**National Science Foundation**
4201 Wilson Boulevard
Arlington, Virginia 22230

# DRAFT
# SUPPLEMENTAL
# ENVIRONMENTAL ASSESSMENT

## Advanced Technology Solar Telescope Project,
## Haleakalā, Maui, Hawaiʻi

**June 1, 2011**

# Executive Summary

## Introduction

The National Science Foundation (NSF) completed a Final Environmental Impact Statement (FEIS) and Record of Decision for the Advanced Technology Solar Telescope (ATST) Project in 2009. Since that time, updated design has resulted in changes to the project, some of which are minor and others that require supplemental environmental review. Specifically, NSF, through its awardee, the Association of Universities for Research in Astronomy (AURA)/National Solar Observatory (NSO), and as part of the ATST Project implementation, proposes two actions that warrant additional environmental review: (a) an alteration to the numbers of various sized vehicles accessing the ATST Project site and (b) the incorporation of an upgrade to two Federal Aviation Administration (FAA) towers located on FAA property adjacent to the Haleakalā Observatories (HO) site where the ATST Project is approved for construction. Both of these proposed actions require supplemental federal environmental review because each potentially results in additional environmental impacts or new impacts not previously considered.

This supplemental Environmental Assessment (EA) is tiered to the ATST Final Environmental Impact Statement (FEIS), focusing on the potential impacts of the project components that have been developed or have changed since completion of that document. The supplemental EA is prepared pursuant to the National Environmental Policy Act (NEPA; 40 CFR 1500-1508) and NSF's NEPA-implementing regulations (45 CFR 640). An environmental assessment is not required under State of Hawaiʻi Chapter 343 pursuant to Hawaiʻi Revised Statutes Section 343-5. The Section 106 of the National Historic Preservation Act (NHPA) consultation process for these actions will be combined with the NEPA process for these proposed actions.

## Identification of Agencies Proposing the Supplemental Actions

NSF is the lead federal agency for the ATST Project, including the original FEIS and subsequently this supplemental EA. Two other federal agencies have a stake in the proposed action. Because the ATST facility may interfere with FAA ground-to-air signal conveyance, NSF, through AURA/NSO, is funding necessary tower upgrades on two existing FAA towers. As such, this supplemental EA will cover NEPA compliance requirements for the activities proposed on FAA property. This supplemental EA is also being prepared to evaluate the potential environmental effects associated with the changes to the types of commercial vehicles to be operated on the historic Haleakalā National Park road during construction and operation of the ATST Project. The FEIS evaluated issuance of a National Park Service (NPS) Special Use Permit (SUP), pursuant to 36 CFR Section 5.6. The NPS will incorporate these changes into its SUP as analyzed in this supplemental EA.

# Purpose and Need

In December 2009, this Project was approved by NSF in December 2009 and subsequently in December 2010 by the Hawai'i BLNR for this land use within the State Conservation District. Continued planning and design highlighted issues requiring modifications to the Project before the implementation phase. The following proposed changes are needed to facilitate construction of the approved ATST Project and avoid long-term impacts to adjacent facilities:

- The classes of construction vehicles proposed in the FEIS have been revised to account for realistic vehicle availability on Maui and to provide the most appropriate available vehicle type to safely deliver materials to the site.
- To offset potentially major, adverse, long-term impact on the FAA air traffic control communication signal conveyance, as noted in the ATST FEIS, upgrades to two existing FAA Remote Communication Air to Ground (RCAG) towers are needed. Proposed upgrades provide for a high-gain design to allow interisland air traffic control communications around the ATST facility.

# Project Location

The future ATST facility is located within the HO complex on the summit of Haleakalā on the eastern lobe of Maui, Hawai'i. The HO complex is within the State Conservation District lands and is managed by the University of Hawai'i Institute for Astronomy (UH IfA). The FAA administers an air traffic control communication repeater station on federally owned land located immediately west of the HO within the State Conservation District lands. The FAA towers proposed for upgrade are approximately 800 feet west of the future ATST facility.

The Park road corridor is the only access road leading up to HO. The NPS has exclusive jurisdiction over the Park road, which begins at 6,800 feet above sea level. This portion of the Park road to be used to access HO is historically important and eligible for listing on the National Register of Historic Places. Haleakalā Highway (SR 37) is a 37-mile road between central Maui's main town of Kahului and the summit of Haleakalā. Up to the Park entrance, the road is a state road (SR 378), built prior to the Park road corridor.

# Proposed Actions Alternative

## Modification to Construction Vehicle Class Load

The volume of traffic associated with ATST construction would not change from that presented in the FEIS. However, based on vehicle availability on the island of Maui, the number of vehicles of various Federal Highway Administration (FHWA) classifications[1] (class) necessary for construction is proposed to change. This change reflects realistic vehicle

[1] FHWA uses a classification scheme to categorize vehicles carrying passengers versus those carrying commodities. Non-passenger vehicles are further subdivided by number of axles and number of units, including power and trailer units (FHWA, 2008).

availability on Maui and provides the most appropriate available vehicle type to safely deliver materials to the site.

The FEIS analysis estimated that nearly 25,000 truckloads over the duration of ATST construction would access the project site via the Park road corridor. Compared to the FEIS analysis, the number of medium-sized trucks has been reduced by accounting for an overall lack of vehicles on Maui and incorporating the use of available vehicles. Class 9 tractor trailers are the mainstay of island trucking based on their versatility in weight, length, and type of cargo capability. Even when load weights are far less than the vehicle design weight, Class 9 vehicles would commonly be used. However, the more recent analysis indicates that no Class 12 vehicles would be used during construction.

The FEIS and associated Section 106 Programmatic Agreement estimated that up to 25 extremely wide loads (18 to 24 feet) would warrant full closure of the Park road to ingress and egress traffic during the entire ATST construction duration, to allow for unimpeded use of the road by construction vehicles. The revised calculations include an additional 200 wide-load vehicles; however, these additional loads would not require the full closure of the Park road. Some construction vehicles would require oncoming traffic to pull over so they can safely pass. To promote safe and efficient traffic flow along the Park road during construction vehicle deliveries, and to avoid impacts on features of the historic road and natural resources on the side of the roadway, 10 existing paved pull-off locations have been identified between mile posts 10.3 and 21.2 to allow general purpose traffic to pull off the Park road as the wider construction vehicles pass. In these locations, traffic monitors would be staged to direct motorists. A pilot vehicle would precede all wide-loads whether the Park road is closed or not, and appropriate Hawaiʻi Department of Transportation permits and signage would be obtained. Extremely wide loads would be preceded by two pilot vehicles.

## FAA Tower Upgrade

The FAA RCAG system on Puʻu Kolekole, located approximately 800 feet west of the future ATST facility and consisting of two communications towers, maintains two sets of frequencies for contact with interisland air traffic down to 8,000 feet. The addition of the ATST facility could result in physical obstruction to the geometric line-of-sight for signals from the RCAG. These frequencies could experience attenuation, which would be defined as signal loss in a narrow swath of seven degrees, originating at the RCAG antennas and intersecting the width of the ATST Project structure 800 feet away. As such, the FEIS concluded that the proposed Project would have a major, adverse, long-term impact on this facility that could be mitigated to a negligible, adverse, and long-term level with implementation of FEIS Mitigation Measure MIT-2. With this mitigation measure, the FEIS concluded that NSF would work with FAA to address signal attenuation. The action proposed as part of this supplemental EA was developed through continued coordination with FAA and does not alter the FEIS analysis. This action consists of installing six swing arms and high-gain antennas on each of two RCAG towers (twelve swing arms and antennas total), constructing and installing a new ladder and platform on each RCAG tower to meet federal Occupational Safety and Health Administration standards, and relocating or replacing existing antennas with new high-gain antennas.

Each swing arm would be silver-gray in color and non-reflective and would extend 4 feet horizontally from the tower in four directions. Each swing arm would be 1.5 inches in diameter. These swing arms would be visible by the human eye from the immediate area, but they would not be visible from any publicly accessible area. There would be no change in the tower height or width. The duration of tower upgrades would occur over an approximate 3-week period, depending on weather. If possible, construction activities would occur outside of the Hawaiian petrel is not present or nesting (December through the end of February). Construction vehicles would include four vehicles onsite each day for the 3-week period for installation and testing, including two pickup trucks, one passenger car, and one flat-bed truck; no heavy machinery would be needed. Vehicle and material staging would occur on the work area, away from sensitive Hawaiian silversword habitat. Pursuant to ATST mitigation commitments, a botanical specialist would inspect the area prior to staging and ground work.

# Alternatives and Impacts

## No-Action Alternative

Under the No-Action Alternative, the ATST Project would be funded and built at the HO Mees site, as analyzed in the FEIS; however the proposed upgrades to the two existing FAA towers analyzed under the action alternative described in the FEIS under Mitigation Measure MIT-2, would not be implemented. In other words, under the No-Action Alternative, radio communications could experience attenuation in a narrow arc, due to physical obstruction by the ATST facility. As such, the No-Action Alternative reiterates the noted major, adverse impact identified and analyzed in the FEIS if the mitigation (MIT-2) were not implemented. Traffic volumes, scheduling, and vehicle types would be in accordance with the FEIS analysis (NSF, 2009).

## Summary of Project Impacts

The proposed alteration to the numbers of various vehicles accessing the ATST Project site has the potential to affect cultural, historic, and archeological resources; biological resources; roadways and traffic; visitor use and experience; air quality; and noise. With implementation of FEIS Mitigation Measure MIT-7 and Programmatic Agreement Measures III.A and III.H, effects on cultural, historic, and archeological resources within the Park road corridor associated with construction and operation of the ATST Project are expected to be negligible, adverse, long-term, and direct. No additional impacts to cultural, historic, and archeological resources are anticipated. No new impacts to biological resources would occur as a result of modification to the construction vehicle load class. With implementation of FEIS Mitigation Measure MIT-9, the potential for adverse impacts to wildlife species would be avoided. The Project increase in equivalent single-axle loads (ESALs) and traffic volume from existing conditions is considered relatively small; however, the potential to further degrade road conditions along Park road corridor remains. Implementation of FEIS Mitigation Measure MIT-11 (Roadway Repair) and Mitigation Measure MIT-12 (Restoration of Historic Park Roadway Structures and Natural Resources) would minimize the potential for damage to road conditions and resources along the Park road.

The impact on visitor use and experience from the proposed modification to construction vehicle load class on visitor use and experience would be minor, adverse, direct, and short-term. Impacts to the viewscape would not differ from those discussed in the FEIS.

Implementation of FEIS Mitigation Measure MIT-13 (Noise Controls) would offset the impacts on the soundscape. The impact on air quality would only occur during ATST construction and not measurably increase from the proposed Project changes. Measures outlined in the FEIS would minimize emissions. Construction traffic noise would be minor, adverse, and short-term along the Park road corridor. Implementation of FEIS Mitigation Measure MIT-13, as defined above, would reduce combustion noises.

The FAA tower upgrades have the potential to affect biological resources; roadways and traffic; infrastructure and utilities; visual resources and view plane; topography, geology, and soils; air quality; and noise. Impacts associated with the FAA tower upgrades would be negligible and minor for the resources previously listed, and implementation of biological resources FEIS Mitigation Measure MIT-9 (SUP-prescribed Biological Resource Protection) would reduce these impacts.

### Summary of No-Action Alternative Impacts

Because the No-Action Alternative would include implementation of the approved ATST project without implementing the Project changes proposed in this supplemental analysis, impacts on cultural, historic, and archeological resources; biological resources; roadways and traffic; infrastructure and utilities, visual resources and view plane; visitor use and experience; topography, geology, and soils, air quality; and noise under the No-Action Alternative would be the same as those noted in the FEIS.

### Summary of Cumulative Impacts

Major cumulative impacts associated with past, present, and reasonably foreseeable future actions in the Project area, including the ATST Project, relate to cultural, historic and archeological resources; biological resources; roadways and traffic; infrastructure and utilities, visual resources and view planes; visitor use and experience; topography, geology, and soils, air quality; and noise. While the proposed project changes could contribute to cumulative impacts on some resources, the conservation measures are expected to result in negligible to minor cumulative impacts. Furthermore, certain FEIS mitigation measures and conservation measures would reduce adverse impacts resulting from cumulative activities. Likewise, implementation of the proposed FAA tower upgrade would reduce a potentially major impact that would occur as a result of the ATST Project.

## Other Required Analyses

NEPA requires additional evaluation of the project's impacts on the relationship between local short-term uses of the environment and long-term productivity, irreversible or irretrievable commitment of resources, and unavoidable adverse impacts (40 CFR 1502.16).

### Relationship between Local Short-Term Uses of the Environment and Long-Term Productivity

Impacts associated with proposed changes to construction vehicle loads would be short-term, lasting only during ATST Project construction. The impacts would primarily affect traffic flow, visitor access, and historic resources. These proposed changes would allow for a more efficient and safer construction process for the Project. The ATST Project would implement FEIS-prescribed mitigation measures necessary to minimize or avoid disruption of traffic and visitor access, and the NSF is committed through its funded AURA agent to pay for the repairs to any damage to roadways attributed to the Project, as well as contribute to a future road repair project to compensate for regular wear and tear to the Park road from the ATST Project activities. Although the proposed change to construction vehicle loads would result in potentially additive impacts to these resources, employment of the FEIS mitigation measures would adequately address the effects and no additional mitigation would be necessary to reduce short-term effects or to promote long-term productivity.

Likewise, upgrades to the FAA RCAG towers would result in very short-term impacts and would allow for long-term productivity of interisland air traffic control communications, which would otherwise be compromised without this measure. The Project would take whatever actions are reasonable and practicable to minimize impacts on biological resources and the environment.

### Irreversible and Irretrievable Commitments of Resources

No new commitments would result from the two project changes considered in this supplemental EA: modification of the construction vehicle load and upgrades to the FAA towers. Vehicles and equipment would use petroleum, oils, and fuels. There would be no increase in demand on other environmental resources, local resources, or human resources that were not accounted for in the FEIS.

### Unavoidable Adverse Impacts

Modification of the construction vehicle load would result in unavoidable short-term impacts on traffic flow. While mitigation is proposed to limit the impact, construction vehicles would still require temporary road closures and oncoming traffic to pull off to the side of the road. This short-term impact affects traffic and visitor use and experience. A Traffic Management Plan is being developed to manage traffic flow and communication and to coordinate emergency vehicle access during these periods of traffic congestion. No long-term, unavoidable adverse impacts are associated with this project change. The FAA tower upgrades would result in no unavoidable adverse short- or long-term impacts.

## Agency Consultation and Public Involvement

NSF has maintained communication through consultation and coordination with NPS, U.S. Fish and Wildlife Service, Hawaiʻi State Historical Preservation Office, the State of Hawaiʻi DLNR, and UH IfA by means of the following activities:

- FEIS planning process
- Development of the Programmatic Agreement
- Development of an EA addressing the issuance of an Incidental Take License
- Implementation of a series of conservation measures to mitigate biological impacts beyond those mitigated in the FEIS
- Development of a Habitat Conservation Plan

- Current supplemental environmental review process

Likewise, the USFWS is preparing a Biological Opinion for the ATST Project including the proposed Project changes analyzed in this supplemental EA. The findings and relevant analysis of the Biological Opinion are included herein.

The public has been given the opportunity through these processes to be active participants in the proposed Project and provide input to the planning. In accordance with NEPA and NHPA Section 106, NSF has held formal and informal meetings with the public and the ATST Native Hawaiian Working Group throughout the project planning. The next ATST Native Hawaiian Working Group meeting will be scheduled during the week of June 13, 2011, which will also serve as the public hearing for the draft supplemental EA under NEPA. A 30-day public review of the draft supplemental EA will begin on June 2, 2011, and end on July 2, 2011. A public meeting is scheduled for June 16, 2011.

# Contents

**Appendix**

## Tables



## Figures

# Acronyms and Abbreviations

| | |
|---|---|
| AEOS | Advanced Electro-Optical System |
| AIS | Alien Invasive Species |
| ASL | above sea level |
| ATST | Advanced Technology Solar Telescope |
| AURA | Association of Universities for Research in Astronomy |
| CDUP | Conservation District Use Permit |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| dB | decibel |
| dBA | A-weighted sound pressure level |
| BLNR | Board of Land and Natural Resources |
| BO | Biological Opinion |
| DLNR | Hawaiʻi Department of Land and Natural Resources |
| DOE | U.S. Department of Energy |
| DOFAW | Division of Forestry and Wildlife |
| EA | environmental assessment |
| ESA | Endangered Species Act |
| ESAL | equivalent single-axle load |
| FAA | Federal Aviation Administration |
| FHWA | Federal Highway Administration |
| FEIS | Final Environmental Impact Statement |
| HDOT | Hawaiʻi Department of Transportation |
| HO | Haleakalā Observatories |
| HRS | Hawaiʻi Revised Statutes |
| MP | mile post |
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act |

| | |
|---|---|
| NPS | National Park Service |
| NRHP | National Register of Historic Places |
| NSF | National Science Foundation |
| NSO | National Solar Observatory |
| PA | Programmatic Agreement |
| RCAG | Remote Communication Air to Ground |
| ROD | Record of Decision |
| ROI | region of influence |
| SR | State Route |
| SUP | Special Use Permit |
| TMP | Traffic Management Plan |
| UH IfA | University of Hawai'i Institute for Astronomy |
| USFWS | U.S. Fish and Wildlife Service |

**SECTION 1**

# Introduction

The National Science Foundation (NSF) completed a Final Environmental Impact Statement (FEIS) in July 2009 and a Record of Decision (ROD) for the Advanced Technology Solar Telescope (ATST) Project was published in December 2009. Since that time, updated design has resulted in changes to the Project, some of which are minor and others that require supplemental environmental review. Specifically, NSF, through its awardee, the Association of Universities for Research in Astronomy (AURA)/National Solar Observatory (NSO), and as part of the ATST Project implementation, proposes two actions that warrant additional NEPA review: (a) an alteration to the numbers of various sized vehicles accessing the ATST Project site and (b) the incorporation of an upgrade to two Federal Aviation Administration (FAA) towers located on FAA property adjacent to the Haleakalā Observatories (HO) site where the ATST Project is approved for construction. Both of these proposed actions require supplemental federal environmental review because each potentially results in additional environmental impacts or new impacts not previously considered.

Pursuant to Chapter 40 of the Code of Federal Regulations (CFR), Part 1502.9(c), agencies shall prepare supplements to either draft or final environmental impact statements (EISs) if the agency makes substantial changes to the proposed action that are relevant to environmental concerns, or if significant, new circumstances or information relevant to environmental concerns bear upon the proposed action or its impacts. This supplemental Environmental Assessment (EA) is tiered to the FEIS, focusing on the potential impacts of the Project components that have been developed or have changed since completion of that document. The supplemental EA is prepared pursuant to the National Environmental Policy Act (NEPA; 40 CFR 1500-1508) and NSF's NEPA-implementing regulations (45 CFR 640). An environmental assessment is not required under State of Hawai'i Chapter 343 pursuant to Hawai'i Revised Statutes Section 343-5.The Section 106 of the National Historic Preservation Act (NHPA) consultation process for these actions will be combined with the NEPA process for these proposed actions.

## 1.1 Background

An FEIS and accompanying ROD were completed for the ATST Project in 2009. The EIS evaluated potential impacts resulting from the construction, operation, and maintenance of the ATST Project within the 18.166-acre HO site at the summit of Haleakalā, Maui, Hawai'i. Construction activities evaluated include demolition of the existing driveway, parking area, and other ancillary infrastructure at the HO site; grading, leveling, excavating, caisson drilling, and ATST facility construction. This work would require use of the Haleakalā National Park (the Park) roadway and State Highway 378 to access the summit of Haleakalā, temporary road widening to accommodate wide loads; and subsequent removal of temporary road widening at the Park entrance station. A ROD approving this Project was issued by NSF in December 2009.

Because the ATST Project is located within the State Conservation District, the Hawaiʻi Department of Land and Natural Resources (DLNR) must authorize on the use of Conservation District lands through issuance of a State Conservation District Use Permit (CDUP). A CDUP was issued for the ATST Project in December 2010.

Although environmental review for the construction, operation, and maintenance of the ATST Project was concluded in 2009, facility planning and design continued toward implementation. Additional mitigation was developed to further reduce the potential biological impacts identified in the FEIS. A separate EA (NSF, 2011) was prepared pursuant to NEPA and HRS Chapter 343,Hawaiʻi's environmental review law, to address these conservation measures and issuance of an Incidental Take License from the DLNR Division of Forestry and Wildlife (DOFAW). Coordination with the National Park Service (NPS) and FAA resulted in the adoption of other conservation measures, which are the subject of this EA. Further development of facility design has refined Project details. Actions resulting from this later, additional planning were determined by NSF to be either categorically excluded from further NEPA review pursuant to NSF's regulations at 45 CFR Part 640, or already considered within the scope of the FEIS. These proposed minor project modifications, which do not require additional NEPA review, are listed in Table 1-1.

