affected cultural resources either listed on or eligible for listing on the NRHP; and (4) considering ways to avoid, minimize, or mitigate adverse effects. Under the Advisory Council on Historic Preservation's regulations, a determination of either adverse effect or no adverse effect must be made for affected NRHP-listed or eligible cultural resources located within the APE. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the NRHP. Adverse effects also include reasonably foreseeable effects caused by the proposal that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5, *Assessment of Adverse Effects*). The resolution of adverse effects can occur in a variety of ways, in accordance with 36 CFR 800.6 (*Resolution of Adverse Effects*). A determination of no adverse effect means there is an effect, but the effect would not diminish, in any way, the characteristics of the cultural resource that qualify it for inclusion in the NRHP. Finally, Section 110(f) of the National Historic Preservation Act requires that agency officials, to the maximum extent possible, minimize harm to any National Historic Landmark that may be directly and adversely affected by a project. These requirements are also addressed under 36 CFR 800.10 (*Special Requirements for Protecting National Historic Landmarks*). All effect determinations are made in consultation with the California SHPO.

In all cases where new cultural resources are discovered during project activities, or where it is discovered post-review that NRHP-eligible resources may be affected, potential adverse impacts to those NRHP-eligible resources would be determined through coordination by the Park and the SHPO. Impact threshold definitions below contain statements specifically related to adverse effects as defined in 36 CFR 800.

National Register properties within the proposed APE on Alcatraz Island are substantially understood except for historic archeological properties, Alcatraz Island is a National Historic Landmark district listed in the National Register. The Prison Building, New Industries Building, and Powerhouse buildings are all listed as contributing features to the district.

General Methodologies for Impact Analysis

The purpose of this impact analysis is to assess the effects of the proposed project on the cultural resources of Alcatraz Island for the solar PV panel installations and associated infrastructure. The current uses of the area were considered and the potential impacts of the proposed construction and installation on cultural resources were analyzed. Cultural resources that occur within the Park that may be affected by the proposed project were considered under this analysis.

IMPACT THRESHOLDS

The following thresholds were used to determine the magnitude of effects to cultural resources resulting from implementation of the proposed project. (Note: Cultural resources are nonrenewable resources and adverse effects to them generally consume, diminish, or destroy the original historic materials or form, resulting in a permanent loss in the integrity of the resource that can never be recovered.)

Archeological Resources

Negligible: Impact is at the lowest levels of detection with neither adverse nor beneficial consequences. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Minor: Beneficial: Preservation of a site(s) or shipwrecks(s) in their natural state. For purposes of Section 106, the determination of effect would be *no adverse effect.* Adverse: Disturbance of a site(s) or shipwreck(s) results in little loss of integrity or important information potential, and the qualities of the resource (the material aspects that provide a connection to the past) are retained. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Moderate: Beneficial: Stabilization of a site(s). For purposes of Section 106, the determination would be *no adverse effect*. Adverse: Disturbance of a site(s) results in loss of integrity. For purposes of Section 106, the determination of effect would be *adverse effect*. A memorandum of agreement is executed among the NPS and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the memorandum of agreement to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.

Major: Beneficial: Active intervention to preserve a site(s) or shipwreck(s). For purposes of Section 106, the determination of effect would be *no adverse effect*. Adverse: Disturbance of a site(s) or shipwreck(s) results in loss of most or all of the resource's integrity and its potential to yield important information related to the resource's significance, or its importance. For purposes of Section 106, the determination of effect would be *adverse effect.* A memorandum of agreement is executed between the NPS and SHPO and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b).

Historic Structures

Negligible: Impact is at the lowest levels of detection with neither adverse nor beneficial consequences. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Minor: Beneficial: Preservation of a structure. For purposes of Section 106, the determination of effect would be *no adverse effect*. Adverse: Disturbance of a structure results in little loss of integrity, and the qualities of the resource (the material aspects that provide a connection to the past) are retained. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Moderate: Beneficial: Would involve the rehabilitation of a structure or building in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. For purposes of Section 106, the determination of effect would be *no adverse effect*. Adverse: The impact would alter a character-defining feature(s) of the structure or building but would not diminish the integrity of the resource to the extent that its listing on or eligibility for listing on the NRHP would be jeopardized. For purposes of Section 106, the determination of effect would be *adverse effect*.

Major: Beneficial: Active intervention to preserve a structure. For purposes of Section 106, the determination of effect would be *no adverse effect*. Adverse: Disturbance of a structure results in loss of most or all of the resource's integrity. For purposes of Section 106, the determination of effect would be *adverse effect*. A memorandum of agreement is executed between the NPS and SHPO and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b).

Cultural Landscapes, National Historic Landmarks, and Historic Districts

Negligible: The impact is at the lowest levels of detection or barely perceptible and not measurable. For purposes of Section 106, the determination of effect would be *no adverse effect.*

Minor: Beneficial: Character-defining features would be preserved in accordance with the Secretary of the Interior's Standard for the Treatment of Historic Properties, therefore maintaining the integrity of the cultural landscape, National Historic Landmark, or historic district. For purposes of Section 106, the determination of effect would be *no adverse effect*. Adverse: The impact would not notably affect the character-defining features of a cultural landscape, National Historic Landmark or historic district. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Moderate: Beneficial: The landscape, National Historic Landmark or district, or its features would be rehabilitated in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties, to make possible a compatible use of the landscape while preserving its character-defining features. For purposes of Section 106, the determination of effect would be *no adverse effect*. Adverse: The impact would alter a character-defining feature or features of the cultural landscape, National Historic Landmark, or historic district but would not diminish the integrity of the property to the extent that its NRHP eligibility would be jeopardized. For purposes of Section 106, the determination of effect would be *adverse effect.*

Major: Beneficial: The cultural landscape, National Historic Landmark, or historic district would be restored in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties to accurately depict the features and character of a landscape as it appeared during its period of significance. For purposes of Section 106, the determination of effect would be *no adverse effect*. Adverse: The impact would alter a character-defining feature(s) of the cultural landscape, diminishing the integrity of the resource to the extent that it would no longer be eligible to be listed on the NRHP. For purposes of Section 106, the determination of effect would be *adverse effect*. A memorandum of agreement is executed between the NPS and SHPO and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b).

Area of Potential Effects

In accordance with the Advisory Council on Historic Preservation's regulations implementing Section 106, the APE is defined as the geographic area within which an undertaking may directly or indirectly cause alteration in the character or use of historic properties (36 CFR 800.16(d)). For analysis of effects to cultural resources for the current project, the APE assumes that the alternative with the greatest "footprint" is selected (the proposed project), the project APE consists of the boundaries of the Alcatraz Island National Historic Landmark District. Figure 4 shows the general APE. On October 7, 2009, the NPS started Section 106 consultation with the California SHPO and requested the concurrence of the California SHPO on the APE.

Impact Analysis

Archeological Resources

With the exception of a single prehistoric artifact, no prehistoric sites are known to be present on Alcatraz Island. NPS does not anticipate any impact to archeological resources; however archeologists meeting

Secretary of the Interior's qualification standards will monitor ground disturbing activities in areas with potential for archeological sensitivity. No impacts to archeological resources are expected.