TABLE 1-1
Analysis of Design Modifications Not Requiring Additional NEPA Analysis

| Design Modification | Impact Compared to the FEIS analysis |
|---|---|
| **Utility Building**<br>• Steel frame dimension of the utility building: 55 feet, 4 inches by 40 feet (FEIS design dimensions: 64 feet by 40 feet).<br>• Mezzanine level added and now the current design height is 28 feet, 5.5 inches (FEIS design building height: 18 feet). | • Reduced building footprint.<br>• Less disturbance of the already disturbed ground.<br>• Because the building is on the opposite side of the taller ATST facility, the increase in the building height would not affect the viewshed from Puʻu ʻUlaʻula and would not be noticeable in contrast to the ATST facility from other viewpoints in populated places in Maui.<br>• Environmental impacts would be consistent with those identified in the FEIS analysis. |
| **Fluid Cooling System (Utility Building)**<br>• A pre-cooler section has been added to the fluid cooler used for rejecting waste heat from the equipment in the Utility Building. This new system collects excess rainwater before reaching the cistern to cool the area around the chillers. | • Internal system – no external modification.<br>• Reduced risk of overflow at the cistern as rainwater is collected.<br>• Improved energy efficiency using excess rainwater.<br>• No change in the impact relative to the design studied in the FEIS. |
| **Power Transformer**<br>• Co-locate the new ATST transformer and the upgraded Mees transformer on the northern side of the observatory access road (FEIS location: northwestern corner of utility building). | • Located in an area that has been disturbed previously.<br>• Additional trenching to connect conduits would be minimal, adjacent to previously analyzed trenching, and would be adjacent to the road, in already disturbed soil.<br>• Environmental impacts would be consistent with those identified in the FEIS analysis. |

TABLE 1-1
Analysis of Design Modifications Not Requiring Additional NEPA Analysis

| Design Modification | Impact Compared to the FEIS analysis |
|---|---|
| **Infrastructural Design**<br>• FEIS analyzed a grounding field consisting of a series of shallow trenches around the facility and fanning out to the south of the S&O Building filled with conductive concrete or coke breeze (a granular material with high conductivity) to safely provide an electrical ground for the observatory, which is in an environment with a high risk of lightning strikes.<br>• The shallow trenches that fan out to the south of S&O Building have been eliminated and replaced with trenching around parking and service area, Utility Building and Cistern.<br>• The trench would be filled with conductive concrete and counter poise to provide an electrical ground for the observatory. | • The new proposed trench utilizes already disturbed area around foundations.<br>• Environmental impacts would be consistent with those identified in the FEIS analysis. |
| **Retaining Wall and Stepped Apron**<br>• Apron design surrounding ATST facility was changed to a “stepped” design (FEIS design: flat apron).<br>• Retaining wall extends along the entire northern edge of the ATST Building and lower enclosure, protecting the lower level of the apron. | • Impacted area is within the area surveyed and analyzed in the FEIS.<br>• Amount of material to be excavated is consistent with the original design excavation.<br>• Longer retaining wall would not affect the visual impact as viewed from Haleakalā National Park, populated areas on Maui, or the east-facing ahu.<br>• Environmental impacts would be consistent with those identified in the FEIS analysis. |
| **Fan Vents**<br>• Removal of vent louvers and vent doors at the utility level.<br>• FEIS layout incorporated four large ground-level vent louvers on the southern, western, and northern sides of the Operations Building. In addition, five large roll-up vent doors were arrayed around the lower enclosure up at the utility level of the building. Based on further modeling, this thermal arrangement was found to be inadequate.<br>• Vent louvers and vent doors replaced by 17 small fan and louver units around the perimeter of the lower enclosure at ground level. | • No change in the impact relative to the design studied in the FEIS. |
| **Operations Building Perimeter**<br>• Extend the southern edge of the Operations Building perimeter, making it flush with the southern edge of the lower enclosure. | • Slight increase in the footprint of the ATST Operations Building but is within the area of impact analyzed in the FEIS.<br>• Will not result in any substantial increase in the amount of excavation.<br>• Environmental impacts would be consistent with those identified in the FEIS analysis. |

TABLE 1-1
Analysis of Design Modifications Not Requiring Additional NEPA Analysis

| Design Modification | Impact Compared to the FEIS analysis |
|---|---|
| **Re-Grade and Level Main Observatory Roadway**<br>• Re-grade observatory access roadway to necessitate proper site drainage and erosion abatement. | • Located in an area that has been disturbed previously and graded multiple times.<br>• No undisturbed ground would be affected.<br>• Environmental impacts would be consistent with those identified in the FEIS analysis. |
| **Pier and Lower Enclosure Foundations**<br>• FEIS analyzed a foundation using a series of large diameter caissons drilled down to 25 feet deep. Subsequent geotechnical investigation found this to be a less beneficial design option.<br>• New foundation design for the pier is a simple 1 meter thick mat-type foundation.<br>• New foundation design for the lower enclosure is a basic perimeter concrete-ring grade beam. | • Significantly less excavation would be required for the ATST foundation.<br>• Heavy drilling for the caissons would not be required.<br>• Less earth would be displaced in the construction of the foundation.<br>• Vibration associated with the caisson drilling would be eliminated and reduce any threat of collapse of the Hawaiian petrel burrows nearby.<br>• Area to be excavated is all within the area of potential impact analyzed in the FEIS.<br>• Environmental impacts substantially less than those analyzed the FEIS. |
| **Drywell in Parking Area**<br>• Drywell (6 feet in diameter by 20 feet deep) has been added to the site grading plan at the southwestern corner of the ATST parking lot, to capture and dissipate water that drains into this area during heavy rain events. | • Located in an area that has been disturbed previously by placement of electrical and utility conduits and is currently encompassed by the Mees Observatory parking lot.<br>• Located in an area analyzed in the FEIS.<br>• No increase in environmental impacts as compared to the FEIS analysis. |
| **Reclassification of Cesspool to Seepage Pit**<br>• As a requirement of the HI Department of Health, cesspool must be reclassified as a seepage pit. | • Only the classification of the cesspool would change.<br>• No physical work is associated with this action.<br>• No environmental impacts would be associated with this reclassification. |
| **Ice Tank Platform**<br>• FEIS design included three ice tanks located on the ground to the north of the existing Mees cistern.<br>• Incorporates a steel “bridge” and working platform structure that spans over the top of the cistern.<br>• Three ice tanks mounted on top of this platform are accessed via a small stairway on the northwestern side of the cistern for maintenance.<br>• Four concrete pad foundations would be used to support the steel platform. | • Some excavation would be required for the four concrete pads for the platform.<br>• The amount of disturbance would be less than in the original design.<br>• No increase in environmental impacts as compared to the FEIS analysis. |
| **Reber Circle Foundations**<br>• Concrete perimeter foundations that surround the Reber Circle area would be removed. | • Impact of removal was analyzed in the FEIS.<br>• No increase in environmental impacts as compared to the FEIS analysis. |

TABLE 1-1
Analysis of Design Modifications Not Requiring Additional NEPA Analysis

| Design Modification | Impact Compared to the FEIS analysis |
|---|---|
| **Telescope Mount Assembly**<br>• FEIS design included a hydrostatic bearing system (HBS) as part of the Telescope Mount Assembly (TMA).<br>• The HBS was eliminated from the TMA since the completion of the FEIS. | • Synthesized hydrocarbon-based hydraulic oil, a hazardous material analyzed in the FEIS, would not be required eliminating the risk of spill or release in transportation, storage, or use.<br>• The elimination of hydrostatic bearings would also reduce the need for conditioned airflow through the TMA area in which the bearings would have resided. Therefore, overall power consumption would be reduced by approximately 200-400 kW including heating, cooling, and fan power.<br>• No new adverse impacts compared to the FEIS analysis. |
| **Mirror Coating Operations**<br>• FEIS design included mirror coating equipment and space in the ATST facility.<br>• The ATST Project would use the AEOS mirror coating facility at HO. | • Reduction in truck loads, both standard-sized and wide load, delivering the coating chamber and related equipment to the facility (reduction incorporated into the Supplemental EA).<br>• Reduction in construction and maintenance activities and associated construction crew and vehicles.<br>• Reduction in hazardous material use and storage associated with the mirror coating operations, as analyzed in the FEIS.<br>• No new adverse impacts compared to the FEIS analysis. |
| **FAA Site Staging/Laydown Area**<br>• FEIS generally discussed the potential use of the FAA parking area as a staging/laydown area during ATST construction. Final agreement between the ATST Project and FAA was not completed prior to completion of the FEIS and ROD.<br>• Based on continued coordination with FAA, the ATST staging and laydown area would be located both on the HO property (north of the Faulkes Building and access road – analyzed in full in the FEIS) and on the FAA site (west of the Faulkes Building).<br>• Temporary design includes a gravel ingress/egress access from the FAA access road and a sediment barrier surrounding the site to capture stormwater runoff. | • Location is previously disturbed resulting in no adverse effect on biological or archeological resources.<br>• Adjacent staging and laydown areas located in close proximity to the ATST Project site would reduce traffic coordination and simplify material delivery.<br>• Stormwater would be contained onsite within a sediment barrier and would not contribute to the onsite infiltration basin or to offsite.<br>• No increase in environmental impacts as compared to the FEIS analysis.<br>• Upon completion of construction, the FAA site would be restored to pre-existing conditions. |
| **Offsite Staging/Laydown Area**<br>• A staging/laydown site would be located in either the industrial Kahului or Central Valley baseyard area, which are both already used for those purposes.<br>• The space to be rented would consist of at least 8,000 sq ft of interior space. For maneuvering of truck loads, the exterior would require a paved area of at least 12,000 sq ft. The rented area would have electrical, water and security fencing, which would be required for storage of containerized materials. | • Locations are currently used for this purpose. No new types of impacts would occur.<br>• No new development or installation would be needed for construction staging or laydown.<br>• Siting would avoid new impacts on otherwise natural areas.<br>• No increase in environmental impacts as compared to the FEIS analysis. |

## 1.2 Identification of Agencies Proposing the Supplemental Actions

NSF is the lead federal agency for the ATST Project, including the original FEIS and subsequently this supplemental EA. Because NSF would fund the ATST Project and associated actions, this analysis must comply with NEPA and NSF's NEPA-implementing regulations.

Two other federal agencies have a stake in the proposed actions. Tower upgrades would occur on FAA property. This action is prompted because the ATST facility may interfere with FAA ground-to-air signal conveyance over a few degrees of geometric line-of-sight; therefore, NSF, through AURA/NSO, is funding necessary tower upgrades to reduce or eliminate such interference. As such, this supplemental EA will cover NEPA compliance requirements for the activities proposed on FAA property. This supplemental EA is also being prepared to evaluate the potential environmental effects associated with the proposed changes to the types of commercial vehicles to be operated on the historic Park road during construction and operation of the ATST Project. The FEIS evaluated issuance of a NPS Special Use Permit (SUP), pursuant to 36 CFR Section 5.6. The NPS would incorporate these changes into its SUP as analyzed in this supplemental EA.

Although the original FEIS was a joint federal and state document, proposed changes in this analysis do not trigger additional need for state environmental review and an environmental assessment is not required under State of Hawaiʻi Chapter 343 pursuant to Hawaiʻi Revised Statutes Section 343-5.

## 1.3 Conformance with Existing Plans, Permits, and Consultations

Because the proposed Project changes would not occur within HO, the HO Management Plan approved by the DLNR in December 2010 (KCE, 2010) and related plans and permits do not apply. Proposed Project changes would not alter pending issuance of the HRS Chapter 195D Incidental Take License or the CDUP issued in December 2010 by the Board of Land and Natural Resources (BLNR) or the Habitat Conservation Plan, approved on May 27, 2011. The FEIS addressed use of State Conservation District lands, in accordance with HRS Chapter 343. As noted above, this supplemental analysis tiers to the FEIS, and proposed changes considered in this analysis do not trigger additional need for state environmental review.

Federal consultations are ongoing with the U.S. Fish and Wildlife Service (USFWS) and the State Historic Preservation Office (SHPO). USFWS is drafting a Biological Opinion (BO) addressing the agencies' actions.

## 1.4 Purpose and Need

If built, the ATST would be the best facility in the world for the study of magnetic phenomena in the solar atmosphere and would be the first large, ground-based, open-access solar telescope constructed in the United States in more than 40 years. Understanding the role of magnetic fields in the outer regions of the sun is crucial to understanding solar activity, including flares and mass ejections, which can significantly affect life on Earth. Among the specific research areas that the ATST is designed to address are the processes whereby cosmic magnetic fields are generated and how they are destroyed; the role played by cosmic magnetic fields in the organization of plasma structures and the impulsive releases of energy seen ubiquitously in the universe; mechanisms responsible for solar variability and its impact on climate; and the conditions responsible for solar activity, including solar flares and coronal mass ejections, which can affect terrestrial communications and power systems. In addition, the telescope would contribute to improved understanding of space weather, which creates hazards for communications to and from satellites, and affects the safety of astronauts and air travelers. No comparable facility currently exists, nor are any comparable facilities being planned.

As noted, this Project was approved by NSF in December 2009 and subsequently in December 2010 by the Hawaiʻi BLNR for this land use within the State Conservation District. Continued planning and design identified construction issues requiring modifications to the project before the implementation phase. The following proposed changes are needed to facilitate construction of the approved ATST Project and avoid long-term impacts on adjacent facilities:

- First, although the total number of vehicle trips projected to construct the ATST facility has not increased from that presented in the FEIS, the availability of vehicles on Maui in the size classes as presented in the FEIS is limited. Therefore, the numbers of vehicles in various classes have been revised to reflect realistic vehicle availability on Maui and to provide the most appropriate available vehicle type to safely and effectively deliver materials to the site.

- Second, the FEIS noted a potentially major, adverse, long-term impact on the FAA air traffic control communications ground-to-air signal conveyance capability over a few degrees of geometric line-of-sight. FEIS Mitigation Measure MIT-2 noted that "NSF would work with FAA to address signal attenuation". However, specific plans, responsibilities, and timelines were not analyzed. The antenna upgrade of the two existing FAA Remote Communication Air to Ground (RCAG) towers with a high-gain design is needed to allow improved signal paths around the ATST facility for interisland air traffic control communications.

## 1.5 Project Location

The future ATST facility is located within the HO complex on the summit of Haleakalā on Maui, Hawaiʻi, as shown on Figure 1-1. The HO complex is within the State Conservation District. The land was given in fee by the State of Hawaiʻi in 1961 to the University of Hawaiʻi for research purposes, under Executive Order 1987. The Institute for Astronomy (UH IfA) manages the property. The FAA administers an air traffic control communication repeater station on federally owned land located immediately west of the HO, within the State Conservation District, as shown on Figure 1-2. The FAA towers proposed for upgrade are approximately 800 feet west of the future ATST facility. A U.S. Department of Energy (DOE) research facility, also on federally owned land, is situated immediately west of HO and northwest of the FAA parcel. The remaining land surrounding HO and the adjacent federal properties are owned by the State of Hawai'i and a commercial landowner, as shown on Figure 1-3.

The Park road corridor, which traverses the Park, is the only access road leading up to HO. The NPS has exclusive jurisdiction over the Park road, which begins at 6,800 feet above sea level (ASL). As noted and analyzed in the FEIS (NSF, 2009), the portion of the Park road used to access HO is historically important and eligible for listing on the National Register of Historic Places (NRHP). Haleakalā Highway (SR 37) is a 37-mile road between central Maui's main town of Kahului and the summit of Haleakalā. Up to the Park entrance, the road is a state road (SR 378), built prior to the Park road corridor. This part of the highway passes through private property consisting of land used for residential and ranching purposes (NSF, 2009).

There is no change proposed to the Project location or access route discussed in the FEIS. Vehicles would use the Park road to access the HO complex, as shown on Figure 1-1.

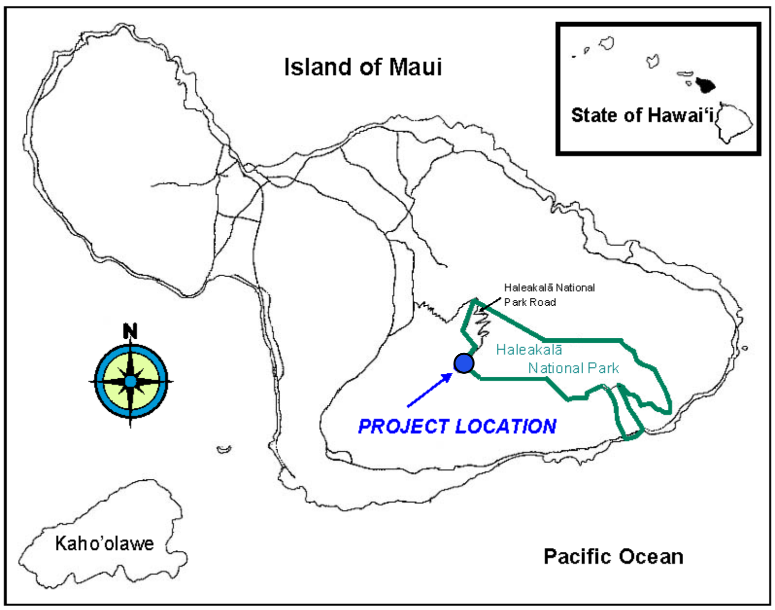



FIGURE 1-1
ATST Approved and Supplemental Project Location and Haleakalā National Park Road on Island of Maui, Hawai'i

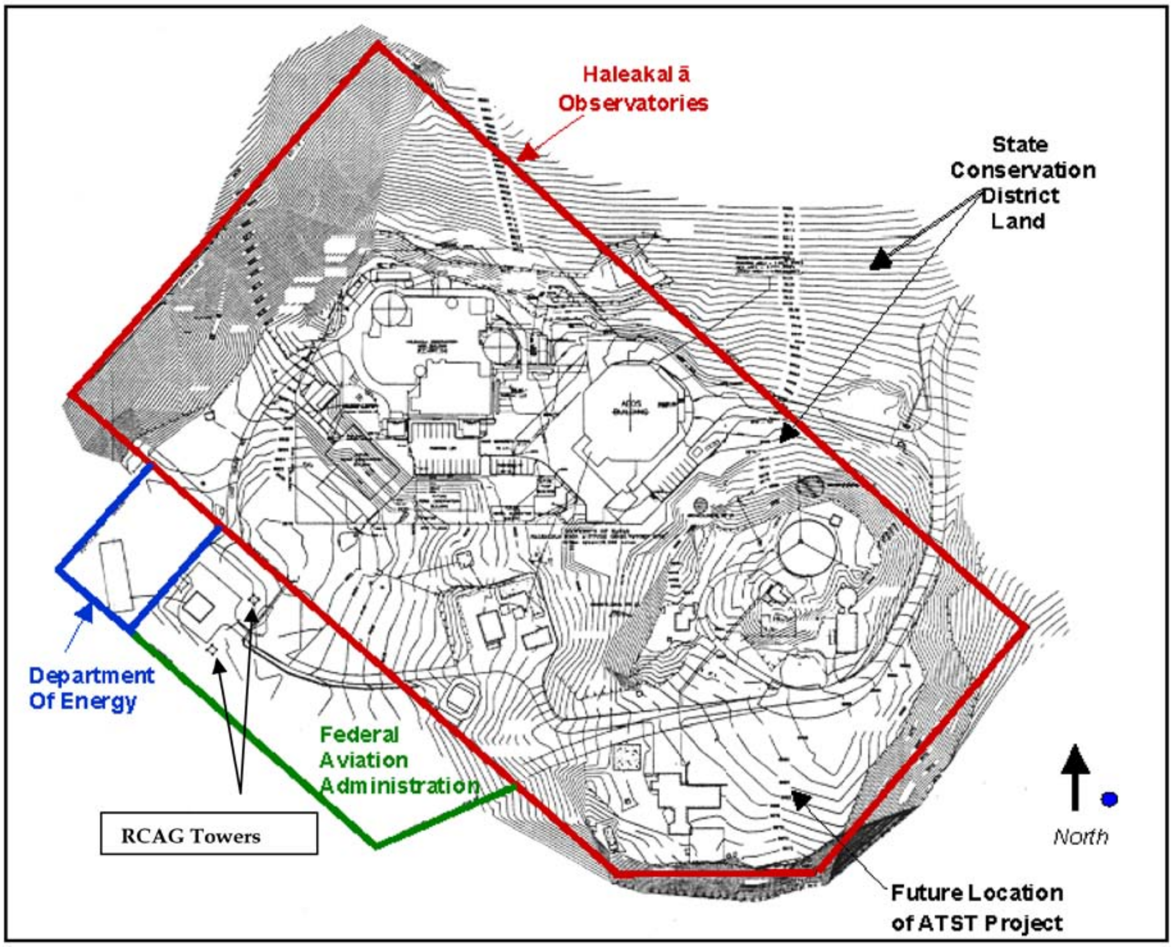
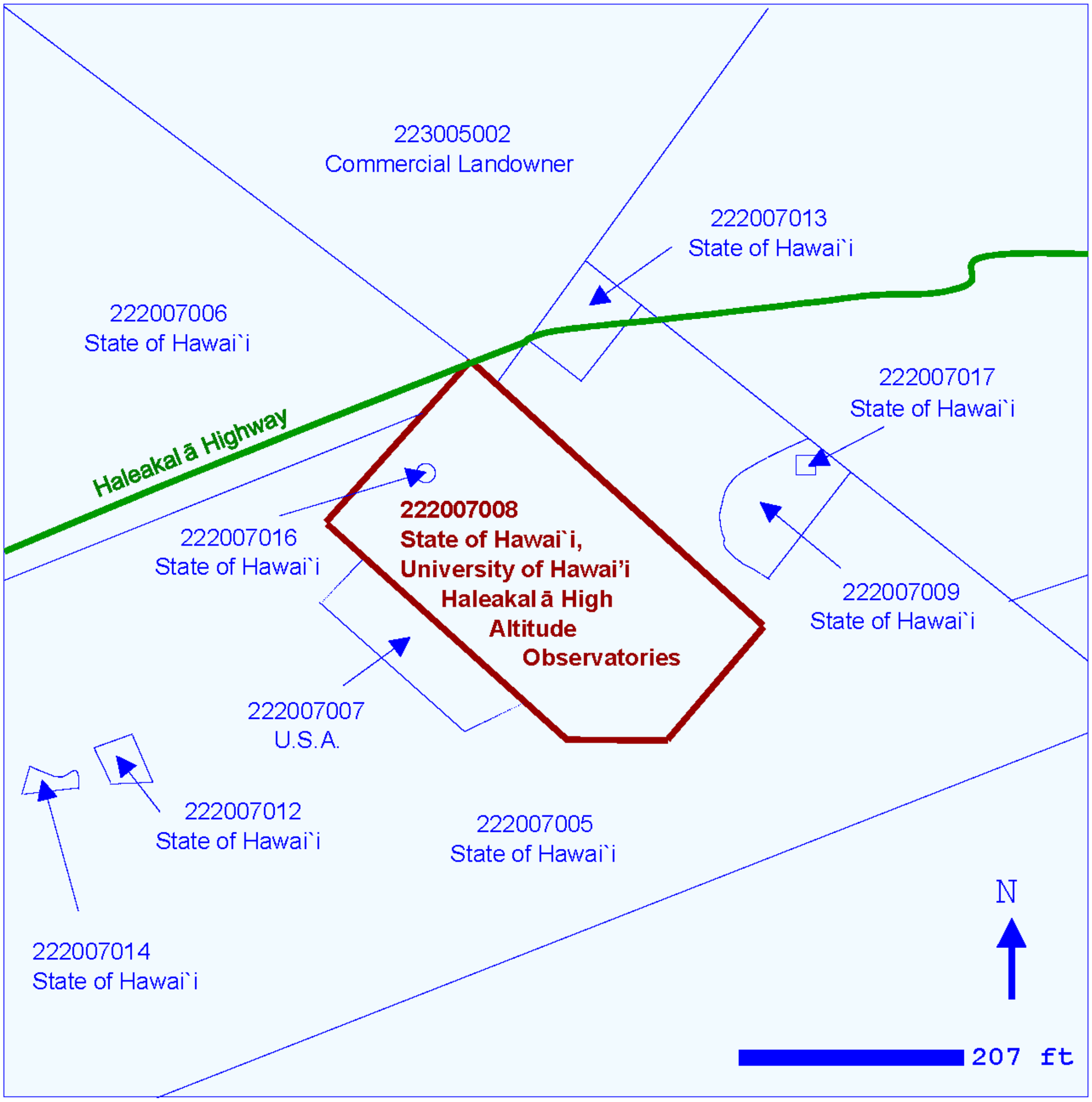



FIGURE 1-2
Haleakalā High Altitude Observatory Site, Federal Aviation Administration, and Department of Energy Properties




Internet website: http://kivanetext.co.maui.hi.us/kivanet/2/permit/index.cfm

FIGURE 1-3
Tax Map Key for Haleakalā High Altitude Observatory Site,
Federal Aviation Administration Property, and Adjacent Properties

# 1.6 Description of the Proposed Actions and Alternatives

## 1.6.1 Proposed Actions Alternative

### Modification to Construction Vehicle Load Class

The volume of traffic associated with ATST construction would not increase from that presented in Table 2-4 of the FEIS (page 2-30; 25,000 trips). Based on vehicle availability on the island of Maui, the number of vehicles of various Federal Highway Administration (FHWA) classifications[2] (classes) necessary for construction is proposed to change. This change reflects realistic vehicle availability on Maui and provides the most appropriate available vehicle type to safely deliver materials to the site.

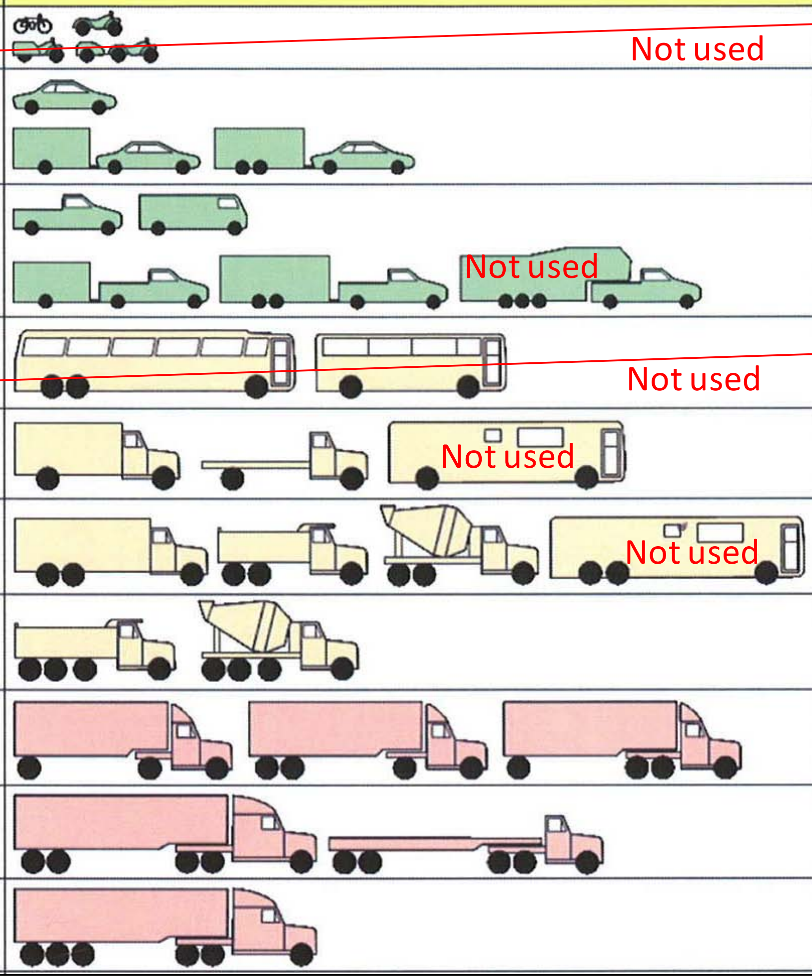
According to a NEPA review completed subsequent to the FEIS (*Environmental Assessment for the Issuance of an Incidental Take License and Proposed Conservation Measures Associated with the Advanced Technology Solar Telescope, Haleakalā, Maui, Hawaiʻi* [NSF, 2011]) and subsequent issuance of a Finding of No Significant Impact/Decision Document, in order to reduce impacts on the Hawaiian petrel (*Pterodoma sandwichensis* or ʻuaʻu), the construction period was changed to be a year-round. This shortened the construction from 7 to 8 years to 6 to 7 years, thereby increasing the number of vehicle loads proportionally for each year. This adjustment was previously analyzed (NSF, 2011). The compressed traffic volume to account for the shortened schedule is therefore not included in this analysis but is factored into the revised calculations. The general phases of construction over the 6- to 7-year period are described in Table 1-2. Each class of vehicle that would be used during ATST construction is defined in Table 1-3.

TABLE 1-2
General Phases of Construction

| | |
|---|---|
| Year 1 | Excavation and site work |
| Year 2 | Foundation and scaffolding/framework |
| Year 3 | Steel and building construction |
| Year 4 | Completion of building and upper enclosure |
| Year 5 | Upper enclosure and telescope mount assembly |
| Year 6 | Telescope mount assembly and optics |
| Years 6-7 | Integration, Testing, and Commissioning |

[2] FHWA uses a classification scheme to categorize vehicles carrying passengers versus those carrying commodities. Non-passenger vehicles are further subdivided by number of axles and number of units, including power and trailer units (FHWA, 2008).

TABLE 1-3
Construction Vehicle Class Descriptions



| | Class | Schema | Description |
|---|---|---|---|
| Light-weight Vehicles | 1 | Not used | ~~all motorcycles plus~~ two wheel axles |
| | 2 | | all cars plus one/two axle trailers |
| | 3 | Not used | all pickups and vans single/dual wheels plus one/two/three axle trailers |
| Single Unit Vehicles | 4 | Not used | ~~buses~~ single/dual wheels |
| | 5 | Not used | two axle, single unit single/dual wheels |
| | 6 | Not used | three axle, single unit |
| | 7 | | four axle, single unit |
| | 8 | | four or less axles, single trailers |
| | 9 | | five axles, single trailers |
| | 10 | | six or more axles, single trailers |

Class 9 tractor trailers are the mainstay of island trucking, based on their versatility in weight, length, and type of cargo capability. Even when load weights are far less than the vehicle design weight, Class 9 vehicles would commonly be used. Furthermore, the FEIS analysis indicated that Class 12 vehicles would be used. However, the more recent analysis indicates that no Class 12 vehicles would be used during construction.

Wide loads are defined as any load that exceeds the Hawaiʻi Department of Transportation (HDOT) limit of 9 feet. In cases where vehicles are transporting extremely wide loads (18 to 24 feet), road closures are required to allow full, unimpeded use of the road.

Table 1-4 compares the proposed numbers of vehicles by vehicle class between the proposed actions and Table 2-4 in the FEIS.

TABLE 1-4
Comparison of Construction Vehicle Class and Volume by Construction Year

| Vehicle Class | Year 1 | | Year 2 | | Year 3 | | Year 4 | | Year 5 | | Year 6 | | Year 7 | | Total Class | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **FEIS** | **Proposed Actions** | **FEIS** | **Proposed Actions** | **FEIS** | **Proposed Actions** | **FEIS** | **Proposed Actions** | **FEIS** | **Proposed Actions** | **FEIS** | **Proposed Actions** | **FEIS** | **Proposed Actions** | **FEIS** | **Proposed Actions** |
| **12** | — | — | — | — | — | — | 10 | — | 10 | — | 11 | — | — | — | 31 | — |
| **10** | | 16 | 2 | 6 | — | 4 | — | — | — | — | 1 | — | — | — | 3 | 26 |
| **9** | 14 | 104 | | 68 | — | 120 | 34 | 99 | 12 | 76 | 27 | 24 | — | — | 87 | 491 |
| **9&10** | — | — | — | — | — | — | — | 36 | — | 11 | — | 39 | — | — | 0 | 86 |
| **8** | — | 10 | — | — | — | 8 | — | — | — | — | — | — | — | — | 0 | 18 |
| **7** | 65 | 108 | 313 | 50 | 20 | 30 | 15 | 12 | 13 | 17 | 61 | 33 | — | — | 487 | 250 |
| **6** | 41 | 160 | 5 | 220 | 20 | 100 | — | 150 | | 50 | 10 | 50 | 204 | 204 | 280 | 934 |
| **5** | 9 | 57 | 18 | 30 | 20 | 30 | — | 20 | — | 30 | — | 18 | — | — | 47 | 185 |
| **4** | — | — | — | — | — | — | 4 | — | — | — | — | — | — | — | 4 | — |
| **3** | 1265 | 1,290 | 1,140 | 1,140 | 960 | 1,110 | 1,260 | 1,560 | 1,260 | 1,560 | 1,080 | 1,800 | 2,920 | 1,460 | 9,885 | 9,920 |
| **2** | 1260 | 1,275 | 1,140 | 1,140 | 960 | 1,110 | 1,260 | 1,560 | 1,260 | 1,560 | 1,080 | 1,800 | 2,920 | 1,460 | 9,880 | 9,905 |
| **Total by Year** | **2,654** | **3,020** | **2,618** | **2,654** | **1,980** | **2,512** | **2,583** | **3,437** | **2,555** | **3,304** | **2,270** | **3,764** | **6,044** | **3,124** | **20,704** | **21,815** |

The FEIS and associated Section 106 Programmatic Agreement (PA) estimated that up to 25 extremely wide truckloads would warrant full closure of the Park road to visitor traffic in order to ingress and egress traffic during the full ATST construction duration. The revised calculations include an additional 200 wide-load vehicles; however, these additional loads would not require the full closure of the Park road. Wide-load construction vehicles would require oncoming traffic to pull over so they can safely pass. To promote safe and efficient traffic flow along the Park road during construction vehicle deliveries and also to avoid impacts to features of the historic road and natural resources on the side of the roadway, ten existing paved pull-off locations have been identified between mile posts (MP) 10.3 and 21.2, to allow general purpose traffic to pull off the Park road as the wider construction vehicles pass. In these locations, traffic monitors would be staged to direct motorists. A pilot vehicle would precede all wide loads whether the Park road is closed or not, and appropriate HDOT permits and signage would be obtained. Extremely wide loads would be preceded by two pilot vehicles. Figure 1-4 shows the 10 paved existing pull-off locations along the Park road that would be used by oncoming traffic when wide loads are passing.

A Traffic Management Plan (TMP) is being prepared for the ATST Project, including a description of the construction vehicle plan, schedule, potential impacts, and associated mitigation strategies to manage traffic flow and safety and to offset impacts to traffic and visitor use. The TMP will be reviewed and approved by the Park prior to construction.

### FAA Tower Upgrade

The FAA RCAG system on Puʻu Kolekole is located approximately 800 feet west of the future ATST facility, as shown on Figure 1-2. The RCAG system consists of two communications towers and maintains two sets of frequencies for contact with interisland air traffic down to 8,000 feet. The existing towers are shown on Figure 1-5. As a result of the addition of the ATST facility, physical obstruction to the geometric line-of-sight for signals from the RCAG could occur. These frequencies could experience attenuation, which would be defined as signal loss in a narrow swath of 7 degrees, originating at the RCAG antennas and intersecting the width of the ATST Project structure, about 800 feet away. As such, the FEIS concluded that the Project would have a major, adverse, long-term impact on this facility that could be mitigated to a negligible, adverse, and long-term level with implementation of FEIS Mitigation Measure MIT-2. With this mitigation measure, the FEIS concluded that NSF would work with FAA to address signal attenuation; however, specific plans, responsibilities, and timelines were not analyzed at that point because a proposed plan for addressing the signal attenuation had not yet been fully developed. The action proposed as part of this supplemental EA was developed through continued coordination with FAA and does not alter the FEIS analysis. The design and agreement between NSF and FAA has been developed, however, to allow for environmental review.

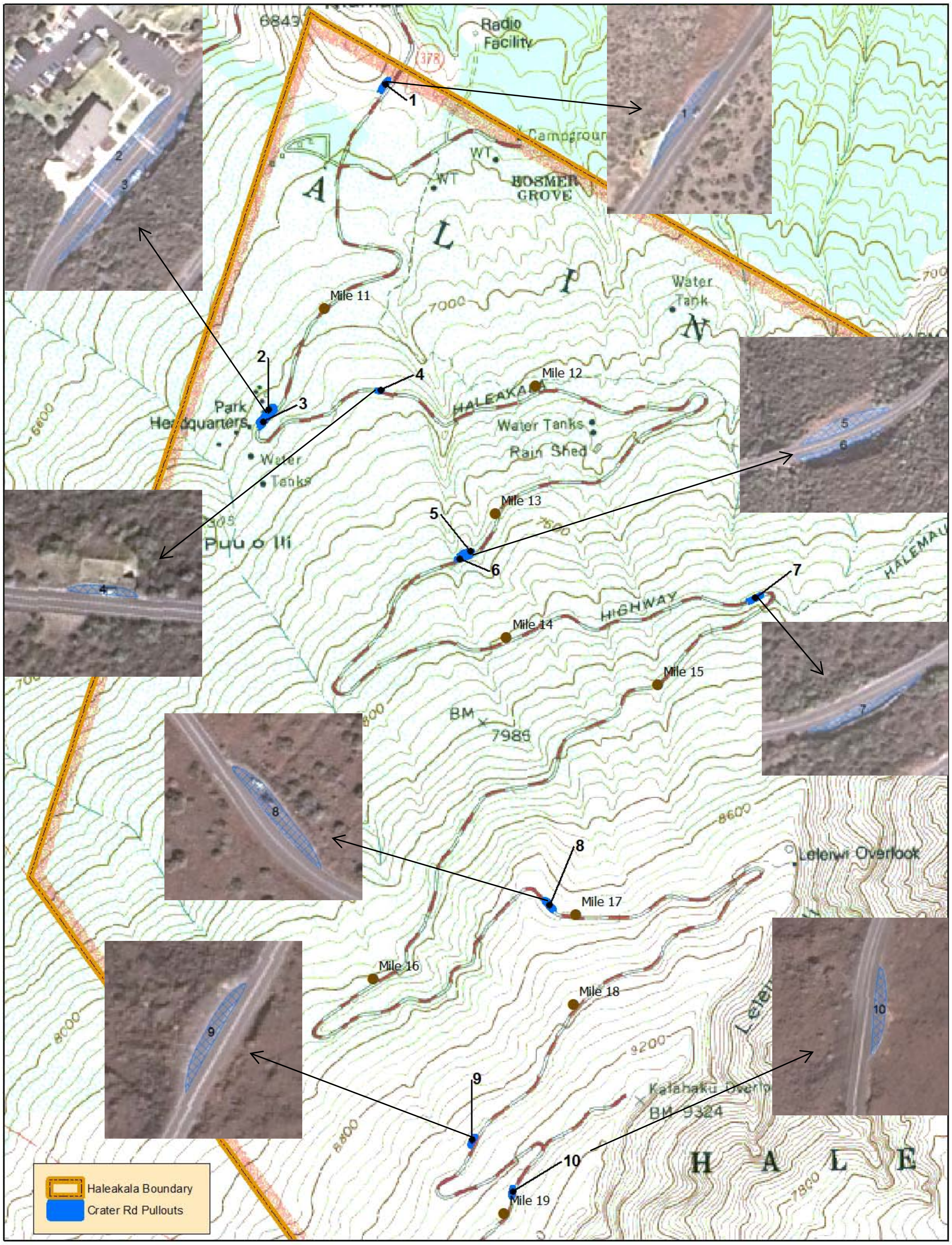



FIGURE 1-4
Existing Paved Park Road Pull-offs

FIGURE 1-5
Two Existing FAA RCAG Towers

The antenna upgrade would effectively modify the existing design of the FAA RCAG towers with a high-gain design, allowing improved signal paths around the ATST facility. This action consists of installing six swing arms and high-gain antennas on each of the two RCAG towers (12 swing arms and antennas total), constructing and installing a new ladder and extending the existing platform on each RCAG tower by 2 feet in one direction to meet OSHA standards, and relocating or replacing existing antennas with new high-gain antennas. Other upgrades would be to replace corroded bolts and nuts that have weathered over time. Groundwork would be isolated to a concrete pad and footing supporting the new ladder.

The tower upgrades are depicted on Figure 1-6. Each swing arm would be silver-grey in color and non-reflective and would extend 4 feet horizontally from the tower in four directions. Each swing arm would be 1.5 inches in diameter. These swing arms would be visible by the human eye from the immediate area, but they would not be visible from any publicly accessible area. There would be no change in the tower height or width. The duration of tower upgrades would occur over an approximate 3-week period, depending on weather. If possible, construction activities would occur during December through the end of February when the Hawaiian petrel is not present or nesting. Construction vehicles would include four vehicles on site each day for the 3-week period for installation and testing including two pickup trucks, one passenger car, and one flat-bed truck; no heavy machinery would be needed. Vehicle and material staging would occur on the work area, away from sensitive Hawaiian silversword habitat. Pursuant to ATST mitigation commitments, a botanical specialist would inspect the area prior to staging and ground work. Likewise, construction vehicle use and construction activities would employ mitigations outlined in the FEIS, including time restrictions, adherence to the TMP, and coordination with the Park.

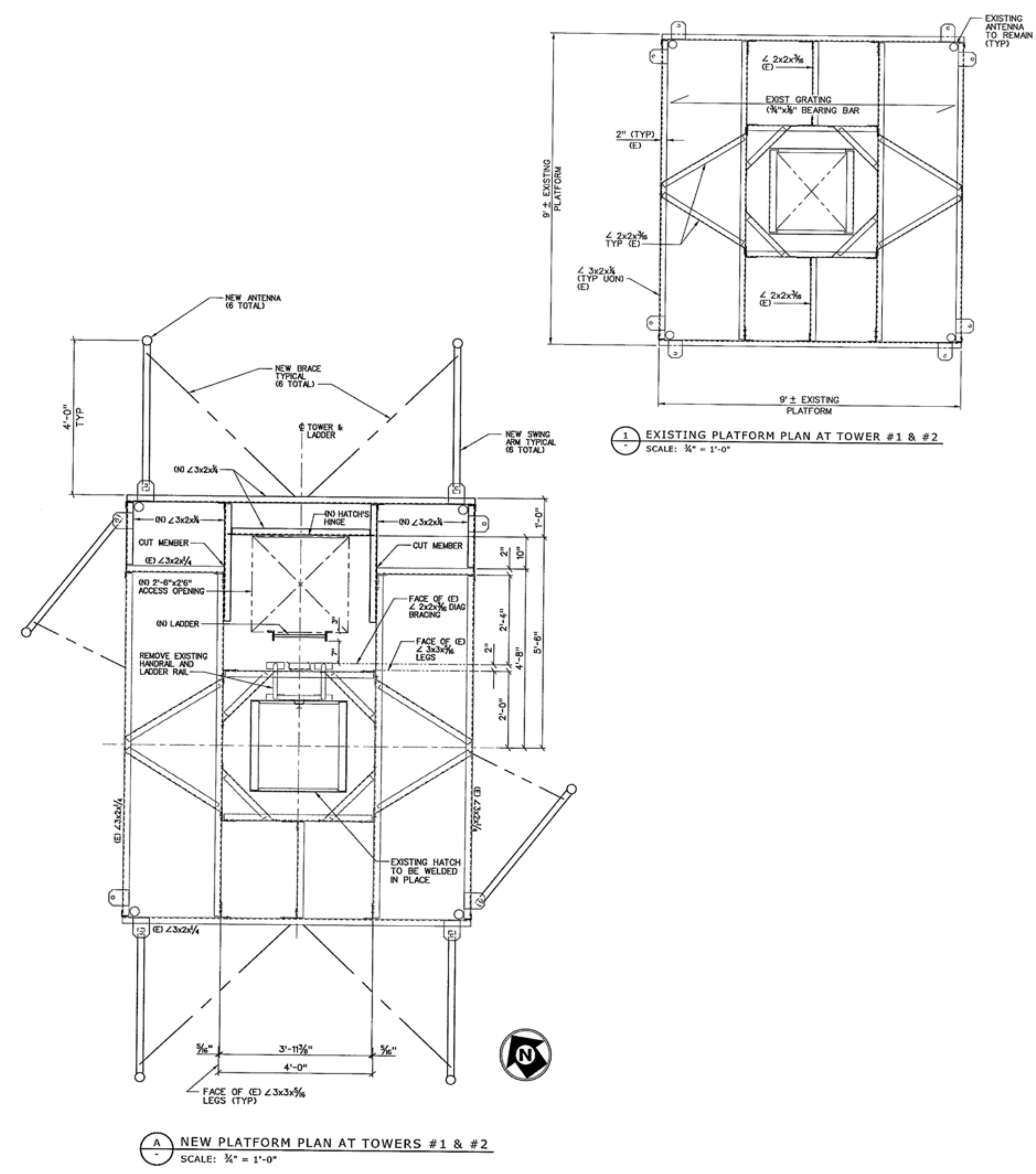



FIGURE 1-6
Proposed FAA Tower Upgrades

### 1.6.2 No-Action Alternative

Under the No-Action Alternative, the ATST Project would be funded and built at the HO Mees site, as analyzed in the FEIS (NSF, 2009). The FEIS identified a potential major, adverse, long-term impact on the FAA air traffic control communications ground-to-air signal conveyance capability over a few degrees of geometric line-of-sight. As noted in Section 1.4, Purpose and Need, FEIS Mitigation Measure MIT-2 noted that "NSF would work with FAA to address signal attenuation," however the details of that mitigation were not available until this analysis. The mitigation action is effectively the action alternative of this supplemental EA. The No-Action Alternative reiterates the noted major, adverse impact identified and analyzed in the FEIS if the mitigation (MIT-2) were not implemented. In other words, under the No-Action Alternative, there would be no upgrade to the FAA RCAG towers, meaning interisland communications could experience interference in the arc area where the ATST facility would be built.

Traffic volumes, scheduling, and vehicle types would be in accordance with the FEIS analysis (NSF, 2009). As a result, material delivery may be less efficient by using fewer or smaller-load vehicles than appropriate or by mobilizing vehicles from off-island. Potential safety constraints could arise if vehicle classes did not match the required use, or longer construction periods might have to account for the less efficient material delivery. Furthermore, the No-Action Alternative could potentially have an impact on the local economy if off-island vehicles or crews are brought to Maui throughout the construction period.

Pursuant to Council on Environmental Quality (CEQ) regulations, 40 CFR 1502.14, the No-Action Alternative is included in the alternatives evaluation to provide the baseline for evaluating potential environmental impacts of the action.

### 1.6.3 Alternatives Eliminated from Further Consideration

This supplemental analysis tiers from the completed FEIS (NSF, 2009). Alternatives considered are consistent with that analysis. Further, the proposed changes to the Project do not affect the selection of the preferred alternative. Proposed Project changes associated with the modification to construction vehicle load class were based on available resources and safe implementation. Alternatives to this modification would reduce the effectiveness of the construction plan. FAA has considered alternatives to the RCAG tower upgrades, as proposed. Each of these alternatives was eliminated for the following reasons:

- Situating new FAA RCAG towers in a new location to redirect ground-to-air signal conveyance between islands. This alternative was eliminated because the only alternative FAA site location on Haleakalā that could support RCAG operations just west of the Park at 7,500 feet elevation would likely not provide the same coverage to the east as does the current location, due to terrain blocking. Furthermore, the environmental impacts would likely be more than the proposed actions.
- Co-locating a new repeater antenna on the southeastern side of the ATST facility. This alternative was eliminated because it would not be practical to redirect the signal 800 feet from the FAA facility to ATST.
- Increasing the height of the current towers to extend signal coverage further and over the top of the ATST enclosure. This alternative would also result in practical limitations and potentially more environmental effects than the proposed actions.

Other than the No-Action Alternative, no other alternatives are considered in this supplemental EA.

## 1.7 Resources Eliminated from Further Consideration

Resources potentially affected are noted under each proposed Project change above. Upgrades to the FAA towers and modifications to the construction vehicle classification would not change impacts addressed in the FEIS (NSF, 2009) for the following resources:

**Land Use and Existing Activities.** There would be no change in land use as a result of the proposed Project changes. Furthermore, there would be no change in the level or types of existing activities occurring within HO, the FAA property, or the Park road. The conditions analyzed in the FEIS would not change.

**Water Resources.** Implementation of the proposed Project changes would not affect surface water or groundwater quality conditions and would not alter stormwater drainage patterns. The conditions analyzed in the FEIS would not change.

**Hazardous Materials and Solid Waste.** Implementation of the proposed Project changes would not result in a measurable change to hazardous and solid waste. Although vehicle classifications would change, the volume of vehicles would not increase. The FEIS analysis would not change. Materials used in the FAA tower upgrades would be negligible. No notable increase in hazardous materials or solid waste impacts would result from proposed Project changes.