No impacts to archeological resources would occur as a result of installation of the interpretive signs because the signs would be installed in previously disturbed areas where no archeological resources have been identified.

Conclusion.

The proposed project would result in no impacts to archeological resources. There would be no cumulative impacts to archeological resources.

Based on this impact analysis, the proposed project is not likely to result in any effects that would constitute impairment of archeological resources, resulting in a Section 106 finding of *no adverse effect*.

Historic Structures, Cultural Landscapes, National Historic Landmarks, and Historic Districts

The proposed project has the potential to affect the historic fabric of the Alcatraz Island Cultural Landscape, Historic District, and National Historic Landmark by introducing modern elements to the historic context of historic buildings, including the New Industries Building, Powerhouse, and main Prison Building.

Solar PV Arrays

Installation of the solar PV system modules includes mounting them against the roof and away from Prison Building skylights. Positioning of the panels, tilted or flat, would be determined in consultation with the California SHPO to minimize potential effects to the integrity of the historic building (NPS 2009b). The PV installation would be designed so that there is the least possible loss of historic materials and so that character-defining features are not obscured, damaged, or destroyed. The PV system would be designed to be as inconspicuous as possible, would be compatible with the industrial character of the building architecture, and in a manner that makes clear what is historic and what is new.

At a meeting with the California SHPO on June 1, 2009, the SHPO commented that installation of solar arrays on the roof of the Prison Building was acceptable, and that no adverse effect would result under Section 106 because the roof is flat and has a 3-foot parapet. As such, the roof of the Prison Building is not visible to the public and therefore installation of the arrays would not detract from the visual characteristics of the building that make it eligible for the NRHP. The roof of the New Industries Building is two stories above the ground; however, given the topography of the island, the New Industries Building rooftop is visible to visitors from the pathway below the Recreation Yard. As such, the panels would be

visible, but would be but made as inconspicuous as possible. At the June 2009 meeting, the SHPO indicated that a finding of no adverse effect under Section 106 could be achieved through effective design that sensitively incorporates the solar arrays with the plain, industrial aesthetic of the building. The original roof of the building was replaced and was modified by the installation of pipe stanchion supports for a PV system that was never installed. As such, the historic integrity of the roof of the New Industries Building has already been compromised, and the existing pipe stanchions detract from the historic character of the building. Installation of the solar arrays on the rooftop of the New Industries Building would be compatible with and improve the visual historic character of the building as viewed from the adjacent pathway and would be in keeping with the SHPO's recommendation. Additionally, the panels would be compatible with the existing functional and industrial character of Alcatraz Island. Consultation with the SHPO on panel design would be undertaken to ensure no adverse impacts would occur (mitigation measure CR-1).

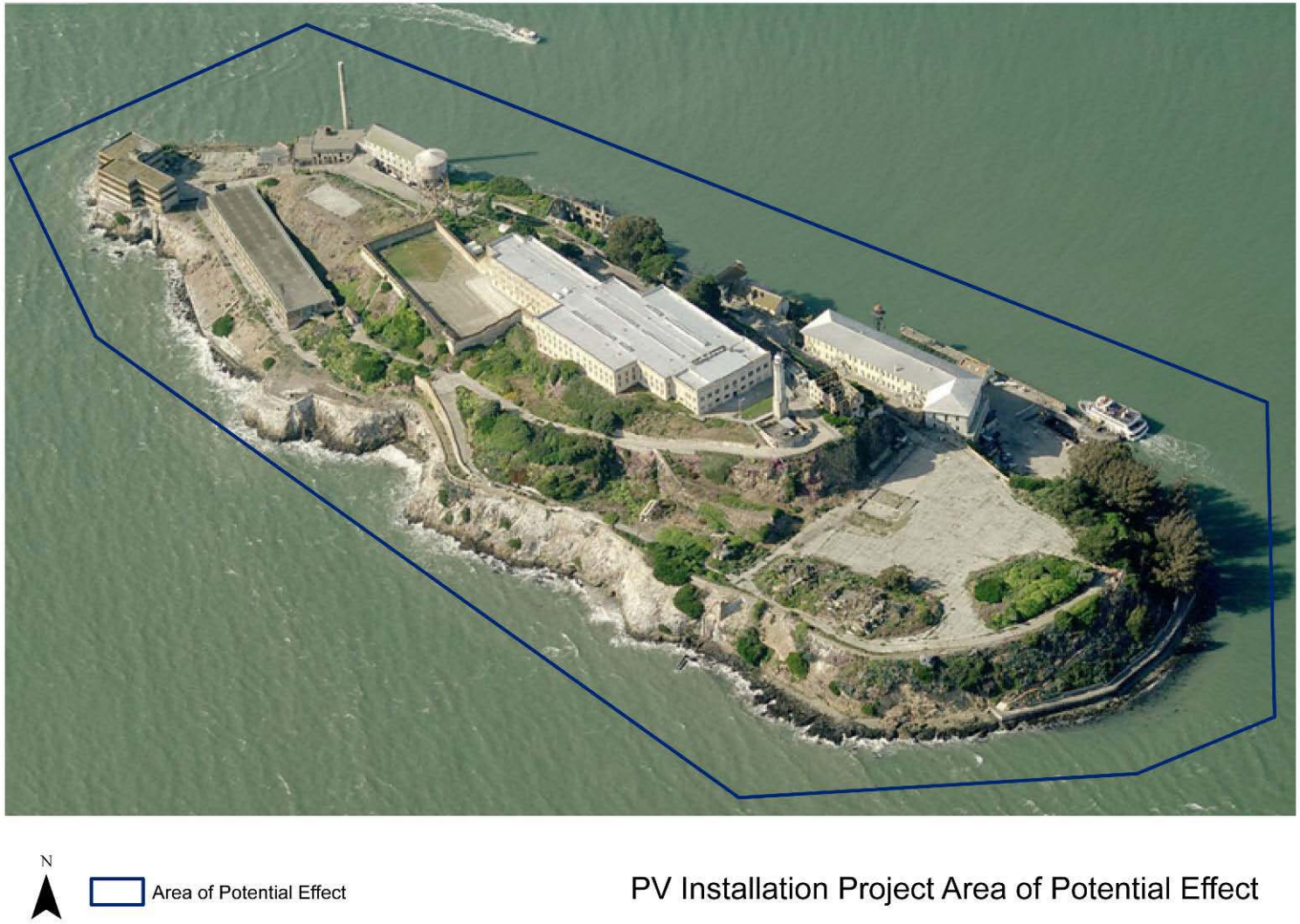
The staging areas for lift equipment, where construction materials would be conveyed to the roof of each building, would be located in already designated and disturbed areas, ensuring minimal disruption and no adverse effects to cultural resources.

Inverters and Cables

The PV system would be connected via cables to the electrical distribution system in a new 480V AC metering switchboard located at or near the existing Power Plant. Inverters would be placed in both the Prison Building and New Industries buildings. These inverters would range from 150 to 333 kW and weigh from 4,000 to 8,000 lbs. The units are typically supported on raised, reinforced concrete housekeeping pads located at the ground floor.