**Socioeconomics and Environmental Justice.** Implementation of the proposed Project changes would not affect, beneficially or adversely, socioeconomic resources, environmental justice, or the protection of children. No changes in the population or additional need for housing or schools would occur. The beneficial impacts affecting the local economy and employment would be in line with the FEIS analysis. The No-Action Alternative could potentially have an adverse effect on the local economy if vehicles or drivers are imported from off-island.

**Public Services and Facilities.** Implementation of the proposed Project changes would not result in additional demand on police protection, fire protection, schools, healthcare services, or recreation facilities. Upgrades to the FAA RCAG towers would correct the radio signal degradation noted in the FEIS and would be consistent with the level of mitigation analyzed under FEIS Mitigation Measure 2. There would be no other changes to public services and facilities and no changes to the FEIS impacts analysis.

**Natural Hazards.** The proposed Project changes would not be affected by natural hazards. The FEIS discusses the potential natural hazards within the Project study area, including high winds, extreme rain, ice, snow, earthquakes, and hypoxia. While these conditions continue to be relevant to the Project area, there would be no change to this analysis or the potential impacts resulting from implementation of the proposed Project changes.

These resources are therefore eliminated from further consideration in this analysis. The analysis and conclusions presented in the FEIS for these resources remain valid.

**SECTION 2**

# Affected Environment

This chapter provides an overview of the baseline cultural and physical conditions that occur within the Project area, as defined in Section 1.5, Project Location. Only those environmental conditions relevant to the proposed Project changes are presented. As such, the region of influence (ROI) is defined as relevant only to these proposed Project changes at the beginning of each section. These are discussed in the following sections:

- 2.1 Cultural, Historic, and Archeological Resources
- 2.2 Biological Resources
- 2.3 Roadways and Traffic
- 2.4 Infrastructure and Utilities
- 2.5 Visual Resources and View Planes
- 2.6 Visitor Use and Experience
- 2.7 Topography, Geology, and Soils
- 2.8 Air Quality
- 2.9 Noise

Each section gives an overview of the general conditions of the resource within the ROI.

## 2.1 Cultural, Historic, and Archeological Resources

The proposed Project changes do not alter the cultural, historic, or archeological resources analysis included in the FEIS, which covered traditional cultural properties, resources, and practices; historic resources; archeological resources; and a comprehensive Section 106 regulatory compliance process for the entirety of HO and the Park road corridor. Rather, this analysis tiers to a portion of that analysis that is focused only on the Park road corridor.

As noted in the FEIS, the historic Park road corridor has been evaluated by the NPS and Historic American Engineering Record and determined eligible for listing in the NRHP as a historic cultural landscape with contributing historic features. In a letter from the SHPO dated July 21, 2009, for the Section 106 process associated with the ATST Project, it was acknowledged that the Park road is considered significant under Criterion A for its development of the National Park System, the development of early NPS landscape architectural design styles, and the craftsmanship of the Civilian Conservation Corps. The Park road is also considered significant under Criterion C for its association with rustic, park design that characterized early NPS development during the 1930s. Historic features of the roadway include 1 bridge, 11 box culverts, and original culverts with mortared stone headwalls. In addition, the Park road corridor is within the boundaries of the Crater Historic District. The contributing features of the Park road corridor include natural systems and features, spatial organization, land use, buildings and structures, circulation, topography, views and vistas, and archeological sites associated with the cultural landscape.

The entire Haleakalā Highway (SR 37) is a 37-mile road that stretches from central Maui’s main town of Kahului to the summit of Haleakalā. The portion of the highway leading up to the Park entrance is a State road (SR 378) and was built prior to the Park road corridor. This part of the highway traverses through private property consisting of land used for residential and ranch purposes (NPS, 2009).

The FEIS also identified 11 archeological sites within 50 feet of the Park road corridor. Most of these sites are eligible for listing in the NRHP under Criterion D, and one is listed under Criteria C and D. These sites include short-term camp sites associated with prehistoric or historic activities, cairns that appear to be trail markers, and segments of wall associated with cattle ranching.

A cultural and archeological survey was completed on the FAA site in 2006 in coordination with the replacement of the U.S. Coast Guard tower located on the FAA property. No archeological resources were identified on the site (USCG, 2006; CKM Cultural Resources, 2006). No historic resources are known on the site.

A PA was established between the NSF, the Park, the Advisory Council on Historic Preservation, the SHPO, the University of Hawaiʻi, and other signatories in 2009 for the purpose of developing mitigation to offset potential impacts on this historic resource as a result of ATST construction activities. The NSF's Section 106 compliance process that was initiated in 2005 has continued through the FEIS and current supplemental EA planning processes. More than 30 formal and informal consultations were conducted during the FEIS process, including public meetings, workshops, and interviews. Subsequently, a Native Hawaiian Working Group was established and has met four times in accordance with Section II A of the PA, to assist with historic and cultural property matters during construction. In addition, NSF and the Park have been working together to address environmental compliance needs associated with the SUP required by the Park for commercial vehicles to operate on the Park road corridor. NSF and the Park have agreed to coordinate their environmental compliance requirements under NEPA and Section 106 for the FEIS and this supplemental EA. It was through this partnership that the cultural, historic, and archeological resources of the Park were identified.

## 2.2 Biological Resources

Biological resources consist of vegetation and wildlife and their habitats. Threatened and endangered species, and the habitats upon which they depend, are protected under the federal Endangered Species Act (ESA). The ESA requires federal agencies to demonstrate that any action they authorize, fund, or carry out will not adversely affect a threatened or endangered species, or destroy or adversely modify any critical habitat for that species.

For the purpose of the analysis, the FEIS (NSF, 2009) defines the Park road corridor as a 50-foot corridor along the Park road, measured from the mid-point of the road extending out 25 feet on each side. The ROI for biological resources is defined as the Park road corridor and the FAA property. Each biological resource in this section is discussed separately for both areas of the ROI. Detail regarding biological resources within the ROI was obtained from the FEIS and from the *Habitat Conservation Plan for Construction and Operation of the Advanced Technology Solar Telescope* (NSF, 2010b), which addressed the potential take of the federally endangered Hawaiian petrel. In addition, an *Arthropod Habitat Reconnaissance and Assessment* field survey and report were completed in April 2010 and encompassed the 328-

acre conservation area surrounding HO and the FAA site (Pacific Analytics, 2010). This survey profiled the habitat and botanical communities within the conservation area and searched for the presence of arthropods known to occur in the region. Finally, the USFWS is preparing a BO addressing the Project actions. Relevant conclusions are included in the biological analysis. This analysis does not replace information provided in the FEIS; rather, it extracts relevant portions of the FEIS specific to the more limited ROI of the Park road corridor and FAA property, which are necessary to inform the analysis of these changes. As such, specific biological resources, based on the information contained in the FEIS and in the reports mentioned above, are presented below.

### 2.2.1 Botanical Resources

#### Park Road Corridor

The Park road corridor contains biological ecosystems that are unique and fragile, and includes more than one biological zone for plants. The lower half of the Park road corridor, up to about 8,500 feet, is within the subalpine shrub land zone, which contains common species such as the coriaceous, small-leaved shrub pukiawe (*Stypheliatameiameiae*). The tallest tree-shrub of subalpine shrub lands is mamane (*Sophora chrysophylla*) whose golden-yellow flowers in the spring provide food for native honeycreepers that seasonally travel from nearby rain forests. ʻOhelo and kiipaoa are common components of the subalpine zone; historically, both have been suppressed by feral goats and are recovering well in their absence. Other common and characteristic native subalpine species include the shrubs pilo (*Coprosma montana)*, kukaenene (*Coprosma ernodeoides*), hinahina (*Geranium cuneatum tridens*), and ʻaʻaliʻi (*Dodonaea viscosa*), and the herbs *Carex wahuensis*, *Deschampsia nubigena* and ʻuki (*Gahnia gahniiformis*). Non-native grasses, especially velvet grass are common and persistent between native shrubs (Medeiros et al., 1998).

Subalpine shrub lands of Haleakalā occur primarily on the western and northwestern flanks of the volcano extending from just below the Park boundary at 6,724 feet up to approximately 8,530 feet, where the elevation grades into the alpine zone. The upper Park road corridor is in the alpine zone, which occurs on the older, outside western slope of the volcano (UH IfA, 2010). Considerable diversity exists within these biological zones, and Haleakalā silversword (*Argyroxipbium sandwicense* or ʻahinahina), a threatened species evaluated further in this analysis, inhabits both zones.

#### FAA Site

As stated above, the FAA site is situated near the summit of Haleakalā at an elevation of approximately 9,950 feet and therefore supports sparse vegetation. The area immediately surrounding the FAA towers is highly disturbed.

The vegetation and wildlife within these areas are consistent with those described in the FEIS (NSF, 2009). Mapping of the existing vegetation conducted by the U.S. Department of Interior in July 2009 indicated that 74 percent of the State Conservation District lands, including the ATST conservation area and the FAA site, is classified as barren, 11 percent is vegetated by Hawaiʻi montane-subalpine dry shrub land, less than 1 percent is vegetated by Hawaiʻi alpine dwarf shrub land, and the remaining 14 percent is classified as developed (including developed, open space, developed low intensity, and developed medium intensity) (NSF, 2009). In general, shrub lands are sparsely vegetated with dwarf native shrubs. Vegetation cover and stature are limited by harsh environmental conditions. Vegetation cover is generally less than 10 percent and vegetation is generally shorter than 3 feet tall (NSF, 2009). A 2010 survey of the ATST conservation area identified vegetation in this area as largely undisturbed native species consisting primarily of pūkiawe (*Leptecophylla tameiameiae*), naʻenaʻe (*Dubautia menziesii*), and mountain pili (*Trisetum glomeratum*). The terrain is steep and covered with volcanic ejecta consisting of lava, cinder, and ash (Pacific Analytics, 2010).

## 2.2.2 Fauna

### Park Road Corridor

Wildlife recorded within the Park and along the Park road corridor was collected from various surveys and observations and from anecdotal information from Park records. Fauna consists of avifaunal species, mammals, and invertebrates. Avian species likely to be found along the Park road corridor include, but are not limited to, quail (*Callipepla californica, Coturnix japonica*), francolin (*Francolinus* spp.), pheasant (*Phasianus colchicus*), chukar (*Alectoris chukar*), plover (*Pluvialis* spp., *Charadrius* spp.), sandpiper (*Actitius macularia, Calidris* spp.), dove (*Streptopelia chinensis, Geopelia striata, Zenaida macroura*), rock pigeon (*Columbia livia*), Hawaiian owl (Pueo; *Asio flammeus sandwichensis*), northern mockingbird (*Mimus polyglottos*), common myna (*Acridotheres tristis*), house finch (*Carpodacus mexicanus*), Hawaiʻi amakihi (*Hernignathus virens*)**,** iiwi, (*Vestiaria coccinea*), (Conant and Stemmermann Kjargaard, 1984). Several invertebrate surveys have been completed along the Park road and at the Park entrance station. Sixty species of arthropods were identified, both endemic and non-indigenous, none of which were found to be listed or proposed for listing as endangered or threatened (Pacific Analytics, 2010). Introduced fauna that could be observed along the Park road corridor include the chukar, the feral goat (*Capra hircus*), the Polynesian rat *(Rattus exulans)*, and the roof rat (*Rattus rattus*). The Indian mongoose (*Herpestes javanicus* or *Iole manakuke*) is occasionally observed. These are not federally listed or State listed as threatened or endangered species. Feral house cat (*Felis catus*) and house mouse (*Mus musculus*) are also found along the Park road corridor, with cats occasionally seen crossing the Park road (NSF, 2009).

### FAA Site

The FAA site is adjacent to HO on the Kolekole cinder cone and it is surrounded by what will be the 328-acre ATST conservation area near the summit of Haleakalā (NSF, 2011). Thus, surveys conducted for HO and the ATST conservation area are applicable to the FAA site as well. In addition, the FAA site was recently surveyed for botanical and invertebrate species (Pacific Analytics, 2010). Based on these surveys, wildlife found throughout the conservation and summit area, including the FAA site, consists of bird, mammal, and invertebrate species, including several federally and State-listed species; these species are discussed further below.

Avian species identified and recorded in this area generally include common, introduced bird species. Other introduced fauna occurring in the summit area include the feral goat (*Capra* sp.), feral house cat, house mouse, Polynesian rat, and the roof rat. The Indian mongoose is also occasionally observed.

A 2010 survey of the conservation area identified a variety of arthropod species including an endemic carabid beetle (Mecyclothorx) and two rare species of longhorn beetles of the genus Plagithmysus, but generally found the area to be less diverse than that in the adjacent HO. No federally listed or State-listed invertebrate species were detected during this survey (Pacific Analytics, 2010).

### 2.2.3 Threatened and Endangered Species

#### Flora

The Haleakalā silversword, which is federally listed as threatened, is known to occur on the FAA site, throughout the summit area, and in various areas of the Park. Critical habitat is present for both the Haleakalā silversword and many-flowered geranium (*Geranium multiflorum* or nohoanu), which is federally listed as endangered. About 2.5 acres of many-flowered geranium critical habitat and 1,031.6 acres of Haleakalā silversword critical habitat occur within the ROI adjacent to the Park road and within the FAA site. Primary threats to this habitat include ungulate impacts, such as trampling and browsing, and invasion by non-native plant species.

#### Fauna

Four listed fauna species are known to occur or have the potential to occur within the ROI: the Hawaiian petrel, the nēnē (*Branta sandvicensis* or Hawaiian goose), the Newell's shearwater, (*Puffinus auricularis newelli*, ʻaʻo, or Hawaiian shearwater*)*, and the Hawaiian hoary bat (*Lasiurus cinereus semotus* or ʻope ʻape ʻa). The threatened and endangered species occurring within the ROI are listed in Table 2-1.

TABLE 2-1
Threatened and Endangered Species Occurring within the ROI

<table>
<tr><th>Scientific Name</th><th>Common Name</th><th>Federal Status</th><th>State Status</th><th>Habitat</th><th>Date Last Observed</th><th>Likelihood of Occurrence</th></tr>
<tr><td colspan="7">Flora</td></tr>
<tr><td rowspan="2">Argyroxipbium sandwicense ssp. macrocephalum</td><td>Haleakalā silversword, ʻahinahina</td><td>Protected under ESA</td><td>Protected by State</td><td>May occur in alpine dry shrub land</td><td>Known currently</td><td>C</td></tr>
<tr><td colspan="6">Known to occur in Park and at summit.</td></tr>
<tr><td rowspan="2">Geranium multiflorum</td><td>Many-flowered geranium, nohoanu</td><td>Protected under ESA</td><td>Protected by State</td><td>May occur in alpine dry shrub land</td><td>Known currently</td><td>P</td></tr>
<tr><td colspan="6">No live or dead plants occupy the proposed ATST Project site although they exist in the vicinity.</td></tr>
</table>

TABLE 2-1
Threatened and Endangered Species Occurring within the ROI

| Scientific Name | Common Name | Federal Status | State Status | Habitat | Date Last Observed | Likelihood of Occurrence |
|---|---|---|---|---|---|---|
| **Fauna** | | | | | | |
| *Pterodoma sandwichensis* | Hawaiian petrel, ‘ua‘u | Protected under ESA | Protected by State | May occur in alpine dry shrub land | Known currently | C |
| | Most likely observed at the summit area during the nesting season, February to November. | | | | | |
| *Branta sandvicensis* | Hawaiian goose, nēnē | Protected under ESA | Protected by State | May occur in beach strands, grasslands, woodlands | Known currently | C |
| | Known to occur from sea level up to 8.200 feet (in Park and along Park road corridor, but less likely to occur at summit). | | | | | |
| *Puffinus auricularis newelli* | Newell’s shearwater | Protected under ESA | Protected by State | May occur in open native forests or mixed vegetation | Known currently | C |
| | Known to breed in West Maui and on the southern and eastern edges of the Park. Likely to occur along the Park road corridor; less likely to occur at the summit and ATST Project site. | | | | | |
| *Lasiurus cincereus* | Hawaiian hoary bat, ‘ope ‘ape ‘a | Protected under ESA | Protected by State | May be seen foraging in alpine shrub lands, near edges of native and non-native forests, over open water; may roost in native and non-native tree foliage | Known currently | C |
| | Known to occur in the lowlands of Haleakalā (in Park and along Park road corridor). | | | | | |

Likelihood of occurrence at HO:
C = Confirmed
P = Potentially may occur
U = Unlikely to occur

Source: FEIS, NSF, 2009

**Hawaiian Petrel.** The Hawaiian petrel, a federally and State-listed endangered bird species, is present in the Park summit area (Bailey, 2003). The largest known nesting colony of Hawaiian petrel is located in and around the Park (Simons and Hodges, 1998). No known burrows are located within the FAA site, as shown on Figure 2-1. There are about 220 burrows along the Park road corridor and outside the crater rim (Bailey, 2003). Many of these burrows are within the 50-foot Park road corridor. The Hawaiian petrel at the Park is the only population of seabirds in Hawai‘i’s national parks that is intensively monitored and managed. Since 1980, monitoring for Hawaiian petrel distribution and breeding success at the Park occurs annually as part of regular resource management activities. Hawaiian petrels in the Park nest in burrows, most of which are located along the steep cliffs of the western rim of Haleakalā Crater.

The Hawaiian petrel can be found nesting at Haleakalā from late February to November. The birds make their nests in burrows and return to the same burrow every year. The species distribution during their non-breeding season is not well known, but they are suspected to disperse north and west of Hawaiʻi, with very little movement to the south or east. Hawaiian petrels typically leave their nests just before sunrise to feed on ocean fish near the surface of the water and transition from the ocean back to Haleakalā just before sunset. These birds have limited vision, and their high speed and erratic nocturnal flight patterns may increase the possibility of collisions (Simons and Hodges, 1998). Hawaiian petrels are believed to navigate by stars, so man-made lights may confuse in-flight Hawaiian petrel. Evidence suggests these birds will fall to the ground in exhaustion after flying around lights, where they are susceptible to being hit by cars or attacked by predators (NSF, 2009). Hawaiian petrel have been seen on the Park road at night, and data indicate that Hawaiian petrel carcasses found show indications of being hit by vehicles on the Park road (Bailey, 2003). In addition to these hazards, confirmed causes of Hawaiian petrel mortality include nest collapse caused by wild goats; predation by native owls and introduced predators; collision resulting in road kill; collision with objects such as buildings, utility poles, fences, lights, and vehicles; and disturbance from road resurfacing activity (NSF, 2009).

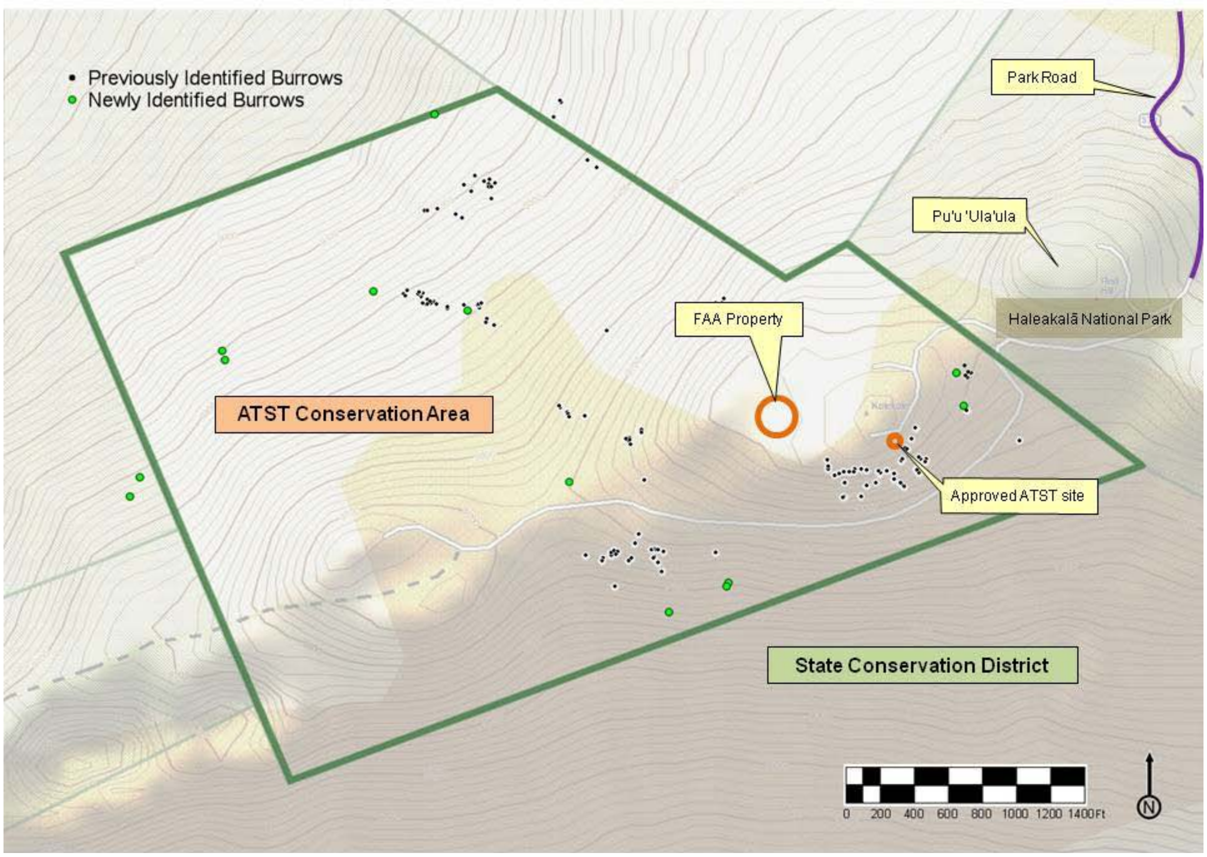



FIGURE 2-1
Identified Petrel Burrows at the Summit Area

**Nēnē**. The nēnē, or Hawaiian goose, is a federally listed and State-listed endangered species on Haleakalā and is the only extant species of goose not occurring naturally in continental areas. The nēnē formerly bred on most of the Hawaiian Islands, but breeding is currently restricted to the islands of Hawaiʻi, Kauaʻi, and Maui. Nēnē seem to be adaptable and are found at elevations ranging from sea level to almost 8,200 feet. Critical habitat has not been designated for the nēnē. The nēnē population on Maui is thought to consist of approximately 330 individuals. While the nēnē has been known to fly over the summit area of Haleakalā, it is outside the known feeding range of the bird. The nēnē is known to frequently occur along the Park road corridor, from the Park entrance to the Leleiwi Overlook and occasionally above, and in areas outside the Park on the lower slopes of Haleakalā. The nesting periods for this non-migrating, terrestrial goose occur from October to March. Nēnē are ground-nesters and their nests are usually well hidden in the dense shade of a shrub or other native vegetation. Once abundant, the nēnē population has declined. The primary causes of this decline were habitat loss, hunting during the nēnē breeding season (fall and winter), and the impacts of alien mammals introduced during Polynesian and western colonization.

Current potential threats, based on the USFWS classification of factors that may negatively affect a species, leading to its decline, as identified in Section 4(a) of the ESA, include the following: (1) the present or threatened destruction, modification, or curtailment of its habitat or range; (2) over-utilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) the inadequacy of existing regulatory mechanisms; and (5) other natural or manmade factors affecting its continued existence. Relating to the last threat, an average of one nēnē per year is killed by vehicles along the Park road (NSF, 2009).

The USFWS Draft Revised Recovery Plan for the nēnē depicts a high degree of threat to this species but the plan also indicates that there is a high recovery potential because the nēnē does not interbreed with domestic geese and does not conflict with regular human activities.

**Newell's Shearwater.** The Newell's shearwater is known to breed in west Maui (Cowan, pers. comm. 2011) and along the southern and eastern edge of the Park. Newell's shearwater can be heard vocalizing as they fly into these valleys from the lower elevations to the north and east (Bordenave, pers. comm. 2011; Fretz, pers. comm. 2011). Although the Project site is within the natural range of the Newell's shearwater, Newell's shearwater vocalizations have not been heard in the Project area. It is believed that these birds are unlikely to traverse the higher elevation portions of the Crater Rim to access the lower-elevation valleys. Seabirds may be attracted to vehicle headlights and exposed to vehicle strikes on the Park road. In the past 10 years, six downed Newell's shearwater have been detected on Maui (Spencer, pers. comm. 2011); no Newell's shearwater vehicle strikes have been reported in the Park (USFWS, 2011a).

**Hawaiian Hoary Bat.** The Hawaiian hoary bat is a federally listed endangered species that resides on the lower slopes of Haleakalā. The Hawaiian hoary bat is found on Hawaiʻi Island, Maui, Oʻahu, Kauaʻi, and Molokaʻi. On Maui, the bat resides in the lowlands of the Haleakalā slopes. Bats have been detected near the Park Headquarters Visitor Center, and Hosmer Grove. Even though several sightings have been reported near HO and the FAA site, it is unlikely that the bat is a resident of the area because of the relatively cold summit temperatures and the lack of flying insects in the area, which is the preferred food source (NSF, 2009). The Hawaiian hoary bat has been observed visually and acoustically along the Park road corridor at all elevations (NSF, 2009).

The nocturnal Hawaiian hoary bat is the only native terrestrial mammal known to occur in the Hawaiian archipelago, although other bat species have been found in subfossil remains. According to the USFWS, relatively little research has been conducted on this endemic Hawaiian bat, and data regarding its habitat and population status are very limited. It is believed that bats typically depart the roost shortly before sunset and return before midnight, although this is based on a small number of observations (USFWS, 1998). Bats are most often observed foraging in open areas, near the edges of native and non-native forests, over marine and fresh open water, and over lava flows. Roosting bats have been recorded using a variety of species including hala *(Pandanus tectorius)*, kukui *(Aleurites moluccana)*, pukiawe *(Styphelia tameiameaiae)*, java plum *(Syzygium cumini)*, ohia lehua *(Metrosideros polymorpha)*, and *Eucalyptus* sp. Bats have been observed feeding from 3 to 492 feet above ground and water. Most of the available data suggest that this elusive bat roosts solitarily in the foliage among trees in forested areas.

Habitat requirements may vary seasonally and with reproductive conditions, but specific behaviors are unclear. Breeding probably occurs mostly between September and December, with young being born in May or June. Hawaiian hoary bats do not migrate off-island, although seasonal elevation movements and island-wide migrations may occur. The lack of available roosting sites is believed to be a major limitation for many bat species, but other threats to this subspecies include direct and indirect impacts of pesticides, predation, alteration of prey availability (introduced insects), and roost disturbance (USFWS, 1998). The recovery plan for the Hawaiian hoary bat (USFWS, 1998) suggests the subspecies is experiencing a moderate degree of threat and has a high potential for recovery. Critical habitat has not been designated for this species.

## 2.3 Roadways and Traffic

The FEIS included the Roadways and Traffic analysis as part of the Infrastructure and Utilities discussion. For the purpose of this supplemental EA and to focus on the analysis, Roadways and Traffic is extracted for focused consideration. As noted in Section 1.7, other Utilities and Infrastructure resources would not be affected by proposed Project changes. Additional discussion of Infrastructure and Utilities is noted in Section 2.4 below.

The ROI considered in the Roadways and Traffic analysis includes the 10.1 miles of Haleakalā Crater Road (SR 378; part of the historic Haleakalā Highway) leading to the Park road, the Park road corridor, and roadways within HO and extending to the FAA site, as shown on Figure 2-2.

Various route options in the upper Kula community provide access to SR 378, a two-lane county- and state-maintained road. This road continues to the entrance of the Park. From this point, the Park road continues to the boundary adjacent to HO. This route provides the only access to HO and the FAA site.

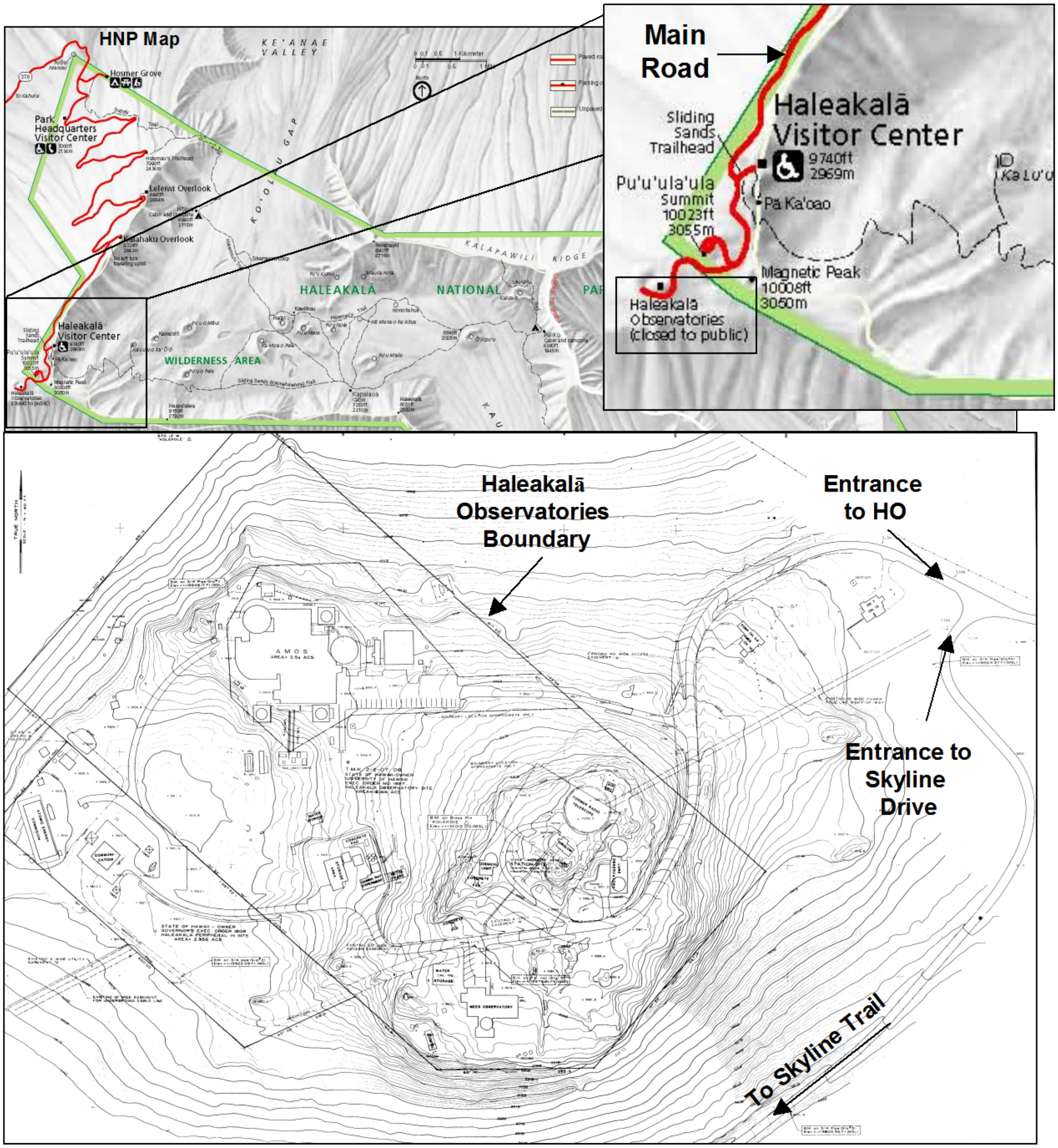



FIGURE 2-2
Park Road Corridor and HO Access Roads

Road conditions along the Park road were investigated by FHWA in early 2009 (FHWA, 2009). Conclusions of the FHWA roadway analysis stated that while a majority of the Park road had an estimated service life of 8 years or greater, a section of roadway between MP 11.2 and 14.8 was at or near the end of its service life and will continue to deteriorate at a faster rate over time. The ATST Project has committed in the FEIS (pages 4-15 and 4-132 to 4-133) to work with the Park and contribute to a future road repair project to compensate for regular wear and tear to the Park road from Project activities as well as roadway repairs when damage can be attributed to ATST Project activities.

The FHWA report also analyzed conditions of culverts along the Park road and the historic bridge. With regard to the condition of the culverts, the report identified two culverts, No. 26 and No. 64 as being vulnerable because they have “very little cover” and several other damaged or suboptimal conditions. With regard to the historic bridge, it was generally in sound condition and had a favorable load rating, despite being constructed in 1934. The Project has committed in the FEIS and the PA under Section 106 consultation of the National Historic Preservation Act to implement various measures to protect the Park road.

Visitors to the Park generate most of the vehicle traffic on the Park road, with the highest traffic volumes occurring during peak recreation hours. The high elevations combined with relatively steep grades and numerous switchback curves on the road limit vehicle speeds, particularly speeds of trucks and tour buses.

The FHWA study of Park road conditions also characterized current traffic volumes, based on statistics provided by the NPS. In the FHWA study (FHWA, 2009), Tables 9 and 10 show an average traffic volume from 2004 to 2008 of approximately 190,000 total vehicle trips annually, comprising approximately 443 daily passenger car trips and 30 daily bus trips. To quantify the level of wear that the road is exposed to, the FHWA study converts these traffic volume statistics to 11,021 equivalent single-axle loads (ESALs) annually.

## 2.4 Infrastructure and Utilities

The Infrastructure and Utilities analysis is focused on communication systems. The proposed Project changes do not change the wastewater and solid waste disposal, stormwater and drainage system, or electrical systems, which were included in the FEIS infrastructure and utilities section. Further, as noted in Section 2.3, Roadways and Traffic are extracted as a separate analysis. The ROI for infrastructure and utilities includes the FAA site and the HO complex.

Hawaiian Telcom provides telephone and other communications services for the HO complex. The FAA operates and maintains 50-watt transmitter and receiving equipment for remote air/ground interisland and trans-Pacific communications to and from aircraft. The antennas for these transmitters/receivers are located on two towers within the FAA property, approximately 800 feet west of the future ATST facility. The FAA site is on federally owned land within the State Conservation District. The USCG operates a 100-foot microwave radio transmission tower on the FAA property. Additionally, a U.S. Department of Energy (DOE) research facility is situated immediately west of HO and northwest of the FAA parcel, also on federally owned land.

The proposed Project changes include upgrades to the two FAA towers (see Figure 1-5). Each of the existing towers is 60 feet tall and each has a 10-foot-4-inch square base that tapers to 4-foot square at a height of 40 feet. The 4-foot square structure extends from the 40-foot to 60-foot height. A 10-foot square platform is at the top with a 3-foot-4-inch-high guardrail.

## 2.5 Visual Resources and View Planes

The ROI considered for visitor resources and view planes includes the summit and northwestern slopes of Haleakalā. The closest visitor vista point is Puʻu ʻUlaʻula (Red Hill Overlook). Approximately 1.7 million visitors annually are attracted to Haleakalā's various lookouts and vantage points for its spectacular vistas. Visibility of the HO facilities varies depending upon one's vantage point within the Park. As seen on Figure 2-3, several HO facilities are highly visible from Puʻu ʻUlaʻula. Some HO facilities are even visible from the Park entrance station to about the first mile of the Park road, the Park Headquarters Visitor Center, portions of the Park road corridor (particularly the last one-third of the Park road closest to the summit), and near the summit (Pa Kaʻoao or White Hill) from the Haleakalā Visitors Center.

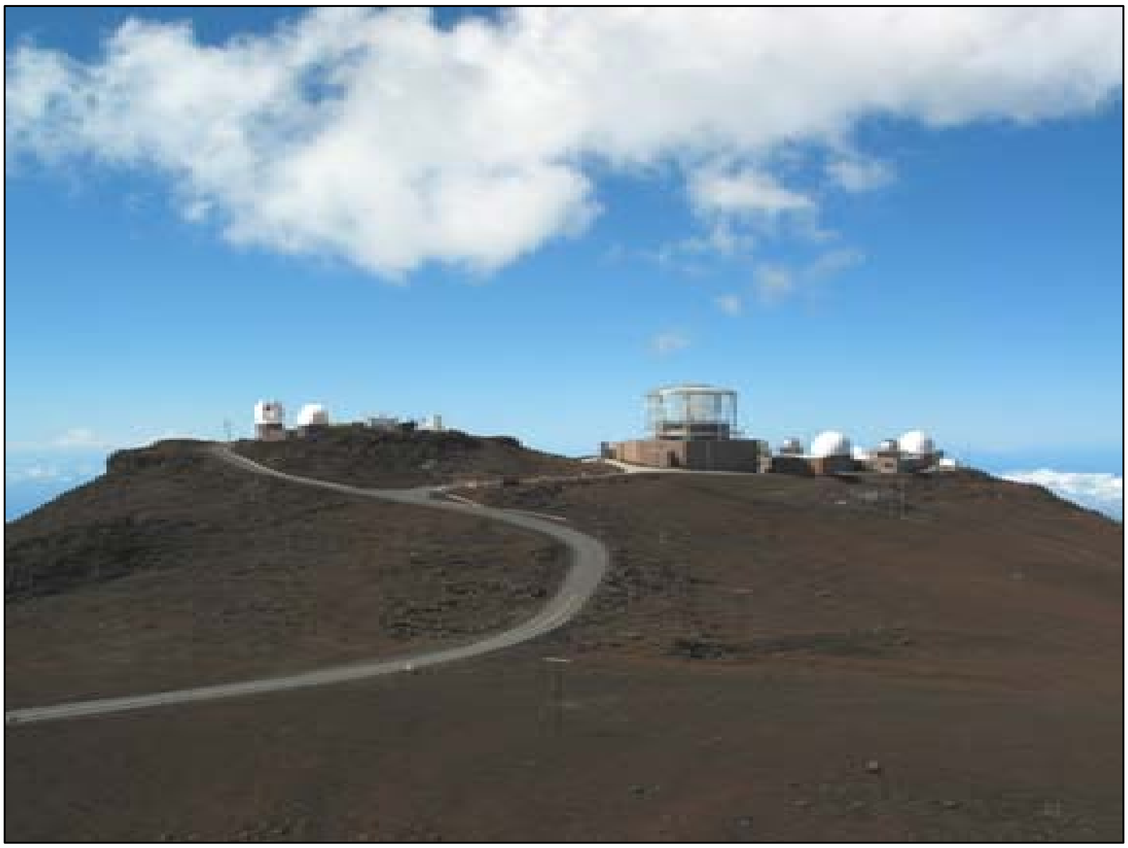


FIGURE 2-3
Current View of HO from Puʻu ʻUlaʻula

The FAA facilities and towers on the opposite side of Puʻu Kolekole, where HO sits, are not visible from Puʻu ʻUlaʻula, as shown on Figure 2-3. The towers and FAA facilities are otherwise undetectable from most locations on Maui because of topographic conditions, distance, and the minimalist design of the towers. With binoculars, the towers may be detectable from areas northwest of the summit, including Kula, Olinda, or Pukalani (NSF, 2009).

## 2.6 Visitor Use and Experience

The ROI is the Park and the Park road corridor; the FAA site is not accessible to the general public. As noted in the FEIS (NSF, 2009), the Park encompasses approximately 33,230 acres and attracts more than 1 million visitors annually to experience the natural and cultural wonders the Park was designated to protect. There are three primary visitor areas within the Park: the Summit area, the Wilderness area, and the Kīpahulu area (located on the eastern side of Haleakalā near the coast).

Visitors are attracted to the Summit and Wilderness areas because of the sightseeing, scenic driving, walking, hiking, camping, and picnicking opportunities. Popular visitor destinations along the Park road corridor include the following:

- Hosmer Grove between MP 10 and 11, for camping, picnicking, and hiking
- Park Headquarters Visitor Station at MP 11.2, for visitor information and restrooms
- Halemauʻu Trailhead at MP 14.8, for hiking into Haleakalā Crater
- Leleiwi Overlook between MP 17 and 18, vista
- Kalahaku Overlook between MP 18 and 19, vista
- Haleakalā Visitor Center at MP 20.3, vista, visitor information, restrooms, and Sliding Sands Trailhead
- Pa Kaʻoao (White Hill) trail near the Haleakalā Visitor Center for viewing into Haleakalā Crater
- Puʻu ʻUlaʻula (Red Hill Overlook) at MP 21.2, vista.

## 2.7 Geology, Soils, and Topography

The ROI for the supplemental topography, geology, and soils analysis is the FAA site based on proposed earth work associated with the proposed tower upgrades. As noted in the FEIS, the summit of Haleakalā is above 10,023 feet above sea level (ASL). The FAA site ranges from approximately 9,920 feet ASL at the west side and 9,960 feet ASL on the east side of the site. The site is unpaved, barren, and most of the site ground surface is heavily disturbed.

The area where the FAA site is located is on the rim of the volcano crater, estimated to have been formed 120,000 to 150,000 years ago. Soils at the site are classified as crushed cinder and are susceptible to erosion. Maui County is designated as seismic Zone 2B in the 1997 Uniform Building Code (USCG, 2006).

## 2.8 Air Quality

The ROI for determining the affected environment for air quality includes the summit of Haleakalā and the Park Road corridor. As noted in the FEIS, it is considered that all areas in Hawaiʻi comply with federal and state ambient air quality standards; no areas of Hawaiʻi are classified as nonattainment or maintenance areas. Therefore, all of Maui, including

Haleakalā, is currently an attainment area for EPA "criteria" pollutants, which include sulfur dioxide, nitrogen oxides, carbon monoxide, ozone, lead, and certain particulate matter. Furthermore, the Park is categorized as a Class 1 area under the Clean Air Act's Prevention of Significant Deterioration Program, a category the EPA reserves for the most pristine areas of the country in order to maintain the excellent level of air quality already attained (NSF, 2009).

Another contributing factor to the excellent air quality at the summit of Haleakalā is the favorable meteorological conditions, including a temperature inversion layer that rings the mountain at an elevation of approximately 5,000 and 7,000 feet ASL. This inversion layer stabilizes the atmosphere above the basin and limits airborne pollutants from rising to the summit, including those from the largest source of air pollution in the area, Kilauea Volcano on the island of Hawaiʻi. Additionally, prevailing trade winds from the northeast are persistently gusty at the summit, which accelerate the dilution of locally generated air emissions. Ambient winds of 20 to 50 miles per hour are commonly reported at the summit, creating turbulence and accelerating the atmospheric dispersion.

The relatively limited commercial or industrial development on Haleakalā results in few local anthropogenic (man-made) emission sources with the potential to affect air quality at HO. However, because the natural substrate at HO and the adjacent FAA and DOE properties is a mixture of fine volcanic sand and cinders, a small amount of naturally occurring fugitive dust from the finer material is released when the substrate is disturbed. The primary sources of anthropogenic pollutant emissions at the summit are the intermittent activities associated with existing research facility operations. These include low-impact mobile emission sources, such as vehicle traffic to and from the summit, as well as stationary source emissions resulting from periodic testing of diesel-fueled emergency generators. General maintenance activities at HO and on the adjacent FAA and DOE properties likewise result in temporary and low-impact emissions. For example, mirrors at observatories are periodically recoated, and this produces short-duration air emissions well below those requiring a State permit. These activities were analyzed in the FEIS (NSF, 2009).

## 2.9 Noise

Changes in noise conditions evaluated in the FEIS would only occur as a result of construction-related traffic and FAA tower upgrades. Other conditions from construction, stationary sources associated with facility operations, and operational traffic would not change. This noise analysis focuses on conditions within the Project area that may be affected by the proposed changes in traffic vehicle load class, as noted in Section 1.6.1, including construction traffic associated with the FAA tower upgrade activities.

The ROI for the noise analysis is the summit of Haleakalā, the Park road corridor and areas within the Park from which construction traffic-related noise and FAA tower upgrades would be audible.

### 2.9.1 Fundamentals of Noise

Consistent with the FEIS, this section provides an overview of the fundamentals of noise. Noise is defined as unwanted sound. There are several ways to measure noise, depending on the source of the noise, the receiver, and the reason for the noise measurement. The technical noise terms used in this report are presented in Table 2-2.

TABLE 2-2
Definitions of Acoustical Terms.

| Term | Definitions |
|---|---|
| Ambient Noise Level | The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location. |
| Decibel (dB) | A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the measured pressure to the reference pressure, which is 20 micropascals. |
| A-weighted Sound Pressure Level (dBA) | The A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear. The A-weighting scale measures sound in a similar fashion to how a person perceives or hears sound, thus achieving very good correlation in terms of how to evaluate acceptable and unacceptable sound levels. All sound levels in this report are A-weighted. |
| Equivalent Sound Level ($L_{eq}$) | A-weighted sound levels are typically presented as the equivalent sound pressure level ($L_{eq}$), which is defined as the average noise level, on an equal energy basis for a stated period of time, and is commonly used to measure steady state sound or noise that is usually dominant. Equivalent Sound Level is considered to be related directly to the impacts of sound on people since it expresses the equivalent magnitude of the sound as a function of frequency of occurrence and time. |

The impacts of noise on people can be divided into three general categories:

- Subjective impacts of annoyance, nuisance, and dissatisfaction
- Interference with activities such as speech, sleep, learning[3]
- Physiological impacts such as startling and hearing loss

The general human response to changes in noise levels that are similar in frequency content (for example, comparing increases in continuous [$L_{eq}$] traffic noise levels) are summarized below:

- A 3-dB change in sound level is considered a barely noticeable difference.
- A 5-dB change in sound level will typically be noticeable.
- A 10-dB change is considered to be a doubling in loudness.

### 2.9.2 Existing Environment

As stated in Section 2.3, Roadways and Traffic, high volumes of vehicular and bus traffic traverse the Park road each year. The FHWA HALE Road Report (dated 2007 and was appended to and incorporated into the FEIS), Table 9 of the concluded that approximately 22 cars and 0.89 bus per hour entered the Park and used the Park road, resulting in an approximate daytime baseline noise level from visitor traffic of 47 A-weighted sound pressure level (dBA), similar to that of a typical rural setting (NSF, 2009).

[3] It has been noted that quietness at the summit area ensures that visitors and practitioners are able to experience the natural surroundings, in which the dominant sound is wind.

Existing noise conditions at the summit of Haleakalā vary, depending on location, wind conditions, and the nature of nearby noise sources. Previous sound level measurements conducted at HO indicated truck traffic as the primary mobile noise source. Moderate wind speeds at the summit had instantaneous noise levels measured in the range of 45 to 50 dBA, while construction-related vehicles (general) were recorded at 82 to 93 dBA at a distance of 50 feet. Natural sound levels in the Wilderness area, excluding wind or other ambient sources, are typically 10 dBA (NSF, 2009).