Figure 4. Proposed Project Area of Potential Effects

Source: Microsoft Corporation 2009



In the Prison Building, the inverter would sit atop an elevated 6-inch tall concrete pad in the north corner of the shower room located on the basement level of the building (NPS 2009b). The inverter may be visible to visitors touring the Prison Building, but would be painted in a manner that is consistent with the historic features of the building interior. Cable extending from rooftop solar arrays to the inverter would pass through an existing utility corridor between the prison cells and the shower room. The cable would pass through a new wall penetration that would be close to other similar wall penetrations. The cable would then be routed from the inverter to the Powerhouse through an existing duct bank. Installation of the Prison Building inverter would introduce a new element into the building, but it would not significantly alter its historic setting. However, there would be a long-term minor effect to the character of the historic Prison Building resulting from the placement of the inverter in the shower room because visitors would be able to view the inverter while touring. They would not be able to see the cable to and from the inverter. Installation of the cable would therefore have a long-term minor adverse effect. Effects of inverter and cable installation in the Prison Building would result in a no adverse effect finding under Section 106.

Cable extending from the solar PV arrays on the rooftop of the New Industries Building would penetrate through the roof and be routed to the new inverter inside the building. From there, it would be aligned with previous utility installations alongside a tunnel to the Power Plant. Installation of the New Industries Building cable and inverter would introduce a new element into the building, but would not detract from the historic setting of the building in an adverse way as it would be consistent with the industrial and functional character of the island. This would therefore result in a long-term minor adverse effect to the character of the historic structure. This would be a finding of *no adverse effect* under Section 106.

Interpretive Signs/Kiosks

The proposed interpretive signs/kiosks are new elements to Alcatraz Island. However, no effects to historic structures would occur as a result of installation of the interpretive signs/kiosks because they would not be placed directly on historic buildings.

Cultural Landscapes, National Historic Landmarks, and Historic Districts

The proposed project has the potential to affect the historic fabric of the Alcatraz Island Cultural Landscape, Historic District, and National Historic Landmark by introducing modern elements to the historic context of historic buildings, including the New Industries Building, Powerhouse, and main Cell House.

Solar PV Arrays

The introduction of roof-mounted solar panels into the historic Alcatraz Island setting would result in the addition of non-historic features into the cultural landscape. However, the installation of panels on the Cell House would not be readily visible from most vantage points, especially from significant viewpoints. The panels on the New Industries Building would be visible and would introduce modern, non-congruent elements to the historic context. While character-defining features of the landscape are being altered, it would not diminish the integrity of the landscape to the extent its NRHP eligibility would be jeopardized. In addition, removal of the solar panels in the future, if necessary, would not diminish the integrity of the historic property —one of the standards for rehabilitation as described in the Secretary of the Interior's Standards. The PV installation would be designed so that there is the least possible loss of historic materials and so that character-defining features are not obscured, damaged, or destroyed. The PV system would be designed to be as inconspicuous as possible, would be compatible with the industrial character of the building architecture, and in a manner that makes clear what is historic and what is new. Therefore, the placement of solar panels would result in a long-term minor adverse effect to the Alcatraz Island cultural landscape and historic district. This would be a finding of ***no adverse effect*** under Section 106.

Inverters and Cables

The installation of inverters and associated cables within the Cell House and New Industries Building would result in the addition of non-historic features into the cultural landscape and District boundaries. The inverter and cables installed within the Cell House would be visible and would introduce modern, non-congruent elements to the historic context. However, this installation would not diminish the integrity of the overall property to the extent that its NRHP eligibility would be compromised. The new inverter and cables installed within the New Industries Building would not be visible to the public; this installation would therefore not diminish the integrity of the Alcatraz Island cultural landscape and historic district resulting in a finding of *no adverse effect* under Section 106.

Battery Backup Bank

Installation of a battery backup bank in the Power Plant would provide up to 8 hours of electricity during nighttime hours. Installation of the battery bank would introduce a new element into the historic building but would not be visible to the public and would result in minor, long-term adverse effects to the historic Power Plant. This is consistent with a finding of *no adverse effect* under Section 106.

Interpretive Signs/Kiosks

The proposed interpretive signs/kiosks would result in the introduction of new elements to Alcatraz Island. Installation of the signs/kiosks could therefore result in a long-term, minor adverse effect.

However, because they would be designed in keeping with the historic character of their surroundings, there would be *no adverse effect* under Section 106.

Conclusion

The installation of solar arrays on the rooftops and inverters and cables within the New Industries Building and Cell House, the installation of a battery backup bank in the Powerhouse, and the installation of interpretive signs/kiosks would result in a minor adverse effect to the Alcatraz Island cultural landscape, historic district, and National Historic Landmark. This would be consistent with a finding of *no adverse effect* under Section 106.

SECTION 106 ASSESSMENT OF EFFECT

Table 4 summarizes potential effects to historic properties as a result of the proposed project.

Table 4. Proposed Project. Section 106 Assessment of Effect

Resource	Treatment	Section 106 Finding
Archeological Resources	No impacts would occur.	No adverse effect
Historic Structures	SHPO would be consulted on PV and interpretive display design. Building and landscape rehabilitation will conform to The *Secretary of the Interior's Standards for the Treatment of Historic Properties*.	No adverse effect
Cultural Landscapes, National Historic Landmarks, Historic Districts	Landscape rehabilitation would conform to *Protecting Cultural Landscapes Planning, Treatment, and Management of Historic Properties and Landscapes* Consultation with the SHPO would continue.	No adverse effect

VISITOR USE AND EXPERIENCE

GENERAL METHODOLOGIES FOR IMPACT ANALYSIS

The purpose of this impact analysis is to assess the effects of the proposed project on the visitor experience goals of Alcatraz Island. To determine impacts, the current uses of the area were considered and the potential effects of the proposed construction and installation on visitor experience and use were analyzed. Activities and the type of visitor experience and use/visitation that occur in the Park that might be affected by the proposed project, as well as the visual character of the area and noises experienced by visitors, were considered.

IMPACT THRESHOLDS

Negligible: Visitors would likely be unaware of any effects associated with implementation of the alternative. There would be no noticeable change in visitor use and experience or in any defined indicators of visitor satisfaction or behavior.

Minor: Changes in visitor use and/or experience would be slight and detectable but would not appreciably limit critical characteristics of the visitor experience. Visitor satisfaction would remain stable.

Moderate: A few critical characteristics of the desired visitor experience would change and/or the number of participants engaging in a specified activity would be altered. Some visitors who desire their continued use and enjoyment of the activity/visitor experience might pursue their choices in other available local or regional areas. Visitor satisfaction would begin to decline.

Major: Multiple critical characteristics of the desired visitor experience would change and/or the number of participants engaging in an activity would be greatly reduced or increased. Visitors who desire their continued use and enjoyment of the activity/visitor experience would be required to pursue their choices in other available local or regional areas. Visitor satisfaction would markedly decline.

Duration: Short-term impacts would occur sporadically throughout the course of a year. Long-term impacts would last more than one year.

STUDY AREA

The study area for visitor use and experience includes Alcatraz Island.

IMPACT ANALYSIS

During installation of the PV system, construction equipment would be delivered to the island by vessels at the dock. Although there is the potential for conflict between delivery vessels and the operation of the Alcatraz Cruises passenger ferries that bring visitors to the island, any disruption to existing services would be slight and construction deliveries during construction would be scheduled to minimize any possible disruption. Based on the experience of Park staff, it is expected that the two vessels would be able to navigate a joint approach to the Alcatraz Island dock, without difficulty, and would not cause disruptions in visitor access by ferry (Ryan 2009). There would be short-term negligible adverse impacts to visitor use resulting from the delivery of construction materials at Alcatraz Island as visitors would likely be unaware of any effects associated with the deliveries and there would be no noticeable change in visitor satisfaction or behavior.

For the duration of construction and installation there would be two construction staging areas on the island. A year-round construction staging area that is located at the northeast corner of the Prison Building would be used. This area is visible to visitors, but is already fenced off to visitor access due to its use as a permanent staging area. The second staging area that would be used would be located on the concrete area at the northern tip of the island and would only be used from September to February to avoid impacts to the island's breeding bird population (see Table 1, mitigation measure TR-7, for a

complete list of staging area restrictions). This area is currently not accessible to visitors. If the area were to open to allow access to the New Industries Building, access to visitors would be limited during the time it is being used for construction staging. Neither of these staging areas would disrupt visitor use as they are located in areas not open to visitors. Delivery of materials to these sites, through visitor use areas, would occur before or after operating hours to ensure that visitor access and circulation are not impacted. There would be short-term negligible adverse impacts to visitor use resulting from the presence of construction staging areas because they would be located in areas not accessible to visitors and delivery of materials to these sites would not occur while visitor use is occurring on the island.

Two crane/lift equipment areas would be used to convey PV installation materials to the roofs of the New Industries Building and the Prison Building. One area would be located to the east of the center portion of the Prison Building, and the other area would be located to the north of the New Industries Building. These areas would only be used during non-visitor hours and would therefore not disrupt visitor use. There would be short-term negligible adverse impacts from the use of crane equipment during construction because they would only be used during non-visitor hours and visitors would not notice the impact of this use.

The project would also include the installation of conduit connecting the PV systems with the Powerhouse in the pre-existing underground utility corridor. During this installation, portions of the visitor pathway from the dock to the Prison Building would be sectioned off and not available for visitor use. However, at no point would the width of the entire pathway be blocked. There would be short-term negligible to minor impacts to visitor use because parts of the pathway would be sectioned off and create a notable impact, but visitors would still be able to walk around these areas and access their desired location during their visit to the island.

Although the PV arrays on the New Industries roof would be visible to visitors from the Recreation Yard, the overall daily operation of the PV system would not detract from visitor use and experience. Similarly, although the PV system inverter in the Prison Building would be visible to visitors touring the building, the daily operation of the inverter would only have a long-term negligible adverse impact to visitor use. To further mitigate any impacts to visitor use, the inverter would be painted in a manner that is consistent with the historic features of the interior of the building to make it less noticeable.

The battery backup bank would be located within the Powerhouse, which is not accessible to visitors, and the operation of these units would not be expected to impact visitor use and experience.

Interpretive Program

The PV system would include a data collection and control system that would be used for monitoring, maintenance alerts, and troubleshooting. The data collection and control system would include real time readings for instantaneous power, hourly system output, hourly island energy consumption, ambient temperature, daily and yearly energy totals, and daily and yearly GHG savings. This data would be utilized to create real-time interpretive displays around the island. These real-time displays would provide educational opportunity to inform and educate the public about the PV system and how the NPS seeks to promote sustainable energy consumption on Alcatraz Island. The displays would be located at the Recreation Yard, overlooking the PV arrays on the New Industries Building roof, the Dock, and near the Powerhouse. In addition, one display could be placed at the pier where the Alcatraz Cruises ferry departs. Exact placement and design of the display(s) would be determined in coordination with the Park's sign committee, as well as with the SHPO, to ensure all signs meet park requirements and do not adversely impact the historical character of the island, that is an important component of visitor experience. The construction of these displays would have a short-term minor adverse impact because of the presence of construction equipment and the temporary closure of certain facilities while the displays are being installed. There would be long-term beneficial impacts to visitor use associated with these interpretive displays because they would improve visitor experience, increase educational opportunities, and provide information to the visitors on the Park's efforts to become carbon neutral.

Conclusion

On Alcatraz Island, there would be short-term negligible adverse impacts to visitor use resulting from the delivery of construction equipment, staging areas, and crane equipment areas as these activities would not interrupt visitor access. As a result of conduit installation connecting the PV systems to the Powerhouse, there would be short-term minor adverse impacts due to temporary closure of portions of the visitor pathway that would be noticeable, but not close any areas to visitor access. There would be long-term negligible adverse impacts resulting from the daily operation of the PV system and subsequent inverters. In addition, there would be long-term beneficial impacts due to the installation of several real time interpretive displays that would increase educational opportunities on the island regarding the Park's goal to become carbon neutral.

VISUAL RESOURCES/AESTHETICS

GENERAL METHODOLOGIES FOR ANALYZING IMPACTS

This visual impact assessment addresses potential changes to the project area's visual character, views, and vistas that would result from implementation of the proposed project. Existing photographs, 3D

visualizations prepared by the consultant design team, and the Schematic Design 100% Draft Submittal (NPS 2009b) were used for this analysis.

IMPACT THRESHOLDS

Negligible: The proposed project would not impact the aesthetics or visual viewshed of the proposed project area during construction or operations.

Minor: The proposed project would not substantially change the scenic vista, would not substantially change scenic resources, and would not substantially change the existing visual character or quality of the site and its surroundings. The effect would be detectable, but slight, and would minimally diminish overall integrity, or affect the character defining feature(s) of the visual resources and aesthetic environment.

Moderate: The proposed project would result in a noticeable effect on a scenic vista; alter scenic resources, including but not limited to, trees and historic buildings; or alter the existing visual character or quality of the site and its surroundings. The effect would diminish overall integrity, or would alter a character defining feature(s) of the visual resources and aesthetic environment.

Major: The proposed project would result in a substantial effect on a scenic vista; substantially alter scenic resources, including but not limited to, trees and historic buildings; or substantially alter the existing visual character or quality of the site and its surroundings. The effect would significantly diminish overall integrity, or would significantly alter a character defining feature(s) of the visual resources and aesthetic environment.

Duration: In the short term, the most negative visual impacts would be related to the activity and disruption associated with construction. The long-term impacts would be related to compromised, blocked, or disrupted views from the areas where the proposed project would occur.

STUDY AREA

The study area for visual resources is Alcatraz Island and the views and vistas to and from the island.

IMPACT ANALYSIS

Prison Building

The Prison Building would be affected in three ways from PV installation: by cable routing, inverter location, and PV array on the roof.

Cable. Cable would be routed through existing duct bank to the existing Prison Building and would therefore have no visual effect.