Existing noise conditions generated at the FAA facility is infrequent, generally once per month, as a result of maintenance of an onsite emergency generator. These tower facilities are not otherwise noise generating sites.

No permanent noise-sensitive human receptors are within the ROI, such as residences, schools, hospitals, or other similar land uses where people generally expect and need a quiet environment. Native Hawaiians, however, practice traditional and cultural practices at various locations on Haleakalā, including areas within the ROI. Visitors to the Park stop along the side of the road at vista points and at various recreational locations and trailheads along the corridor.

SECTION 3

# Environmental Consequences

This chapter evaluates the potential environmental impacts on the natural and human environments of the proposed actions and the No-Action Alternative. Consistent with the FEIS (NSF, 2009), each section below describes the methodology used for impact analysis and factors used to determine the significance of impacts (40 CFR 1508.8). Beneficial and adverse impacts on each affected resource are described, including direct and indirect impacts. Direct impacts are caused by a proposed action and occur at the same time and place, while indirect impacts are caused by a proposed action but occur later in time or at a distance from the proposed measures. Following the description of the proposed Project impacts, Section 3.7 discusses whether the proposed actions would contribute to cumulative impacts on this resource.

To determine whether an impact is major, CEQ requires the consideration of context and intensity of potential impacts (40 CFR 1508.27). Context normally refers to the setting, whether local or regional, and intensity refers to the severity and duration of the impact. Each resource has its own impact intensity standards, which are listed and explained in tables under each resource section. Impacts are categorized under one of four levels of significance: negligible, minor, moderate, or major. For the purpose of this analysis, no impact and negligible impact are synonymous. Impact duration is expressed as short-term and long-term, each of which is defined for each resource methodology.

# 3.1 Cultural, Historic, and Archeological Resources

Information to evaluate impacts relevant to this section has been obtained through review associated with the FEIS planning process, PA, and Section 106 consultation efforts. In determining the level of impacts on cultural, historic, and archeological resources, the information obtained has been considered. Because the FAA tower upgrades would not affect cultural, historic, and archeological resources and no archeological or historic resources have been identified on the FAA site (USCG, 2006; CKM Cultural Resources, 2006), only the modifications to construction vehicle load class are analyzed in this section. The ROI for cultural, historic, and archeological resources is the Park road corridor.

## 3.1.1 Impact Assessment Methodology

Impacts are described by the level of intensity they have on cultural, historic, and archeological resources and are categorized as negligible, minor, moderate, or major. The levels of effect to the resources under Section 106 are also provided. For this analysis, these terms are defined as shown in Table 3-1 and are consistent with the FEIS analysis:

TABLE 3-1
Impact Intensity Descriptions for Cultural, Historic, and Archeological Resources

| Impact Intensity | Intensity Description |
|---|---|
| Negligible | Effect is at the lowest levels of detection with neither adverse nor beneficial consequences and would neither alter resource conditions, such as traditional access or site preservation, nor the relationship between the resource and the affiliated group’s body of practices and beliefs. This is analogous to a determination of *no effect* under Section 106 of the NHPA. |
| Minor | Adverse impact — results in little, if any, loss of integrity and would be slight but noticeable, but would neither appreciably alter resource conditions, such as traditional access or site preservation, nor the relationship between the resource and the affiliated group’s body of practices and beliefs. This is analogous to a determination of *no adverse effect* under Section 106 of the NHPA. |
| Moderate | Adverse impact — disturbance of a site results in loss of integrity, and impacts would be apparent and would alter resource conditions. There would be an interference with traditional access, site preservation, or the relationship between the resource and the affiliated group’s practices and beliefs, even though the group’s practices and beliefs would survive. Also included are major impacts that have been mitigated to reduce their intensity under NEPA CEQ 1508. 20 from major to moderate. The determination of effects for Section 106 would be *adverse effects*. |
| Major | Adverse impact — disturbance of a site results in loss of integrity, and impacts would alter resource conditions. There would be a block to, or great effect on, traditional access, site preservation, or the relationship between the resource and the affiliated group’s body of practices and beliefs, to the extent that the survival of a group’s practices and/or beliefs would be jeopardized. This is analogous to a determination of *adverse effect* under Section 106 of the NHPA, and measures to minimize or mitigate adverse effects that would reduce the intensity of impacts under NEPA CEQ 1508.20 from major to moderate cannot be agreed upon. |

**Duration:**

Short-term = Occurs only during the proposed ATST Project construction period
Long-term = Continues after the ATST Project construction period

## 3.1.2 Proposed Actions Alternative

### Modification to Construction Vehicle Load Class

As stated in Section 1.6.1, wide loads are defined as any load that exceeds the HDOT limit of 9 feet. In cases where vehicles are transporting extremely wide loads (18 to 24 feet), road closures are required to allow full, unimpeded use of the road. The FEIS and associated PA estimated that up to 25 extremely wide truckloads would warrant full closure of the Park road to visitor traffic in order to ingress and egress traffic during the full ATST construction duration.

Proposed changes to the type of construction vehicle used for the construction of the ATST Project on the historic Park road corridor would result in an additional 200 wide load vehicles; however, these additional loads would not require the complete closure of the Park road. Wide load construction vehicles would require oncoming traffic to pull over so they can safely pass and to avoid impacts to features of the historic road. The existing 5 inbound and 5 outbound paved pull-off locations on the Park road are shown on Figure 1-4. Traffic monitors would be staged at each pull-off location to direct motorists, a pilot vehicle would precede all wide-load vehicles whether the Park road is closed or not, and appropriate HDOT permits and signage would be obtained and identified in the TMP.

With this mitigation measure, in addition to the mitigation measures described in the FEIS and PA, the effects on cultural, historic, or archeological resources within the Park road corridor associated with implementing the proposed Project changes are expected to be the same as described in the FEIS (pages 4-19 and 4-20): negligible to minor, adverse, short- and long-term, and direct. The proposed changes would be consistent but would not add additional adverse impacts on cultural, historic, and archeological resources. Specifically, all construction vehicles would meet bridge load weight limits. These limits would be verified by the Park prior to entering the Park. No off-road use would occur, and road conditions would be monitored. Larger vehicles have the potential to degrade the roadway and other historic resources along the corridor. As noted in FEIS Mitigation Measure MIT-7 and PA Measures III.A and III.H, NSF will obtain photo documentation prior to and after construction to record changes. NSF, through its awardee AURA/NSO, has agreed to fund a future road repair project to compensate for regular wear and tear to the Park road from ATST Project activities as well as roadway repairs when damage can be attributed to ATST Project activities (NSF, 2009; NSF, 2010a; Thielen, 2009).

NSF will seek to modify the PA to reflect the additional 200 wide-load vehicles.

## 3.1.3 No-Action Alternative

### Modification to Construction Vehicle Load Class

Impacts to cultural, historic, or archeological resources under the No-Action Alternative would be the same as those noted in the FEIS (pages 4-14, 4-15, and 4-19). Mitigation measures noted in the FEIS and associated Section 106 PA would be implemented under the No-Action Alternatives.

# 3.2 Biological Resources

This section identifies potential direct and indirect biological impacts that may result from implementing the proposed Project changes to the ATST Project or the No-Action Alternative. The methods and significance criteria used in this analysis to determine the intensity and extent of impacts on listed species that may result from modifications to construction vehicle load class and FAA tower upgrades are described in the following subsections.

## 3.2.1 Impact Assessment Methodology

The methods used to determine whether proposed Project changes would have impacts on biological resources are as follows:

1. Review and evaluate existing and past actions to identify which actions within the ROI have resulted in diminished health, diversity, or population of biological resources, in order to evaluate the action's potential impacts on biological resources.
2. Review and evaluate the proposed Project changes in contrast to the previously evaluated ATST Project, to determine the potential for impacts on biological resources.
3. Incorporate USFWS consultation findings with regard to likelihood to affect biological resources.
4. Assess the compliance of the proposed Project changes with applicable federal, state, or county regulations that apply to preservation of biological resources.

This analysis does not change or replace the FEIS analysis or conclusions (NSF, 2009); rather, it supplements the analysis by assessing potential biological impacts of the proposed Project changes. Impacts on biological resources were evaluated by determining sensitivity, significance, or rarity of each resource that would be adversely affected by the ATST Project. Factors considered in determining whether an alternative would have an impact on biological resources include the extent or degree to which its implementation would do any of the following:

1. Substantially affect a rare, threatened, or endangered species or its habitat (ESA 1973, Section 7 (a) 2, Interagency Cooperation).
2. Cause the "take" of a highly sensitive resource, such as a threatened, endangered, or special-status species.
3. Result in non-concurrence with the NSF based on a determination of No Adverse Impact in the Informal Consultation Document by the USFWS.
4. Reduce the population of a sensitive species, as designated by federal and state agencies, or a species with regional or local significance by reducing numbers; altering behavior, reproduction, or survival; or by destroying or disturbing habitat.
5. Have an adverse impact on Hawaiian petrel habitat.
6. Conflict with Hawaiʻi Coastal Zone Management Program policies.

7. Introduce or increase the prevalence of Alien Invasive Species (AIS).
8. Cause long-term loss of or impact on a substantial portion of local habitat.

The thresholds of change for the intensity of an impact are defined in Table 3-2.

TABLE 3-2
Impact Intensity Descriptions for Biological Resources

| Impact Intensity | Intensity Description |
|---|---|
| Negligible | The alternative would not affect biological resources or the impact would be below or at the lower levels of detection. |
| Minor | The alternative would result in a detectable change to biological resources; however, the impact would be small, localized, and of little consequence. |
| Moderate | The alternative would result in a readily apparent change to biological resources over a relatively wide area. Mitigation measures would be used to offset adverse impacts and likely be successful. |
| Major | The alternative would result in a substantial change to the character of the biological resource over a large area. Extensive mitigation measures to offset adverse impacts would be needed to reduce impacts, and their success could not be guaranteed. |

**Duration:**

Short-term = Occurs only during the ATST Project construction period
Long-term = Continues after the ATST Project construction period

## 3.2.2 Proposed Actions Alternative

As described above, two Project changes are being proposed: (1) modification to the construction vehicle load class and (2) FAA tower upgrades. Of these two actions, only the latter would result in potential new impacts not discussed in the FEIS. A BO is being prepared by the USFWS finding that the proposed ATST Project, including both proposed project changes analyzed in this supplemental EA, may affect but is not likely to adversely affect the endangered hoary bat, the threatened Newell's shearwater, the Blackburn's sphinx moth, the endangered *Geranium multiflorum*, the Haleakalā silversword, or critical habitat for the Haleakalā silversword or *Geranium multiflorum*. Further, the USFWS has found that the Project is not likely to appreciably reduce the likelihood of both the survival and recovery of the Hawaiian petrel or the nēnē in the wild. Mitigation and conservation measures have been developed to avoid the potential for take and to avoid adverse impact of these species and a monitoring plan has been developed to document the level of take and the success of mitigation during the ATST construction period. Measures relevant to the proposed Project changes are included herein and otherwise adopted as part of the USFWS BO (USFWS, 2011a; 2011b).

### Modification to Construction Vehicle Load Class

No additional impacts to botanical resources would occur as a result of modification to the construction vehicle load class, because proposed changes do not result in increased traffic volume, and vehicles would be confined to existing roadways and designated pull-offs as noted in the FEIS. The effects on botanical resources within the Park road corridor associated with implementing the proposed changes to the ATST Project are expected to be same as described in the FEIS (page 4-23): negligible, adverse, long-term, and direct.

Impacts to wildlife species, including threatened and endangered species, could occur as a result of collision with vehicular traffic associated with ATST construction. Proposed changes to the vehicle fleet would not increase the traffic volume and would not introduce additional impacts on these species.

Abandonment of nēnē nests resulting from disturbance and collapse of petrel burrows in the summit area are possible as a result of vibration induced by construction vehicles and equipment. These impacts would not be increased based on the modification to construction vehicle load class.

Threats to the Hawaiian petrel and nēnē persist as a result of various cumulative activities. Construction activities that could induce ground vibration or loud noise, such as diesel engines (Class 8 and larger), could adversely affect Hawaiian petrel nesting and fledgling success. To offset the increase in noise, construction vehicles to be used for the ATST Project would be fitted with mechanical technologies that reduce combustion noise and minimize noise effects on the petrel to a negligible, adverse, and short-term level (FEIS pages 4-26, 4-138, and 4-140).

As stated previously, no new impacts to biological resources would occur as a result of modification to the construction vehicle load class. The proposed changes do not result in increased traffic volume, and trucks would be confined to existing roadways and designated pull-offs. No additional direct or indirect impacts to botanical resources would be anticipated. The modification to the construction vehicle load class would have no additive effect on the conclusions reached in the FEIS. Furthermore, as addressed in the FEIS, vehicles used during construction have the potential to introduce alien invasive species (AIS) to the environment by tracking these species on tires when entering the ROI. With the implementation of FEIS Mitigation Measure MIT-9 on all construction and operational vehicles (introduction of AIS prevention by washing and inspecting all vehicles, equipment, and materials, and implementing a programmatic monitoring plan for invertebrates, flora, and fauna during the Project), this potential for adverse impacts to wildlife species would be avoided.

Relevant elements of FEIS Mitigation Measure MIT-9 to reduce impacts on botanical resources include:

1. The Project will fund an agreed upon and qualified person to conduct reasonable biological monitoring activities as outlined by the USFWS in its informal consultation.

2. Alien Invasive Species Prevention – NPS vehicle, equipment, and materials washing and inspection protocol will be followed by the ATST Project. Further, as a backup to prevention, HO has implemented weeding throughout HO. This would alleviate AIS introduction if prevention is not successful.

3. Programmatic Monitoring – A programmatic monitoring plan for invertebrates, flora and fauna during the project would be implemented.

Additionally, FEIS Mitigation Measure MIT-9 would be employed to reduce impacts to nēnē from vehicle collisions on the Park road corridor. Relevant elements of FEIS Mitigation Measure MIT-9 to reduce impacts to nēnē include:

> Impact Prevention To Nēnē At Entrance Station – To enable wide loads to clear the Park entrance station, an area 12 feet wide, currently occupied by a septic tank, underground utilities, and native vegetation, would be temporarily developed into a drivable surface. To mitigate the potential impact on nēnē that frequent the area, widening of the shoulder would be completed outside the nēnē nesting season. Park staff would work with the ATST Project team to implement nēnē avoidance methods for this road-widening work. Avoidance measures would include survey of the site for nēnē prior to construction and installation of temporary "orange fencing" around the outer perimeter of the construction area to prevent nēnē from walking into the site during construction. The site will be restored with native vegetation after use to further reduce impacts on nēnē.

After completion of the FEIS, a series of conservation measures was developed in coordination with USFWS to further protect the nēnē and petrel (NSF, 2011). Those measures, which will be implemented by NSF, are as follows:

- **Traffic Calming Devices**. (Installation of temporary devices such as speed humps to minimize vehicle collisions with nēnē). Adverse impacts to the nēnē may occur as a result of ATST-related vehicles. Traffic-calming devices would slow the speed of traffic and limit the potential for the nēnē to be hit by a vehicle.
- **Nēnē Monitoring and Reporting**. (Includes informal identification of nēnē struck by vehicles along the Park road). Personnel associated with the ATST construction, operation, and implementation would work with Park staff to detect and report nēnē found struck along the Park road. Nēnē fatalities that, through adequate evidence, can be attributed directly to ATST construction or operation vehicles would be reported to the USFWS and NPS. Implementation of this measure is not expected to have any direct impact on biological resources but could indirectly affect nēnē by improving the collective understanding of threats to this species.
- **Year-Round Construction.** The FEIS (NSF, 2009) placed certain restrictions on construction activities generating noise and vibration during Hawaiian petrel incubation season (April through July). These restrictions were developed based on early informal consultation with USFWS. However, additional consultation and studies concluded that although continuing Project work through the incubation period would result in "take" of Hawaiian petrels, it would result in less overall reduction in breeding success. Implementing year-round construction would reduce the duration of adverse effects of noise, vibrations, traffic, and other construction activities on biological resources by approximately 1 year. Under this scenario, construction activities would continue through the Hawaiian petrel incubation period.

  In summary, modification to the construction vehicle class would have no additional effects on the conclusions reached in the FEIS (NSF, 2009) and Conservation EA (NSF, 2011). As described in the FEIS (NSF, 2009) and Conservation EA (NSF, 2011), with the implementation of the abovementioned mitigation and conservation measures, the impacts would be negligible and adverse.

### FAA Tower Upgrades

Although upgrades to the FAA towers were included in the FEIS as Mitigation Measure MIT-2, no upgrade or design details were available for analysis. As such, this supplemental EA includes an analysis of impacts not previously discussed. Only biological resources have the potential to be affected by these upgrades, as discussed here.

**Botanical Resources.** As discussed in Section 2.2, the FAA property is a disturbed site and therefore supports fewer native species and more weeds than surrounding undisturbed areas. Native and non-native plants may be present within the site, but upgrades to the existing towers would involve minimal ground disturbance at the base of the existing towers and, therefore, would not likely result in impacts to plant species. Because the threatened Haleakalā silversword is known to occur in the vicinity of the FAA site, the potential exists for construction vehicles and materials to disturb the habitat. The Haleakalā silversword would be identified and avoided by parking vehicles within previously disturbed areas and away from silversword habitat. Furthermore, as stipulated in FEIS Mitigation Measure MIT-9, a biological monitor will be onsite during ATST construction and associated actions such as the FAA tower upgrades. No new impacts to the Haleakalā silversword beyond the negligible impact described in the FEIS (page 4-23) would occur.

The potential exists for encroachment by non-native botanical species to occur during implementation of this action. As such, species could gain entry to the site via construction vehicles. Implementation of the relevant mitigation measures as part of FEIS Mitigation Measure MIT-9 (described above) would commit NSF to employing AIS monitoring, and avoidance and minimization measures to limit these effects. With the implementation of this FEIS mitigation, impacts on botanical resources resulting from the FAA tower upgrade would be negligible, adverse, and short-term.

**Fauna.** Because the only proposed ground disturbance associated with the FAA tower upgrades would be minimal grading and concrete foundation for a ladder at the base of each tower, the likelihood of direct impact on wildlife habitat would be low. Direct impacts to wildlife, including threatened and endangered species, could occur as a result of the tower upgrades by creating additional opportunities for avian species to strike the towers, swing arms, and antennas.

The endangered Hawaiian petrel is present throughout the summit area. As shown on Figure 2-1, burrows have been identified in the area, but not close to the tower site. Park personnel also have monitored the burrows during nesting season to observe which burrows are in use. In comments during the ATST EIS process, Park resource staff have said that the colony is growing and could expand. In accordance with FEIS Mitigation Measure MIT-9 and required mitigation included in the USFWS BO, qualified biological monitors would be onsite to survey for new burrows before construction activities begin. If possible, tower upgrades would be completed while the Hawaiian petrel is not present (December through the end of February). Furthermore, in accordance with FEIS Mitigation Measure MIT-6, construction activities would be restricted to daytime hours. As such, the potential impact to the Hawaiian petrel as a result of the FAA tower upgrade with the prescribed mitigation is considered negligible, adverse, and long-term because the tower upgrades would be permanent and long-term.

As mentioned above, while the nēnē has been known to fly over HO, the summit area is outside the known feeding range of the bird. Because the FAA tower upgrades would not occur within nēnē habitat, impacts to the nēnē would be negligible, adverse, and long-term. This represents the same level of impact as that assessed in the FEIS for construction of the ATST Project.

Hawaiian hoary bats have been observed at the summit but have not been known to reside at those higher elevations. There is a risk of a Hawaiian hoary bat striking the swing arms and high-gain antennas that would be installed on each of the two RCAG towers on the FAA site. However, as explained in the FEIS, no Hawaiian hoary bat carcasses have ever been found at HO, and because these creatures are well equipped to detect obstructions, it is unlikely that they would be victimized by an obstruction. Furthermore, the upgrades would be installed onto existing towers and surrounded by existing antennas. Therefore, these upgrades would not constitute substantial changes to the existing towers. Measures discussed above to avoid impacts to Hawaiian petrel at the FAA site would also protect the Hawaiian hoary bat. Moreover, the upgrades do not include installation of new outdoor lighting on the towers, which could confuse the species. With implementation of these measures, impacts to the Hawaiian hoary bat are expected to be negligible, adverse, and long-term.

### 3.2.3 No-Action Alternative

#### Modification to Construction Vehicle Load Class

Impacts to biological resources under the No-Action Alternative would be the same as those noted in the FEIS (NSF, 2009) and Conservation EA (NSF, 2011). FEIS mitigation measures and subsequent conservation measures noted above would be implemented under the No-Action Alternative. Effects on biological resources within the Park road corridor under the No-Action Alternative would be moderate, adverse, short- and long-term, and direct (FEIS pages 4-23 through 4-29).

#### FAA Tower Upgrades

Impacts to biological resources under the No-Action Alternative would be the same as those noted in the FEIS (NSF, 2009). No upgrades to the existing FAA towers would occur under this alternative, nor would any other construction occur on the FAA site. Measures noted in the FEIS, and in subsequent conservation measures EA, would be implemented under both alternatives to minimize construction-related impacts within and around the ATST Project area. Impacts to biological resources would remain negligible, adverse, and short- and long-term.

# 3.3 Roadways and Traffic

Because the FAA tower upgrades will require the use of construction vehicles, these are added to the calculations for the proposed modification to construction vehicle class load. Both proposed actions are analyzed in this section. As stated in Section 2.3, the ROI for consideration of impacts on roadways and traffic includes SR 378, the Park road corridor, and roadways within HO and extending to the FAA site.

## 3.3.1 Impact Assessment Methodology

The methods used to determine whether the ATST Project would have impacts on roadways and traffic are as follows:

1. Review existing and past actions with respect to their impacts on roadways and traffic.
2. Review and evaluate the Project change to identify its potential to adversely affect the roadways and traffic within the ROI, including damage to the existing infrastructure, capacity overload, or long-term degradation. The methods used include the following:
   a. Consultations and study results from the FHWA survey of Park road corridor (FHWA, 2009)
   b. Comparison with the FEIS (NSF, 2009) to identify supplemental impacts not previously analyzed
3. Assess the compliance of the Project change with applicable federal, state, or county regulations in particular, and permitting for transportation of wide or heavy loads.

The thresholds of change for the intensity of impacts on roadways and traffic are defined in Table 3-3.

TABLE 3-3
Impact Intensity Descriptions for Roadways and Traffic

| Impact Intensity | Intensity Description |
|---|---|
| Negligible | The action would not result in a change to existing roadways and traffic, or the change would be so small that it would not be of any measurable or perceptible consequence. |
| Minor | The action would result in a change to existing roadways and traffic, but the change would be small and localized and of little consequence. |
| Moderate | The action would result in a measurable and consequential change to existing roadways and traffic. Mitigation measures would be necessary to offset adverse impacts and would likely be successful. |
| Major | The action that would result in a substantial change to existing roadways and traffic; the change would be measurable and result in a severely adverse or significant beneficial impact. Extensive mitigation measures to offset adverse impacts would be needed, and their success could not be guaranteed. |

**Duration:**

Short-term = Occurs only during the ATST Project construction period
Long-term = Continue after the ATST Project construction period

## 3.3.2 Proposed Actions Alternative

### Modification to Construction Vehicle Load Class

As stated in Section 1.6.1, wide loads are defined as any load that exceeds the HDOT limit of 9 feet. In cases where vehicles are transporting extremely wide loads (18 to 24 feet), road closures would be required to allow full, unimpeded use of the road. These extremely wide-load vehicle trips requiring full road closure were previously analyzed in the FEIS (NSF, 2009).