Inverter. On the interior of the building, the inverter would be located in the shower room on the basement level. The unit (approximately 4 x 4 x 4 feet) would sit atop an elevated 6 inch tall concrete pad

(NPS 2009b). It would be located in the north corner of the shower room and would not affect the adjacent historic staircase. The concrete pad and inverter would be painted in a manner that is consistent with the historic features of the interior of the building and in a manner that conforms to the Secretary of the Interior Standards for the Treatment of Historic Properties. As a result, there would be a negligible to minor long-term adverse effect because it would not substantially change the existing visual character or quality of the site and its surroundings. The effect would be detectable, but slight, and would minimally diminish overall integrity of this historic resource.

Rooftop PV Array. The Prison Building rooftop is approximately 43,000 square feet and four stories above ground level, surrounded by a 3-foot tall parapet wall. These parapet walls would completely block the view of the PV system from the ground and also the mainland. The PV modules would be placed to avoid visibility by the visiting public from inside the Prison Building through the skylights. As a result, there would be a long-term negligible adverse visual effect resulting from the rooftop PV array because the panels would not impact the visual character of the project area, nor would the rooftop PV array be visible from views looking toward Alcatraz Island.

New Industries Building.

The New Industries Building would be affected in three ways: by cable routing, inverter location, and PV array on the roof.

Cable & Inverter. The conduit would be routed from the concrete vault at the Powerhouse to the inverter located in the west corner of the first floor of the New Industries Building, through the tunnel and would not be visible to the visiting public above. The conduit would be routed with previous utility installations along the side of the tunnel. Once inside the New Industries Building, the conduit would be routed up to the underside of the floor above and then over and down to the inverter. The inverter would be 4 x 4 x 4 feet and mounted on a 6-inch high housekeeping pad (NPS 2009b). Since the cable and inverter would not be visible and would be coupled with existing utility installations, the effects would be slight, resulting in long-term negligible adverse visual impacts.

Rooftop PV Array. The New Industries Building rooftop is flat, about 15,300 square feet, two stories above ground level. The PV array would be designed to minimize visual impact on the historic landscape from viewpoints around the Bay and would be mounted flat configuration, laying parallel the roof surface which would minimize their visual prominence (NPS 2009b). Nevertheless, the New Industries Building is on the primary visitor route at Alcatraz Island and the presence of new PV arrays would be noticeable and would diminish the overall scenic vista (Figure 5) and would detract from the historic value of the building, resulting in a long-term minor adverse impact to visual resources. The design team determined

that it would be impractical to try to completely block the PV array with visual screens since the screening would detract from the historic value of the building more than the PV array (NPS 200b).

Figure 5. Visual Simulation of PV array on the New Industries Building

However, these new rooftop features would allow the NPS to introduce a visitor interpretation opportunity that describes the sustainable initiatives on the island. The introduction of a new visitor interpretation opportunity would create a beneficial visual impact.

There would be minor adverse short-term impacts resulting from construction activity, particularly due to the presence of construction equipment and temporary closures of portions of the primary visitor routes on Alcatraz Island.

Conclusion.

At the Prison Building, there would be a range of long-term visual impacts, but none exceeding minor adverse as a result of installing cable routing, an inverter, and a PV array on the roof. Existing conduits would be used for cable routing where possible and the 3 foot parapet would shield the PV arrays from view both to and from the island.

At the New Industries Building, there would be a range of long-term visual impacts, but none exceeding minor. While the cable routing, an inverter, and a rooftop PV array would create a noticeable change in the scenic view resulting in long-term moderate adverse impacts, the presence of the rooftop PV array would enable the NPS to create an interpretive education display demonstrating sustainable initiatives on the island that would mitigate these impacts to minor.

There would be no impairment to visual or aesthetic resources because impacts would not reach beyond the level of minor, and resources that contribute to the values of the Park would not be impacted beyond this level.

ENERGY RESOURCES

General Methodologies for Analyzing Impacts

GHG emissions were determined by considering the existing conditions and the proposed alternative in terms of the amount of GHG emissions emitted from the diesel generators, emissions attributed to transporting visitors to and from the island and the emissions from waste and wastewater. The GHG emissions inventory was completed using the Climate Leadership in Parks (CLIP) tool. The CLIP tool was developed under the Climate Friendly Parks initiative by the NPS through funding by the EPA, with the purpose of enabling park personnel to complete GHG inventories and then use the tool to track future progress.

Impact Thresholds

GHG emissions are discussed relative to the total amount of emissions estimated for the island. GHG emission thresholds were developed by the NPS and were based on reaching goals to reduce GHG emissions and become carbon neutral. The intensity of changes in GHG emissions is based on the following definitions (reductions in emissions are considered beneficial):

Negligible: Changes in emissions less than 5 percent of the existing Alcatraz GHG footprint

Minor: Changes in emissions between 6 to 25 percent of the existing Alcatraz GHG footprint

Moderate: Changes in emissions between 26-50 percent of the existing Alcatraz GHG footprint

Major: Changes in emissions between 51 to 75 percent of the existing Alcatraz GHG footprint.

Short-term: Short-term impacts are those changes in emissions that would occur during construction

Long-term: Long-term impacts would occur from the operation of Alcatraz Island, and last beyond the construction period.

Study Area

The study area for GHG emissions is Alcatraz Island, as well as the region that is influenced by the production of GHG.

IMPACT ANALYSIS

Under the proposed project, the NPS would install the proposed 290 kW PV system, which would supply a portion of the island's energy needs and augment the rest with the proposed battery bank and new, Tier 3 diesel generator(s). The proposed PV system would generate a minimum of 330,000 kWh of renewable energy per year (HDR 2009). This system would provide approximately 38% of the existing estimated annual energy consumption on the island. Factoring in anticipated growth in energy demand, about

450,000kW/hrs of electricity would need to be augmented with the batteries and generators (e.g., night time and cloudy periods) or negated via energy conservation measures. Ideally, the battery bank would provide sufficient electricity to provide the island's night time energy needs; however, to ensure no interruptions to electric service to users on the island, the system would be connected to the diesel generators. The generators would also provide source electricity for charging the batteries during periods when there was insufficient daylight hours and/or heavy cloud cover for solar power generation where electrical demand might exceed the combined output of the PV modules and the batteries. This arrangement would substantially reduce the GHG emissions from current levels. However, anticipated growth of energy demand is projected for the island, absent conservation measures and the proposed new system would not be able to supply the projected future energy needs only with the proposed PV array and battery bank. The generators would still be relied upon to supply a portion of energy throughout the year varying with season, weather (e.g., periods of clouds), and controller settings. Greenhouse gas emissions would still occur originating from the combustion of approximately 26,000 gallons of diesel fuel (a conservative estimate for planning purposes to accommodate a wide range of potential conditions).

Aside from increases associated with future visitation projections, implementation of the proposed project would directly impact stationary sources on the island through implementation of energy conservation measures and installation of renewable energy sources. The proposed PV system would generate around 330,000 kWh/year while proposed energy conservation measures could save up to 135,000 kWh/year (Berger 2009). Table 5 summarizes the amount of green house gases generated under the proposed project compared with the current condition. This action would result in a reduction of 406 $MTCO_2E$ per year below the current condition, which would result in a 60 percent reduction in GHG emissions from Alcatraz as a stationary source and an almost 20 percent reduction in the islands GHG footprint compared to the No-Action alternative, on an annual basis. Currently, emissions from the diesel generators comprise one-third of the island's GHG footprint and, under the proposed project emissions from the generators it would be reduced to 16 percent of total island emissions. Table 6 shows the amount of GHG generated from various sources under the proposed project compared with the current condition.

Table 5. Estimated annual GHG equivalents for the proposed Alcatraz project (MTCO2E). (Source: NPS CLIP tool as modified by staff)

Scenario	Carbon dioxide (CO2)	Methane (CH4)	Nitrogen oxide (N2O)	Gross emissions
Current Condition	1,997	47	13	2,058
Proposed Project	1,594	46	12	1,652
Difference in Gross Emissions over No-	403	1	1	406

Action				

Note: may not add due to rounding

Table 6. Estimate GHG equivalents for the proposed Alcatraz project (MTCO2E) by source. (Source: NPS CLIP tool as modified by staff)

GHG Source		No-Action	Proposed Project		Gross Reduction
Island Electricity Demand		671	265		406
Alcatraz Cruises		1,342	1,342		0
Wastewater Treatment		35	35		0
Solid Waste		9	9		0
Gross Emissions		2,058	1,652		406

Conclusion

Under the proposed project, GHG emissions from the diesel generators would be reduced by 61 percent (aside from routine emergency exercises and or maintenance), providing long-term benefits. Implementing energy conservation measures and switching to a PV, battery bank and diesel generator hybrid energy system would reduce GHG emissions attributed to island electrical demand by 406 MTCO2E. These reductions would be beneficial and consistent with the Park's Climate Action Plan and GHG reduction goals. Full realization of this estimated reduction requires comprehensive and thorough planning and design of the Tier 3 generator sizes, operational schedules, size of battery bank and anticipated duration of energy supply and balance of battery charging from diesel sources. Additionally, these reductions would be consistent with the state and city of San Francisco's goals of reducing GHG emissions within their jurisdictions. These reductions would persist over the long-term.

PARK OPERATIONS

GENERAL METHODOLOGIES FOR ANALYZING IMPACTS

For this analysis, Park management and operations refers to the quality and effectiveness of Park staff to maintain and administer Park resources and provide for an effective visitor experience, while at the same time having the resources available to maintain energy infrastructure on Alcatraz Island. This includes a qualitative analysis of Park staff responsibilities and level of effort related to the maintenance of energy infrastructure each of the alternatives.

IMPACT THRESHOLDS

Negligible: Park operations would not be impacted or the impact would not have a noticeable or measurable impact on Park operations.

Minor: Impacts would be noticeable and would result in a measurable, but small, change in Park operations. Any required changes in Park staffing and funding could be

accommodated within normal budget cycles and expected annual funding without appreciably affecting other operations within the Park. Current levels of funding and staffing would not be reduced or increased, but priorities may need to be changed.

Moderate: Impacts would be readily apparent and would result in a substantial change in Park operations that would be noticeable to staff and the public. Required changes in Park staffing and/or funding could not be accommodated within expected annual funding and would measurably affect other operations within the Park by shifting staff and funding levels between operational divisions. Increases or decreases in staff and funding would be needed or other park operations would have to be reduced and/or priorities changed.

Major: Impacts would be readily apparent and would result in a substantial change in Park operations that would be noticeable to staff and the public and would be markedly different from existing operations. These changes in Park staffing and/or funding could not be accommodated by expected annual funding and would require the Park to readdress its ability to sustain current Park operations. Increases or decreases in staff and funding would be needed and/or other park programs would have to be substantially changed or eliminated.

Duration: Short-term effects would be one fiscal year. Long-term effects would continue beyond one fiscal year indefinitely into the future.

Study Area

The study area for Park operations is where energy infrastructure occurs that requires Park staff to maintain.

Impact Analysis

In relation to current energy infrastructure on Alcatraz Island park operations has responsibilities related to the maintenance of the two generators on the Island, as well as fuel delivery to service these generators. These tasks are carried out by a contractor, currently Alcatraz Cruises, and overseen by the Park. Regulator maintenance of the generators includes multiple daily inspections (3-4 times a day) of the generator in operation. Each Wednesday, the operating generator is taken off line and weekly maintenance is performed. The generator that was previously off line is then put into operation until the next Wednesday when they are once again rotated. In addition to daily maintenance, occasionally (less than every two years) larger maintenance projects are undertaken when the generators reach certain milestones, such as performing maintenance after the generator has operated for 30,000 hours.

In order to operate the generators, diesel fuel is delivered to the Island twice a week, for a total of approximately 1,200 gallons of fuel per week. During deliveries, two staff persons are necessary, one to walk the fuel delivery line to ensure there are no leaks or other problems, and one to off-load the fuel for delivery.

Under the proposed project, there would be a slight increase in staffing over current levels. In addition to the seven staff currently required to maintain energy infrastructure on Alcatraz Island, an additional laborer and a 25 percent increase in the engineer's time would be required. This increase in resources would be related to the maintenance of the battery backup system. In addition, the amount of labor required for the generators would experience a slight reduction from current levels, as they would require delivery of fuel and maintenance as currently operating, but the amount of fuel needed would be slightly reduced. Additional requirements would include staff training for battery maintenance, acid, connection tightness, and hydrogen removal. The park would also be responsible for implementing the conservation measures described on page 12, which in part would include changing light bulbs, turning out lights and appliances at night, and use of a water heater timer. While there would be a short-term increase in demand on Park operations to implement these conservation measures, in the long-term, the maintenance requirement of these measures would not be expected to require more staff time than current maintenance activities.

All activities related to installation and operation of the PV system, battery back-up, generators, and conservation measures would be expected to be accommodated within the Park's existing budget, but would prevent them from using the funds for operations, resulting in long-term minor adverse impacts.

Conclusion

The proposed project would increase staff needs and result in long-term minor adverse impacts as more staff would be needed to address the continued use of generators and the maintenance of the battery backup system.

SCOPING, COORDINATION, AND CONSULTATION

THE SCOPING PROCESS

The NPS divides the scoping process into two parts: internal and external or public. Internal scoping involves discussions among NPS personnel regarding the purpose of and need for management actions, issues, management alternatives, mitigation measures, the analysis boundary, appropriate level of documentation, available references and guidance, and other related topics.

Public scoping is the early involvement of the interested and affected public in the environmental analysis process. The public scoping process helps ensure that people have an opportunity to comment and contribute early in the decision-making process. For this planning document, project information was distributed to individuals, agencies, and organizations early in the scoping process, and people were given opportunities to express concerns or views and to identify important issues or even other alternatives.

Taken together, internal and public scoping are essential elements of the NEPA planning process. The following sections describe the various ways scoping was conducted for analysis of this proposed project.