Changes to the types of vehicles used for construction of the ATST Project would include an additional 200 wide-load vehicles, which would require oncoming traffic to pull over so they can safely pass; however, these additional loads would not require the complete closure of the Park road. The existing five inbound and five outbound paved pull-off locations on the Park road are shown on Figure 1-4. Traffic monitors would be staged at each pull-off location to direct motorists, a pilot vehicle would precede all wide-load vehicles whether the Park road is closed or not, and appropriate HDOT permits and signage would be obtained and identified in the TMP. Extremely wide loads would be preceded by two pilot vehicles.

The total number of vehicle trips estimated compared to that presented in the FEIS is described in Table 3-4, where the ESAL is calculated using a model employed by roadway design engineers to estimate the potential wear of traffic on a road. Larger ESALs mean more wear on the road. A detailed traffic projection comparing vehicle loads analyzed in the FEIS and updated requirements is provided as a appendix to this report. Trips necessary for construction of the FAA tower upgrades have also been included in this table.

TABLE 3-4
Equivalent Single-axle Loads and Estimated Vehicle Load Chart

| Vehicle Class (FHWA) | Load Equivalency Factor | Number of Trips (from FEIS) | Number of Trips (Proposed Actions) | ESALs (from FEIS) | ESALs (Proposed Actions) |
|---|---|---|---|---|---|
| 2 | 0.0004 | 11,695 | 9,905 | 5 | 4.0 |
| 3 | 0.004 | 11,700 | 9,920 | 47 | 39.7 |
| 4 | 1.25 | 4 | | 5 | |
| 5 | 0.5 | 50 | 185 | 25 | 92.5 |
| 6 | 1.0 | 292 | 934 | 292 | 934.0 |
| 7[a] | 1.5 | 487 | 250 | 731 | 375.0 |
| 8 | | | 18 | | 31.5 |
| 9[b] | 2.1 | 87 | 491 | 183 | 1,031.1 |
| 10 | 2.2 | 3 | 26 | 7 | 57.2 |
| 9 and 10 | | | 86 | | 189.2 |
| 12 | 3.3 | 31 | | 102 | |
| **Total Expected ESALs[c]** | | | | **1,397** | **2754.2** |
| **Total Number of Trips** | | **24,349** | **21,815** | | |

[a]Concrete trucks.

[b]Approximately 225 would be considered wide loads or extremely wide loads.

[c]ESALs Calculation:

11,021 = Average ESALs for the Park per year, over a 5-year period (FHWA, 2009)
459.0 = Total ESALs for ATST per year = 2,754.2 for a 6-year period, or 459.0 ESALs per year
4.2 percent = Percent of Total ESALs through the Park attributed to the ATST Project each year for 6 years

A TMP is being prepared for the ATST Project, including a description of the construction vehicle plan, vehicle permitting for wide and extremely wide loads, potential impacts on traffic conditions and visitor use, measures to manage traffic flow and safety, and mitigation strategies to offset these impacts. The TMP will also include a communication plan to coordinate construction periods with the Park, other tenants of Haleakalā including FAA, DOE, and other HO tenants, and visitors. Finally, the plan will include emergency access procedures for the event that emergency vehicles must access the area during construction. The Park will review and approve the TMP prior to construction.

As previously defined, the ROI for roadways and traffic includes the Park road corridor, the 10.1 miles of Haleakalā Crater Road (SR 378) and the roads within the HO property and extending to the FAA site. The road extending to the FAA site is analyzed separately from the other roadways to clearly distinguish potential impacts associated with Project construction and FAA tower upgrades.

SR 378, Park Road Corridor, Roadways at HO. The proposed Project change would result in an increase of 1,357.2 ESALs from the FEIS condition for a total increase of 2,754.2 ESALs from the existing condition over the 6-year construction period. Using the same calculation as that used in the FHWA report, an increase of approximately 4.2 percent additional ESALs would occur (calculation: 2,754.2/(11,021 X 6) = 4.2 percent). The volume of traffic associated with Project construction would also result in an average 1.6 percent increase over existing annual traffic volumes. The projected ATST Project traffic volumes compared to overall Park traffic use are presented in Table 3-5.

TABLE 3-5
Annual Park Use and Estimated ATST Traffic Volumes

| | Annual Traffic Volume | Percent Increase in Park Road Use |
|---|---|---|
| Average Annual Traffic Volume (2004-2008) | 190,000 | |
| **Projected ATST Project Traffic Volume Per Year** | | |
| Year 1 | 3,020 | 1.6% |
| Year 2 | 2,654 | 1.4% |
| Year 3 | 2,512 | 1.3% |
| Year 4 | 3,437 | 1.8% |
| Year 5 | 3,304 | 1.7% |
| Year 6 | 3,764 | 2.0% |
| Year 7 | 3,124 | 1.6% |

Source: FHWA, 2009

The projected increase in ESALs to 4.2 percent from 1.8 percent from the FEIS condition is still considered a relatively small increase; however, the potential to further degrade road conditions remains. Implementation of FEIS Mitigation Measure MIT-12 stipulates coordination between the Project and the Park concerning construction-related traffic in compliance with the Park SUP. As part of this mitigation, the ATST Project is preparing a TMP that will be approved by the Park. It will contain a detailed traffic management approach and coordination with NPS in order to achieve the necessary mitigation goals. MIT 12 and the associated TMP will minimize the potential for damage to road conditions, thereby reducing the magnitude of road degradation, and will mitigate conflicts with visitor use. The Project is committed in the FEIS and associated Section 106 PA to paying for repairs to any damage to roadways attributable to the Project, as well as contributing to a future road repair project to compensate for regular wear and tear to the Park road from ATST Project activities (NSF, 2009). With this mitigation, the impact on roadways and traffic would be small, localized, and able to be mitigated. Therefore, the impact is considered minor, adverse, short-term and long-term, and direct.

#### FAA Tower Upgrades

Consistent with the above analysis, the proposed FAA tower upgrades would require the use of up to four vehicles per day for a 3-week duration; no heavy equipment would be used. These have been added to the above traffic analysis and table, and would not result in additional impacts as described in the FEIS (page 4-133). The duration of these upgrades would occur concurrent with ATST construction, likely in the first year of construction. These impacts would be negligible, adverse, and long-term.

### 3.3.3 No-Action Alternative

#### Modification to Construction Vehicle Load Class

Impacts to traffic and roadways under the No-Action Alternative would be the same as those presented in the FEIS (NSF, 2009). Mitigation Measures noted in the FEIS and associated Section 106 PA would be implemented under the No-Action Alternative.

#### FAA Tower Upgrades

Under the No-Action Alternative, upgrades to the FAA towers would not occur. There would be no impacts to traffic or roadways.

# 3.4 Infrastructure and Utilities

This section identifies potential direct and indirect infrastructure and utilities impacts that may result from implementing the proposed Project changes to the ATST Project or the No-Action Alternative. As stated in Section 2.4, the ROI for consideration of impacts includes the FAA site and HO complex. The proposed modification to construction vehicle load class would not affect infrastructure and utilities. This proposed change is therefore not analyzed in this section.

## 3.4.1 Impact Assessment Methodology

The methods used to determine whether the proposed Project changes would have a major impact on infrastructure and utilities are as follows:

1. Review and evaluate the infrastructure of existing and past actions with respect to their impacts on communications to identify the action's potential impact on infrastructure and utilities.
2. Review and evaluate each action to identify its potential to adversely affect the communications infrastructure or utilities within and outside of HO. Consultations with FAA to address impacts on communications.
3. Assess the compliance of each action with applicable Federal, State, or County regulations in particular.

The thresholds of change for the intensity of impacts on infrastructure and utilities are defined in Table 3-6.

TABLE 3-6
Impact Intensity Descriptions for Infrastructure and Utilities

| Impact Intensity | Intensity Description |
|---|---|
| Negligible | The action would either not result in a change to existing infrastructure and utilities or the change would be so small that it would not be of any measurable or perceptible consequence. |
| Minor | The action would require or result in a change to existing infrastructure and utilities, but the change would be small and localized and of little consequence. |
| Moderate | The action would require or result in a measurable and consequential change to existing infrastructure and utilities. Mitigation measures would be necessary to offset adverse impacts and likely be successful. |
| Major | The action that would require or result in a substantial change to existing infrastructure and utilities; the change would be measurable and result in a severely adverse or beneficial impact. Extensive mitigation measures to offset adverse impacts would be needed and their success could not be guaranteed. |

**Duration:**

Short-term = Occurs only during the ATST Project construction period
Long-term = Continue after the ATST Project construction period

## 3.4.2 Proposed Actions Alternative

### FAA Tower Upgrades

The only change to existing infrastructure resulting from the implementation of the proposed Project changes would be the upgrades to the existing FAA RCAG towers. There would be no changes to or increased demand on existing utilities, including wastewater generation, or electricity. There would be no increase in stormwater runoff and no change in stormwater drainage. The minor and negligible, adverse and long-term impacts identified in the FEIS for these infrastructure and utility resources remain.

With regard to communication systems, the proposed upgrades to the FAA towers are necessary to offset a potentially major, adverse impact identified in the FEIS as a result of signal attenuation in the area where the ATST facility would intersect the line of FAA ground-to-air communications. The proposed upgrade would both avoid this communication interruption and improve FAA communications from the existing, aged towers. This upgrade would result in measurable and broad improvements to communication systems and safety and is therefore considered a moderate, beneficial, long-term, direct impact on infrastructure and utilities.

## 3.4.3 No-Action Alternative

### FAA Tower Upgrades

The No-Action Alternative would include the construction and operation of the ATST facility without the implementation of FEIS Mitigation Measure MIT-2, the proposed FAA tower upgrade.

The ATST Project would physically obstruct the geometric line-of-sight for signals from RCAG. These frequencies could experience signal attenuation, as discussed above. As such, No-Action Alternative has the potential to have a major, adverse, long-term impact on communication systems.

# 3.5 Visual Resources and View Planes

The proposed modification to construction vehicle load class would not affect visual resources and view planes and is therefore not analyzed in this section. The potential exists for FAA tower upgrades to be visible from certain locations on Maui, but not from the Park. The ROI for consideration of impact on visual resources and view planes includes areas of Maui on the northwestern side of Haleakalā.

## 3.5.1 Impact Assessment Methodology

The methodology used to determine whether the proposed FAA tower upgrades would have a significant impact on visual resources and view planes included reviewing existing and past actions within the ROI, to identify what impacts they have had on the visual resources, including views from wider Maui. This analysis is consistent with that included in the FEIS.

The intensity of the impact to views was assessed using the thresholds described in Table 3-7. These thresholds were used in the evaluation of views from areas throughout Maui.

TABLE 3-7
Impact Intensity Descriptions for Visual Resources

| Impact Intensity | Intensity Description |
|---|---|
| Negligible | The action would either not impact the visual quality of the landscape, or changes would be so slight that there would be no measurable or perceptible consequence to the observer. |
| Minor | The action would result in a detectable change to the visual quality of the landscape; this change would be localized, small, and of little consequence to the observer. |
| Moderate | The action would impact the visual quality of the landscape; this impact would be readily detectable, localized, with consequences at the regional level. Mitigation measures would be necessary to offset adverse impacts and would likely be successful. |
| Major | The action would result in a substantial change to the visual quality of the landscape with substantial consequences to the visitor use and experience in the region. Extensive mitigation measures would be needed to offset any adverse impacts and their success would not be guaranteed. |

**Duration:**

Short-term = Occurs only during the ATST Project construction period
Long-term = Continues after the ATST Project construction period

## 3.5.2 Proposed Actions Alternative

### FAA Tower Upgrades

No heavy equipment would be used for the proposed FAA tower upgrades. The towers are otherwise indistinguishable from most other locations outside of HO and the state and federal lands immediately adjacent to the FAA site. Areas northwest of the summit are the exception, including the communities of Kula, Olinda, and Pukalani, where the existing towers can be seen with the use of binoculars. FAA construction activities may be slightly noticeable from these distances with magnification. The final appearance of the tower, however, would not differ from the current view to the unaided eye. Therefore, the proposed FAA tower upgrades would have negligible, adverse, and short-term and long-term impacts on visual resources and view planes.

### 3.5.3 No-Action Alternative

#### FAA Tower Upgrades

Under the No-Action Alternative, no upgrades would occur on the FAA towers or property. There would be no visual impact.

# 3.6 Visitor Use and Experience

The ROI for consideration of impacts on visitor use and experience focuses on the area affected by the distinct changes from the FEIS analysis. Specifically, the ROI is the Park road corridor, which provides access to the ATST Project location and to various Park recreational spots, as noted in Section 2.4. Upgrades to the FAA tower are not visible from the Park and would not affect visitor use and experience, so the upgrades are not considered in this analysis. Only the modifications to construction vehicle load class are analyzed here because these proposed Project changes have the potential to affect visitor access within the Park.

## 3.6.1 Impacts Assessment Methodology

Consistent with the FEIS visitor use and experience analysis, this evaluation considered previous visitor use surveys, traffic studies, and existing and past actions along the Park road corridor to identify the potential impact on visitor use and experience that may result from the specific proposed Project changes being analyzed in this supplemental EA. Impacts on visitor use and experience could be considered adverse if they result in a decline in the quality or quantity of access to programs offered and existing recreational facilities at the Park. Park facilities include the grounds and structures within Park borders.

Direct impacts are those caused by the proposed ATST Project changes and occurring at the same time and place. For example, a decrease in the overall quality of use and experience for a visitor at the Park because of a change in Park hours or accessibility to the public resulting from road closures or temporary traffic delays required by ATST construction. Indirect impacts are those caused by an action occurring later or farther away, but at a reasonably well known time or place. If wildlife relocate away from the easily accessible visitor areas because of increased noise levels during construction or operation of the ATST, the lower number of wildlife sightings could be an indirect impact on visitor experience.

The thresholds of change for the intensity of impacts on visitors' services are defined in Table 3-8.

TABLE 3-8
Impact Intensity Descriptions for Visitor Use and Experience

| Impact Intensity | Intensity Description |
|---|---|
| Negligible | The alternatives would not affect visitor use and enjoyment of Park resources. Visitors would not likely be aware of the changes. |
| Minor | The alternatives would result in detectable changes to the character of the Park and would affect visitor use and enjoyment of park resources. The changes in visitor use and experience would, however, be slight and likely short-term. Other areas in the Park would remain available for similar visitor use and experience without degradation of Park resources and values. |

TABLE 3-8
Impact Intensity Descriptions for Visitor Use and Experience

| Impact Intensity | Intensity Description |
|---|---|
| Moderate | The alternatives would result in detectable changes to the character of the Park and would affect visitor use and enjoyment of Park resources. Changes in visitor use and experience would be readily apparent and likely long-term. Other areas in the Park would remain available for similar visitor use and experience without degradation of Park resources and values, but visitor satisfaction might be measurably affected (visitors could be either satisfied or dissatisfied). Some visitors who desire to continue their use and enjoyment of the activity, use, and experience would be required to pursue their choice in other available local or regional areas. Mitigation measures, if needed to offset adverse impacts, would be extensive and likely successful. |
| Major | Implementation of the alternatives would result in substantial changes to the character of the Park and would affect visitor use and enjoyment of Park resources. Changes in visitor use and experience would be readily apparent and long-term. The change in visitor use and experience from the proposed alternative would preclude future generations of some visitors from enjoying Park resources and values. Some visitors who desire to continue their use and enjoyment of the activity, use, and experience would be required to pursue their choice in other available local or regional areas. Extensive mitigation measures would be needed to offset any adverse impacts and their success would not be guaranteed. |

**Duration:**

Short-term = Occurs only during the proposed ATST Project construction period
Long-term = Continues after the ATST Project construction period

## 3.6.2 Proposed Actions Alternative

### Modification to Construction Vehicle Load Class

As noted in the FEIS (NSF, 2009), visitors to the Park would be affected by slow moving construction traffic over the construction period. This would affect visitor's access to recreation locations, trailheads, vista overlooks, and other popular attractions, and would also potentially alter the natural viewscape and soundscape of the Park in areas near the Park road. The FEIS and FHWA study of Park road conditions (FHWA, 2009) noted that the traffic increase resulting from the ATST Project would be small as compared to existing visitor traffic and noise levels resulting from these conditions would increase by approximately 3 dBA during construction. This analysis considers the effects that would result from a modification to the construction vehicle load class.

The principle effect on visitor use and experience from the proposed construction fleet modification would be the disruption of traffic flow along the Park road corridor as larger or wider construction vehicles access the ATST Project site. While the impact on traffic is analyzed in Section 3.3, this section focuses on the resulting impact on visitor access.

The total volume of traffic (25,000 trips) would not increase compared to that analyzed in the FEIS, however the frequency of larger or wider vehicles would be increased and distributed over a 6-7 year construction duration instead of a 7-8 year construction duration. A full traffic analysis is presented in Section 3.3, and a detailed schedule of vehicle class use over the construction duration is presented in the appendix.

Existing traffic conditions along the Park road generally result in slow traffic because of the steep slopes and extreme switchbacks. Slow moving construction vehicles would drive under the posted speed limits at switchbacks and grade changes. There are a limited number of allowable passing areas and traffic pull-offs; however, these have been identified and designated for use during the construction period, as shown on Figure 1-4. Wide-load vehicles, defined as any load that exceeds the HDOT limit of 9 feet, would require that oncoming traffic pull off at these designated locations as the larger construction vehicles pass. To this end, construction vehicle drivers would get a briefing about roadway conditions, driving speeds, and safety prior to traversing the Park road corridor. As discussed in Section 1.6.1, each pull-off location would be staffed with a traffic monitor to direct visitor traffic and communicate with Project drivers. Also, these areas would have signs posted notifying visitors of the vehicle activity, and the construction vehicles would be preceded by a pilot vehicle, according to HDOT protocol. As analyzed in the FEIS (NSF, 2009), extremely wide loads (18 to 24 feet wide), requiring full road closure, would be preceded by two pilot vehicles 2011.

Regarding safety, visitors to the Park sometimes park on one side of the road and walk across to scenic lookouts or to the Park Headquarters facility. Hitchhikers are also known to stand along the roadway. To avoid any potential for safety risk, construction vehicle drivers would receive a briefing on pedestrian patterns within the Park road corridor, and public service announcements and information would be distributed to visitors pertaining to safety precautions during the construction activity.

Impacts on visual resources and view planes resulting from construction-related traffic would not differ from those discussed in the FEIS [pages 4-109 and 4-110]. Construction vehicles would use the Park road intermittently. Impacts to soundscape in areas along the Park road may result from the increase in larger, diesel-powered vehicles, which have the potential to generate a louder noise output. In accordance with FEIS Mitigation Measure MIT-13, using construction vehicles with mechanical technologies that reduce the combustion noises would offset this impact on the soundscape. With this technology, effects on soundscapes would be largely the same as those analyzed in the FEIS (pages 4-111 and 4-141).

As stated in the FEIS (NSF, 2009), the ATST Project and the Park would continue to work collaboratively to minimize traffic disruption and delays to visitors and other users traversing the Park road corridor. The TMP would include outlining construction schedules, potential impacts on traffic conditions and visitor use, measures to manage traffic flow and safety, and mitigations to offset impacts to traffic and visitor use. This TMP will be reviewed and approved by the Park prior to construction. With the implementation of this plan, visitors would be aware of traffic conditions and able to plan their visits accordingly. This impact on visitor use and experience from the increase in larger and wider construction vehicles would increase the potential impact realized in the FEIS (page 4-111) and would be minor, adverse, direct, and short-term.

### 3.6.3 No-Action Alternative

#### Modification to Construction Vehicle Load Class

Impacts on visitor use and experience under the No-Action Alternative would be the same as those presented in the FEIS (pages 4-109 through 4-111). Mitigation measures noted in the FEIS would be implemented under the No Action Alternative.

# 3.7 Topography, Geology, and Soils

The ROI for the supplemental topography, geology, and soils analysis is the FAA site based on proposed earthwork associated with the proposed tower upgrades. The modified vehicle classifications used during construction would utilize the paved Park road corridor, consistent with the vehicle routes described in the FEIS. The 10 identified pull-off locations along the Park road are also paved and currently used as pull-offs. Proposed changes to the construction vehicle loads would not create additional impacts on geology, soils, or topography beyond those identified in the FEIS. These proposed changes are not considered further in this analysis. Only the proposed FAA tower upgrades, specifically the associated earthwork, are analyzed here because this proposed Project change has the potential to affect geology and soil conditions.

## 3.7.1 Impact Assessment Methodology

The methods used to determine whether the proposed Project changes would have a major impact on the topography, geology, and soils are as follows:

1. Review and evaluate existing and past actions to identify what impacts they have had on topography, geology, and soils within the ROI in order to evaluate the proposed change's potential impact on the topography, geology, and soils.
2. Review the historical data on topographic changes due to past and present actions.
3. Assess the compliance of each action with applicable Federal, State, or County regulations to ensure that any impacts of the proposed Project changes on topography, geology, or soils would not result in regulatory non-compliance.

The thresholds of change for the intensity of an impact are defined in Table 3-9.

TABLE 3-9
Impact Intensity Descriptions for Topography, Geology, and Soils

| Impact Intensity | Intensity Description |
|---|---|
| Negligible | The action would either not result in a change to the topography, natural physical resource, or soils, or changes would be so small that it would not be of any measurable or perceptible consequence. |
| Minor | The action would result in a detectable change to the topography, natural physical resource, or soils, but the change would be small, localized, and of little consequence. |
| Moderate | The action would result in a measurable and consequential change to the topography, natural physical resource, or soils. Mitigation may be needed to offset adverse impacts and would be relatively simple to implement and likely be successful. |
| Major | The action would result in a substantial change to the topography, natural physical resource, or soils. Extensive mitigation measures to offset adverse impacts would be needed and their success could not be guaranteed. |

**Duration:**

Short-term = Occurs only during the proposed ATST Project construction period
Long-term = Continues after the ATST Project construction period

## 3.7.2 Proposed Actions Alternative

### FAA Tower Upgrades

Upgrades to the FAA towers would be entirely on the existing towers and ground activities would be minor, not affecting geologic or soil conditions. Vehicle turnaround areas and material staging during the estimated 3-week installation and testing period would use disturbed areas of the site currently used by maintenance vehicles for the existing facilities. Although the site is susceptible to erosion, the upgrade activities would be short-term and on a small scale, not introducing substantial numbers of vehicles, staff, or earth movement. Implementation of the proposed FAA tower upgrades would not result in a change to topography, natural physical resources, or soils. Impacts on topography, geology, and soils would be minor, adverse, short-term, and direct.

## 3.7.3 No-Action Alternatives

### FAA Tower Upgrades

There would be no impacts on topography, geology, and soils under the No-Action Alternative because no upgrades to the two existing FAA towers would be made.

# 3.8 Air Quality

The ROI for consideration of air quality impacts of the proposed Project includes the summit of Haleakalā and the Park Road corridor because larger vehicles would be used along the state roads. The proposed upgrades to the FAA towers would not affect air quality; therefore, they are not analyzed in this section. Emissions from vehicles used for ATST construction, including tower upgrades, are considered collectively in this analysis.