Internal Scoping

The installation of PV on Alcatraz Island was initially scoped at a Park Project Review meeting on October 15, 2008. The components of this project were further developed at an internal scoping meeting held at the Park on July 29-30, 2009. Internal scoping uses NPS staff to determine what topics need to be analyzed in the NEPA process. The meetings were attended by personnel from the NPS (Denver Service Center, GGNRA); Consultants (HDR, the Louis Berger Group). Based on these meetings, the interdisciplinary team defined the purpose, need, and objectives of the plan; identified potential issues; discussed preliminary alternatives; and defined data needs. The results of the meetings were captured in a report now on file as part of the administrative record for this analysis.

Public Scoping

Public scoping efforts for this planning process focused on the means or processes to be used to include the public, the major interest groups, and local public entities. Park staff places a high priority on meeting the intent of public involvement in the NEPA process and giving the public an opportunity to comment on proposed project.

Public Scoping Meetings

Every year, the Park holds four open house public meetings informing the public about upcoming projects that are proposed and occurring within the Park. The proposed installation of a solar PV system on Alcatraz Island was discussed and presented at the Tuesday, September 15, 2009, quarterly Open House public meeting. The meeting was held from 4 to 7p.m. at Moose Lodge at Mori Point Gate, Pacifica. This meeting was held to obtain community feedback and to initiate public involvement on this proposed project. The public scoping comment period was from September 14, 2009, through October 19, 2009.

To notify interested parties of the public meeting, the Park sent an email to those who were signed up on their Golden Gate National Recreation Area periodic email news, accessed at http://visitor.constantcontact.com/manage/optin/ea?v=001DaAnlRE77xqvpnne3hog2g%3D%3D. Information regarding these meetings was also posted on NPS's Planning, Environment and Public Comment (PEPC) website (www.parkplanning.nps.gov/goga) as well as the Park website, (www.nps.gov/goga).

Approximately 45 people attended the meeting. Each project occurring or proposed had a separate station that the public could walk around and learn about. The public had the opportunity to ask questions or provide comments to Park personnel that were in attendance. No comments were made at the meeting

about the energy infrastructure improvements because the meeting was not close to Alcatraz. As a result, the public was more interested in other projects closer to the location of the meeting.

Public Scoping Comments

The public scoping period was September 14, 2009, through October 19, 2009. Those attending the meeting were also instructed of additional opportunities to comment on the project, including directing comments to NPS's PEPC website, by email, or by mail.

Ten public comments were received during the public scoping comment period. These comments included suggesting the installation of protective devices to ensure solar PV arrays were not damaged by wildlife. Other suggestions included placing wind turbine generators on the island, as wind is a common element on the island, and the installation of waterwheel generators to respond to passing swells. One commenter mentioned how costs were not listed in the documents or the website and wanted to see project cost versus proposed savings. Overall the public seemed very pleased at the proposal to remove the diesel generators and replace them with a zero emissions, sustainable energy source.

AGENCY CONSULTATION

In accordance with Section 5.5 of Director's Order #12, coordination and public involvement in the planning and preliminary design of the proposed project was initiated early in the process. As required by NPS policies and planning documents, it is the Park's objective to work with state, federal, and local governments and private organization to ensure that the Park and its programs are coordinated with theirs, are supportive of their objectives, and that their programs are similarly supportive of Park programs. The following agencies were consulted:

- State Historic Preservation Office, California
- State Water Resources Control Board/San Francisco Bay Regional Water Quality Board
- California Air Resources Control Board/San Francisco Bay Area Air Quality Management District
- San Francisco Bay Conservation Development Commission
- San Francisco Planning Department

State Historic Preservation Office:

Staff from NPS's Division of Cultural Resources at GGNRA had an initial, informal discussion about the concept for the Alcatraz Solar project with the California State Historic Preservation Office (SHPO) in June 2009. The primary focus of this informal discussion was the idea of

installing PV panels on the roof of the Main Prison Building and the roof of the New Industries Building (Laundry). The approved summary from this informal meeting stated the following:

"Installation of photovoltaic panels on roof of Prison Building is acceptable (no adverse effect) as the roof of the building is flat and has a parapet. As a result, the panels are not visible from any perspective except aerial view. Installation of panels on the Laundry Building is also acceptable as this building's roof is also flat. Though this building does not have a parapet and the roof is visible from a few vantage points, SHPO indicated that no adverse effect could be achieved through effective design that sensitively incorporates the green technology with the plain, industrial aesthetic of the Laundry Building."

Subsequently, NPS formally initiated National Historic Preservation Act Section 106 review in a letter to the SHPO dated October 7, 2009. On December 17, 2009 NPS sent the SHPO a second letter regarding the Alcatraz Solar undertaking. In this letter NPS revised the project description, eliminating the cable portion of the project and adding batteries for power storage to be located in the Powerhouse Building. Additionally, NPS concluded that there would be effects from the subject undertaking, but that these effects would not be adverse. NPS asked for SHPO's concurrence with this no adverse effect finding in this second letter.

NPS informed SHPO of a change to the project description via telephone and email on January 7, 2010. According to this project change, batteries would be placed on the first floor of the New Industries Building, not in the Powerhouse as previously planned. NPS indicated that the finding of effect remained, *no adverse effect.*

A call with SHPO on January 14, 2010 concluded that it concurs with the overall finding of no adverse effect. Per a phone conversation with the SHPO on 1-21-10, a no adverse effect concurrence letter, which will institute the conditions described above, and stipulate continued SHPO review and coordination through the design development process, was in the process of being drafted.

San Francisco Bay Conservation Development Commission (BCDC)

The NPS will submit a Consistency Determination to BCDC for concurrence. The NPS has determined that the installation of a PV system on Alcatraz Island is consistent with the BCDC's adopted coastal zone plan. With appropriate precautionary measures to protect the natural and historic resources on the island, the proposed project is fully consistent with the San Francisco Bay Plan and with Alcatraz Island's priority land use designation. Project conditions from BCDC's concurrence will be incorporated into the project design.

ENVIRONMENTAL SCREENING FORM (ESF)
DO-12 APPENDIX 1

Today's Date: **December 3, 2009** Date Form Initiated: **07/24/2009**

A. PROJECT INFORMATION

Park Name: **Golden Gate NRA**

Project Title: **Photovoltaic Installation on Alcatraz Island**

PEPC Project Number: **23349** PMIS Number: **150682**

Project Type: **Capital Improvement (CI)**

Project Location: County, State: **San Francisco, California** District, Section: **Alcatraz,**

Project Leader: **Liz Varnhagen**

C. RESOURCE EFFECTS TO CONSIDER:

Identify potential effects to the following physical, natural, or cultural resources	**No Effect**	**Negligible Effects**	**Minor Effects**	**Exceeds Minor Effects**	**Data Needed to Determine/Notes**
1. Geologic resources – soils, bedrock, streambeds, etc.	X				Work would be performed within existing buildings, on building rooftops, and existing conduits, no geologic resources would be disturbed.
2. From geohazards		X			Slight potential for earthquake disturbance, but system design would take this into account and minimize impacts.
3. Air quality			X		There will be short term negligible effects on air quality from project construction. However, more importantly, we are aiming for long term beneficial effects from the reduction in combustion of

					diesel fuel for electric power generation on the island with the PV contributing a green energy source for a portion of the Islands energy needs. In the past, NPS operation of the diesel generators has violated our permit with BAAQMD by exceeding the emissions thresholds. The combustion by-products that are regulated are nitrous oxides (NOx), and particulates (PM10 and PM2.5).
4. Soundscapes		X			Under existing conditions, the generators are extremely noisy, but the noise is well contained within the power house, and inperceptible to the park visitor, and apparently not an issue for nesting birds, either. The PV would reduce the need to use the generators to the same extent, and thus the powerhouse would have a slight reduction in noise and a long term, beneficial effect. There will be short term construction noise from the installation of the solar panels on the building roofs. This will be performed outside of bird nesting season. Not expected to detract from visitor experience.
5. Water quality or quantity		X			No in-water activities would occur. Potential for water quality impacts from PV wash-down, but these are expected to be minimal and mitigated through use of water only or management of

					washdown water to avoid direct discharge into San Francisco Bay.
6. Streamflow characteristics	X				No streams are in the project area.
7. Marine or estuarine resources	X				No in water activities would occur, no impacts to marine or estuarine resources would be expected.
8. Floodplains or wetlands	X				None of consequence in the proposed project area.
9. Land use, including occupancy, income, values, ownership, type of use	X				No surrounding residences would be expected to be impacted by the proposed project.
10. Rare or unusual vegetation – old growth timber, riparian, alpine	X				No riparian vegetation. No eel grass beds. All work done in existing disturbed areas.
11. Species of special concern (plant or animal; state or federal listed or proposed for listing) or their habitat			X		Alcatraz is home to seven species of birds that nest on the island. All construction/installation work on Alcatraz should respect established construction windows to avoid and minimize adverse effects to nesting birds protected under the Migratory Bird Treaty Act. Further no PV maintenance would be permitted on the New Industries building during bird breeding season.
12. Unique ecosystems, biosphere reserves, World Heritage Sites	X				None in the project area.
13. Unique or important wildlife or wildlife habitat	X				None in project area (already addressed above for birds)
14. Unique or important fish or fish habitat	X				No in water activities would occur, no effect.
15. Introduce or promote non-native species (plant or animal)		X			There is always the potential of introduction of foreign species. To prevent or minimize this

					possibility, a condition of the project should be to clean equipment so that it is free of any attached exotic species, if it is coming from anywhere outside of San Francisco Bay.
16. Recreation resources, including supply, demand, visitation, activities, etc.	X				The installation of the solar panels should affect Alcatraz visitor experience or services.
17. Visitor experience, aesthetic resources			X		For the most part, the Visitor Experience on Alcatraz will not change; visitors are scarcely aware of any of the power generating activities and infrastructure as it is. The main effect that they may notice will be the visual effect of seeing the solar panels on the New Industries Building. This would be visible from the Recreation Yard below the Prison Building. The visitors would not experience or perceive a change in electrical services. Benefits would be realized from the addition of interpretive displays. Short term inconsequential visitor inconveniences may arise during project construction.
18. Archeological resources		X			As most activities are occurring in already disturbed areas, archeological resources are no likely to be disturbed.
19. Prehistoric/historic structure		X			Alcatraz is full of historic structures. Design for all proposed installations, including electrical conduit and solar panels, will be

					completed in consultation with the SHPO to minimize any adverse effects to the historic integrity of these structures.
20. Cultural landscapes			X		A Cultural Landscape Report is in preparation for all of Alcatraz Island. The proposed project is not expected to have long term adverse effects to the Alcatraz Cultural Landscape. However, the new construction associated with the proposed installation of solar panels is outside of the scope of the GGNRA/NPS Programmatic Agreement with the SHPO. Therefore separate consultation and approval from the SHPO will be required for the solar panels.
21. Ethnographic resources	X				
22. Museum collections (objects, specimens, and archival and manuscript collections)	X				
23. Socioeconomics, including employment, occupation, income changes, tax base, infrastructure		X			Negligible, short term beneficial effects from project planning and construction on the work force (employment) should be quantified because this project has the potential be funded under ARRA.
24. Minority and low income populations, ethnography, size, migration patterns, etc.	X				
25. Energy resources			X		This project will shift the generation source of the electricity used on Alcatraz from exclusively

					fossil fuel, to using renewable solar energy for a portion of the energy generated on Alcatraz Island.
26. Other agency or tribal land use plans or policies	X				
27. Resource, including energy, conservation potential, sustainability	X				There are several energy conservation measures that have been identified and will be included in this project. A Comprehensive Strategic Energy Conservation Management Plan will be initiated. Sources of electrical energy on the island would shift from fossil fuels to clean renewable solar energy. Considered long term beneficial impact.
28. Urban quality, gateway communities, etc.		X			
29. Long-term management of resources or land/resource productivity			X		Beneficial
30. Other important environment resources (e.g. geothermal, paleontological resources)?	X				

Comments:

REFERENCES

BAAQMD (Bay Area Air Quality Management District)

2001. The *Revised San Francisco Bay Area Ozone Attainment Plan for the 1-Hour National Ozone Standard*. November.

HDR

2009 *Golden Gate National Recreation Area. Reconnect Island to Mainland Electrical Supply and Install Photovoltaic System to Replace Diesel Generated Power to Alcatraz Island.* National Park Service. Draft Predesign Document for Review. (August 2009)

National Parks Conservation Association

2008 Summary of the Occurrence, Populations Status and Management of the Western Gull (Larus occidentalis) on Alcatraz Island. July 7, 2008.

NPS (National Park Service)

2001 Final Environmental Impact Statement: Alcatraz Island Historic Preservation and Safety Construction Program

2005 Bird Conservation and Management Strategy for Historic Alcatraz Island

2006 NPS Management Policies 2006.

2008 Golden Gate National Recreation Area Climate Change Action Plan.

2009a Marin Headlands and Fort Baker Transportation Infrastructure and Management Plan Final Environmental Impact Statement. Golden Gate National Recreational Area, Marin County, California. March 2009.

2009b Golden Gate National Recreation Area. *Reconnect Island To Mainland Electrical Supply And Install Photovoltaic System To Replace Diesel Generated Power On Alcatraz Island For The Photovoltaic And Submarine Cable Generated Power Components*. Schematic Design 100% Draft Submittal. September 28, 2009.

2009c Alcatraz Island: Nature and Science. Accessed online August 17, 2009 at: http://www.nps.gov/alca/naturescience/index.htm.

University of Washington

2008 Renewable Energy Options at Golden Gate National Recreation Area at Alcatraz Island. May 2008.

U.S. Environmental Protection Agency (EPA)

1971 Noise from Construction Equipment and Operations, Building Equipment and Home Appliances. (Prepared under contract by Bolt, et al., Bolt, Beranek & Newman, Boston, Massachusetts.) Washington, D.C.

PERSONAL COMMUNICATIONS

Ryan, John. L.

2009 Personal Communication with Spence Smith, October 1, 2009.