## 3.8.1 Impact Assessment Methodology

The methods used to determine whether the proposed ATST Project would have impacts on air quality are as follows:

1. Review and evaluate existing and past actions with respect to their impacts on air quality from dust generation and emissions, in order to identify the action's potential impact on air quality.
2. Review and evaluate the proposed Project changes with respect to human health and hazardous air pollutant industrial hygiene criteria, to identify their potential to adversely affect the air quality within the ROI.
3. Assess the compliance of each alternative with applicable federal, state, or county regulations promulgated by or remanded to the Hawaiʻi Department of Health, and contained in the HRS.

The thresholds of change for the intensity of impacts on air quality are defined in Table 3-10.

TABLE 3-10
Impact Intensity Descriptions for Air Quality

| Impact Intensity | Intensity Description |
|---|---|
| Negligible | The action would either not result in a change to air quality or the change would be so small that it would not be of any measurable or perceptible consequence. |
| Minor | The action would result in a detectable change to air quality, but the change would be small, localized, and of little consequence. |
| Moderate | The action would result in a measurable and consequential change to air quality. Mitigation measures would be necessary to offset adverse impacts and would likely be successful. |
| Major | The action would result in a substantial change to air quality; the change would be measurable and result in a severely adverse or major beneficial impact. The ATST Project with these proposed changes would result in a substantial change to land use or the level and types of existing activities. Extensive mitigation measures to offset adverse impacts would be needed and their success could not be guaranteed. |

**Duration:**

Short-term = Occurs only during the ATST Project construction period
Long-term = Continues after the ATST Project construction period

## 3.8.2 Proposed Actions Alternative

### Modification to Construction Vehicle Load Class

Impacts on air quality associated with the modification to construction vehicle load class would occur from the increase in Class 5 and larger diesel-powered vehicles on state and county roads, the Park road corridor, and roads on and around HO and extending to the FAA site. These vehicles would generate low-level, intermittent exhaust emissions. Adverse impacts on air quality within the ROI, based on meteorological conditions, are expected to be temporary, intermittent, and at levels substantially below both human health and hazardous air pollutant industrial hygiene criteria. Furthermore, vehicles would use the paved Park road and paved pull-off surfaces and no earth disturbance would occur as a result of proposed Project changes. Impacts from proposed Project changes are expected to be the same as described in the FEIS (NSF, 2009, page 4-147). Impacts on air quality would be negligible, short-term, adverse, and direct. Measures outlined in the FEIS (NSF, 2009), including proper use of emission-control technologies and standard exhaust filtration devices on each of these construction vehicles, would further minimize emissions.

### FAA Tower Upgrades

Impacts from construction vehicles and equipment used for the proposed FAA tower upgrade activities would not be distinct from those discussed above. Up to four vehicles would access the site daily for a 3-week period, likely in the first year of ATST construction. The additional traffic, however, would not measurably add to the current level of vehicle emissions associated with existing HO operations and visitor traffic. In addition, no heavy equipment would be used.

Ground work associated with grading, the concrete foundation, and staging of equipment and materials on the FAA site may generate small amounts of fugitive dust. Consistent with ATST Project measures, to minimize fugitive dust emissions resulting from FAA activities, contractors would be required to comply with applicable State regulations under HRS 11-60.1-33, which require the implementation of "reasonable precautions" for controlling fugitive dust. Further, in accordance with the UH IfA Management Plan, the contractor would be required to employ strict dust suppression measures and best management practices. With these measures, the impact on air quality from the FAA tower upgrade activities would be the same as described in the FEIS (NSF, 2009): negligible, short-term, adverse, and direct.

## 3.8.3 No-Action Alternatives

### Modification to Construction Vehicle Load Class

Impacts on air quality under the No-Action Alternative would be the same as those presented in the FEIS (page 4-147). Mitigation measures noted in the FEIS would be implemented under the No Action Alternative.

### FAA Tower Upgrades

There would be no impacts on air quality under the No-Action Alternative because no upgrades to the two existing FAA towers would be made.

# 3.9 Noise

The ROI for consideration of noise impacts encompasses the summit of Haleakalā, the Park road corridor, and areas of the Park from which construction traffic-related noise and FAA tower upgrades would be audible.

## 3.9.1 Impact Assessment Methodology

### State of Hawaiʻi Noise Regulations

The Project area is zoned as a Class A district under these statewide community noise regulations (State of Hawaiʻi, HRS 11-46-4). Class A zoning districts include "all areas equivalent to lands zoned residential, conservation, preservation, public spaces, open space or similar type," and are the most restrictive of maximum allowable ambient noise levels.

The maximum allowable noise levels for nontransportation-related sources within Class A zoning districts are 55 dBA during daytime and evening hours (7 a.m. to 10 p.m.) and 45 dBA during nighttime hours (10 p.m. to 7 a.m.) at the property line. These noise limits are defined as levels that can be exceeded no more than 10 percent of the time in any 20-minute period, or $L_{10\ (20min)}$, and are adjusted upwards by 10 dBA for impulsive sources. Unlike many jurisdictions, Hawaiʻi does not provide an exemption for construction activities but does allow for a permit to be granted for projects that are "in the public interest and which may be subject to reasonable conditions as the director may prescribe."

### National Park Service Noise Abatement Policy

Management policy outlined by the NPS (2001) states that "the Service will take action to prevent or minimize all noise that, through frequency, magnitude, or duration, adversely affects the natural soundscape or other park resources or values, that exceeds levels that have been identified as being acceptable to, or appropriate for, visitor uses at the sites being monitored." Noise levels above the natural soundscape can affect the way that visitors experience a national park.

### Methodology

The methods used to assess the level of potential impact that the proposed Project changes would have on noise are as follows:

1. Review and evaluate existing and past actions with respect to noise that have resulted in impacts. Such a review could be used to identify the potential for adverse impacts resulting from noise (FEIS, Vol. II, Appendix M—USFWS Section 7, Informal Consultation Document, March 2007; and Appendix Q—Study of Vibration Due to Construction Activities at Haleakalā, July 8, 2009).

2. Review and evaluate the proposed modifications to construction vehicle load class from the perspective of expected noise, using industry standard methods to identify sound levels and their potential to adversely affect the environmental setting and its component parts within and adjacent to HO, including recreational activities and Native Hawaiian cultural practitioners. The sources for noise thresholds are from State standards.

3. Assess the compliance of each alternative with applicable federal, state, or county regulations for noise.

The thresholds of change for the intensity of impacts on noise are defined in Table 3-11.

TABLE 3-11
Impact Intensity Descriptions for Noise

| Impact Intensity | Intensity Description |
|---|---|
| Negligible | The action would result in either no change in the noise setting or an increase of less than 3 dBA, and the resulting levels are in compliance with applicable standards. A change of 3 dBA is generally considered the threshold of perceivable difference. |
| Minor | The action would result in an increase of between 3 and 10 dBA. |
| Moderate | The action would result in a measurable and consequential change to noise conditions. This change would be an increase of between 10 and 15 dBA. Mitigation measures would be necessary to offset adverse impacts and would likely be successful. |
| Major | The action would result in a substantially adverse change to noise conditions. This noise increase would be greater than 15 dBA and would exceed the State regulations. Extensive mitigation measures to offset adverse impacts would be needed and their success would not be guaranteed. |

**Duration:**

Short-term = Occurs only during the proposed ATST Project construction period
Long-term = Continues after the ATST Project construction period

## 3.9.2 Proposed Actions Alternative

### Modification to Construction Vehicle Load Class

The FEIS noise analysis included consideration of construction-related vehicular traffic along the Park road corridor. This analysis focuses on the increase in larger vehicles because the traffic volume would not increase.

Baseline conditions of vehicular traffic along the Park road corridor generate a noise level of approximately 47 dBA. In order for a clearly perceptible change in noise to occur, there must be an increase in decibel level of 5 to 6 dBA from the baseline conditions. As noted in the FEIS, even with a considerable number of construction vehicles added to the vehicular traffic per day and per hour along the Park road corridor as a result of the overall ATST Project, the maximum decibel associated with traffic would be 50 dBA. The proposed modification to vehicle class would result in larger vehicles that could be slightly louder; however, the difference would not be perceptible to Park visitors. As summarized in Table 3-4, the construction vehicle fleet would include modifications to certain load classes. The increase in larger, diesel-powered vehicles has the potential to generate a louder noise output as compared to the smaller gas-powered engines as a result of the diesel combustion process. To offset the increase in noise, construction vehicles to be used for the ATST Project would be fitted with mechanical technologies that reduce the combustion noises.

Further, at the peak construction periods when larger vehicles would be used, an average of 11 vehicles would use the Park road in any given month. By implementing FEIS Mitigation Measure MIT-13 (requiring noise-reduction technologies on all construction vehicles and equipment), these noise levels from increased construction traffic would be the same as described in the FEIS (NSF, 2009, page 4-141): minor, adverse, and short-term along the Park road corridor.

### FAA Tower Upgrades

Construction activities would be short-term and concurrent with ATST construction activities. FAA site work would be minimal by comparison and more than 0.5 mile from any public areas. Vehicles and equipment accessing the site for tower upgrades are included in the above analysis. No heavy equipment would be used for the upgrade activities, which would last only 3 weeks. Upgrade activities and testing would not noticeably change the noise setting. Noise impacts from the FAA tower upgrade activities would be negligible, adverse, short-term, and direct. No additional noise impacts than described in the FEIS (NSF, 2009) would result from the FAA tower upgrade activities.

## 3.9.3 No-Action Alternative

### Modification to Construction Vehicle Load Class

Under the No-Action Alternative, noise impacts would be the same as those noted in the FEIS (pages 4-138 and 4-141). Mitigation measures noted in the FEIS would be implemented under the No-Action Alternative.

### FAA Tower Upgrades

There would be no noise impacts under the No-Action Alternative because the two existing FAA towers would not be upgraded.

# 3.10 Cumulative Impacts

The CEQ NEPA-implementing regulations define cumulative impacts as the incremental environmental impacts of a proposed action when added to other "past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions." Cumulative impacts can result from individually minor, but collectively significant, actions taking place over time.

As noted in Section 1.1, this supplemental EA is tiered to the FEIS focusing on the potential impacts of the Project components that have been developed or changed since completion of that document. As such, by definition, the proposed actions would not contribute to cumulative impacts to those resources not affected by proposed changes, including land use and existing activities; water resources; hazardous materials and solid waste; socioeconomics and environmental justice; public services and facilities; and natural hazards. These resources are not addressed further.

To assess the cumulative impacts, the impacts to each resource were considered together with the impacts from past, present, and reasonably foreseeable future activities within the Project area. The cumulative analysis area is the same as that discussed in the resource-specific affected environment sections of this supplemental EA:

- **Cultural, historic, and archeological resources.** This portion of the Park road is historically important and eligible for listing on the NRHP – the cumulative study area is the Park Road corridor.
- **Biological resources.** Potentially affected by use of the Park road corridor and upgrades to the FAA RCAG towers – the cumulative study area is the Park road corridor and FAA site.
- **Roadways and traffic.** Potentially affected by proposed changes to the construction vehicle classification and schedule during the 6-year construction period – the cumulative study area is SR 378, the Park road corridor, and roadways around HO and the FAA property.
- **Infrastructure and utilities.** The FAA RCAG tower infrastructure and utility capability would be affected by the proposed Project changes—the cumulative study area is the FAA site.
- **Visual resources and view planes.** Potentially affected by upgrades to the FAA RCAG towers – the cumulative study area is the island of Maui.
- **Visitor use and experience.** Potentially affected by proposed changes to the construction vehicle classification and schedule during the 6-year construction period – the cumulative study area is the Park road corridor.
- **Topography, geology, and soils.** Potentially affected by upgrades to the FAA RCAG towers – the cumulative study area is the FAA site.
- **Air quality.** Potentially affected by proposed changes to the construction vehicle classification and schedule during the 6-year construction period and upgrades to the

FAA RCAG towers – the cumulative study area is the Park road corridor and the summit of Haleakalā.

- **Noise.** Potentially affected by proposed changes to the construction vehicle classification and schedule during the 6-year construction period and upgrades to the FAA RCAG towers – the cumulative study area is the Park road corridor and areas of the Park within audible range of the Park road and the summit.

The cumulative activities of other past, present, and reasonably foreseeable future activities in the area that are considered in this analysis are the same as those discussed in Section 4.17 of the FEIS (NSF, 2009), including the ATST Project. The ATST Project has now been approved and permitted, the conservation measures having been developed in coordination with USFWS after completion of the FEIS (NSF, 2011).

### 3.10.1 Cultural, Historic, and Archeological Resources

As noted in the FEIS, reasonably foreseeable future activities will require use of the Park road. These activities include construction, maintenance, and operation activities at HO, adjacent federal lands, and within the Park as well as visitor use within the Park. These activities considered cumulatively have the likelihood to degrade the historic Park road corridor, including the historic bridge and eleven culverts, and the potential to affect adjacent archeological resources. This impact is considered moderate, direct, and adverse. The Park monitors these effects and administers maintenance of these resources. The proposed Project changes would have similar impacts as those described in the FEIS (pages 4-19, 4-20, and 4-178) but would have the potential to further degrade the historic roadway and resources. The contribution of both the ATST Project and proposed Project changes when added to the effects of other Park uses would be further mitigated to a minor, adverse, short-term, direct impact by implementing FEIS Mitigation Measures MIT-7 and MIT-11. These measures include photo documentation of the roadway and commitment to repair inadvertent damage to these resources, in line with Department of Interior standards and FHWA recommendations.

### 3.10.2 Biological Resources

As described in the FEIS, construction equipment originating from other islands or the mainland could be infested by unwanted species when they arrive in Kahului. Vehicles used by the ATST Project and other facilities on Haleakalā for construction or operation, as well as continued visitor and maintenance within the Park, also have the potential to introduce AIS. This impact would be minimized with the implementation of the FEIS Mitigation Measure MIT-9, which involves the introduction of an AIS Prevention Program to be employed by ATST Project-related traffic along the Park road corridor. Further, requirements of the HO Management Plan and construction directives for the proposed ATST Project would provide for vehicle steam cleaning, invasive species inspections, and rapid response to onsite discoveries of introduced species. The Park further requires similar measures to be employed by vehicles entering the Park. Therefore, the Project contribution to impacts on botanical resources would be negligible, adverse, and short-term, and the overall cumulative impact is considered minor, adverse, and long-term. There would be no additive contribution from the proposed modification to construction vehicle load class or additional vehicles needed for FAA tower upgrades.

As a result of management within the Park, the most serious threats to the Haleakalā silversword have been virtually eliminated. Further, at the recommendation of the Park, NSF is sponsoring a Haleakalā silversword propagation and planting program to assist with rejuvenation of the species within the Conservation Area for ATST. Cumulatively, effects on the silversword are moderate, beneficial, and long-term.

Threats to the Hawaiian petrel and nēnē persist as a result of various cumulative activities. Construction activities that could induce ground vibration or loud noise, such as diesel engines (Class 8 and larger as shown in Table 3-4), could adversely affect Hawaiian petrel nesting and fledgling success. To offset the increase in noise, construction vehicles to be used for the ATST Project would be fitted with mechanical technologies that reduce the combustion noises and minimize noise effects on the petrel to a negligible, adverse, and short-term level. Hawaiian petrel mortality could result from birds abandoning burrows or failing to feed fledglings, or from the collapse of burrows. Mortality could also occur as a result of birdstrike on the ATST facility, construction equipment, or upgraded FAA tower components. Impacts will be eased through conservation measures developed by NSF, USFWS, and the Park, which are addressed in the *Environmental Assessment for the Issuance of an Incidental Take License and Proposed Conservation Measures Associated with the Advanced Technology Solar Telescope* (NSF, 2011) and FEIS Mitigation Measure MIT-9, which requires a biological monitor during construction, continued monitoring of the Hawaiian petrel, and construction practices identified through Section 7 consultation. With these measures, the contribution by either the ATST Project or the proposed Project changes to cumulative impacts on the Hawaiian petrel would be negligible, adverse, and short-term.

Increases in traffic along the Park road corridor resulting from the ATST Project or other activities on Haleakalā also could result in direct mortality to nēnē individuals as a result of collision with vehicles. FEIS Mitigation Measure MIT-9 and the conservation measures EA mentioned above include providing training about the presence of nēnē for construction crews using the Park road, erecting signs along the road where nēnē are identified, installing temporary traffic calming devices such as speed bumps where nēnē are identified to slow traffic, and continuing the monitoring and rehabilitation of the species. With this, the contribution by either the ATST Project or the additive contribution from the proposed Project changes as a result of larger vehicles associated with the ATST Project or additional vehicles required for the FAA tower upgrades to cumulative impacts on the nēnē would be negligible, adverse, and short-term, and ultimate recovery and rehabilitation could be beneficial.

Collision risk to the Hawaiian hoary bat or the Hawaiian petrel with construction equipment is also a risk and has been reviewed by the USFWS in a BO. Measures to offset this risk are identified in FEIS Mitigation Measure MIT-9 and the conservation measures EA mentioned above include pre-painting construction equipment and external facility structures white and using white polytape on these structures to improve visibility to the species. MIT-9 further includes lowering construction cranes at night. These measures, as applicable, would be adopted for the FAA tower upgrade activities. With implementation of these measures, the contribution by the ATST Project or the potential for additive contribution from the proposed Project changes as a result of FAA tower upgrades to potential collision risk impacts would be negligible, adverse, and short-term.

In summary, the measures outlined in FEIS Mitigation Measure MIT-9 and the conservation measures EA mentioned above, and specifically continued monitoring of sensitive species by the Park, supported by ATST measures, would mitigate potential biological impacts to a negligible, adverse, and short- and long-term level.

### 3.10.3 Roadways and Traffic

The Park road is the sole access corridor to Park recreation points, visitor centers, vista points, and to HO. In the past, activities on the mountain have resulted in large volumes of traffic along the Park road corridor, including construction and operation at and adjacent to HO, and visitors and Park personnel using the Park. Because of the road conditions, all vehicles, and certainly larger ones such as buses and construction vehicles, have been slow moving, particularly around the extreme switchbacks and steep inclines. While this has caused delays, the impact was detectable but not consequential.

Other reasonably foreseeable future activities that may have the potential to affect roadways and traffic in combination with the ATST Project and proposed changes include other construction and maintenance activities at and adjacent to HO and throughout the Park, occurring at the same time and requiring use of the Park road. Further, past actions have resulted in road degradation, and the impacts to the roadway from present and future actions are being monitored. Based on FHWA’s review and recommendation (FHWA, 2009), portions of the Park road will require repair and rehabilitation. The schedule for this is not yet determined but may coincide with the ATST construction timeline and will likely result in lane closures or redirection. These activities collectively have the potential to result in a detectable impact on traffic operations during this period. The potential contribution of the proposed actions, specifically as a result of additional slower-moving wide and extra-wide construction vehicles, would have a noticeable impact on traffic flow and vehicle access. Similar measures as noted in the Project analysis, including preparation and implementation of a TMP and coordination with the Park, would reduce the potential for impacts to roadways and traffic. Coordinating the timing of roadway repair and other Project construction and maintenance traffic around peak recreation times would also alleviate traffic flow disruption. By employing such measures, this impact would still be detectable but would be reduced and avoided where possible. These impacts would be short-term. As such, the cumulative impact on roadways and traffic after mitigation would be minor, adverse, short-term, and direct.

### 3.10.4 Infrastructure and Utilities

Because the proposed Project changes would only have the potential to affect communication systems, the cumulative impact on infrastructure and utilities would only occur on this resource. While other activities may affect wastewater, solid waste disposal, stormwater and drainage, or electrical service, the proposed Project changes would not contribute to these effects, and there would be no cumulative affect considered in this analysis. The primary cumulative impact on communication systems would result from construction on and adjacent to the FAA site, including maintenance of the USCG tower co-located on the FAA site and existing FAA facilities. Maintenance of these facilities would not adversely affect communication systems. Otherwise, the construction and operation of the ATST facility would have a negligible, adverse, and long-term impact with the implementation and contribution of the proposed project changes analyzed in this supplemental analysis.

### 3.10.5 Visual Resources and View Planes

The primary cumulative impact on visual resources and view planes would result from construction activities on the summit of Haleakalā, including the ATST Project. The presence of tall structures within HO, including the ATST facility and other HO structures would contribute. Construction activities would be visible from various locations on Maui, as noted in the FEIS. Other activities, including road repairs involving large pieces of equipment, would also contribute to cumulative impacts on visual resources and view planes. As noted in the FEIS, these impacts would be moderate, adverse, and long-term, and no mitigation would adequately reduce these impacts. The contribution of the proposed FAA tower upgrades would be negligible, adverse, and short-term.

### 3.10.6 Visitor Use and Experience

Visitor use and experience are affected by collective use of the Park road that could restrict or hinder access to various recreational attractions throughout the Park. Because the Park road corridor provides the only access to these locations, consideration of cumulative impact from activities that hinder access is integral to determining the ultimate impact on visitors. As noted in the FEIS, since 1961, the traffic along the Park road corridor has included personnel and service vehicles in support of HO activities. Occasionally, these activities have included slow-moving construction or service vehicles that have caused visitor traffic to be delayed on the way to or from the summit or other recreational areas accessed via the Park road. These delays have ranged from very infrequent (once or twice a month) to very frequent short-term delays, such as during concrete pier construction of AEOS in 1993. Overall, however, the past and present actions have resulted in detectable but not consequential impacts on visitor use and experience along the Park road corridor (NSF, 2009).

As with the cumulative analysis for roadways and traffic, visitor use and experience at HO and the Park are affected by other construction and maintenance activities that occur at the same time visitors require use of the Park road. Furthermore, roadway repairs prescribed by FHWA (FHWA, 2009) have the potential, especially if coinciding with ATST activities, to result in a detectable impact on visitor access to Park resources during this period. The potential contribution of the proposed actions, specifically as a result of additional slower-moving wide and extra-wide construction vehicles, would have a noticeable impact on visitor access and travel delays. Similar measures noted in the Project analysis, including use of signage, coordination with the Park, and public notification, would inform visitors of roadway delays in advance, to allow them to plan their trips accordingly. As necessary, road pull-offs and traffic monitors would allow traffic to flow and avoid inadvertent off-road travel, thus limiting roadside resource impacts. By employing such measures, this impact would still be detectable but would be reduced and avoided where possible. These impacts would be short-term. As such the cumulative impact on visitor use and experience after mitigation would be minor, adverse, short-term, and direct.

### 3.10.7 Topography, Geology, and Soils

The primary cumulative impact on topography, geology, and soils would result from construction and maintenance activities on and adjacent to the FAA site, including maintenance of the USCG tower co-located on the FAA site, existing FAA facilities, and adjacent DOE activities. These activities do not affect topography, but do require periodic vehicular traffic and movement on the unpaved sites. Other natural activities including weather, wind, and seismic shaking also have the potential to loosen soils. These considered with the proposed FAA tower upgrades would be localized and inconsequential. This cumulative impact is considered minor, adverse, and long-term.

### 3.10.8 Air Quality

Air quality is affected by various stationary and mobile sources, including vehicles, construction equipment, generators, and fugitive dust from earth movement activities. Other activities can generate hazardous pollutants. Observatory operations generally do not produce air emissions. All areas of Hawaiʻi are considered to be in compliance with federal and state ambient air quality standards, and no areas are listed as nonattainment or maintenance for criteria pollutants. The FEIS identified minor, adverse, and long-term cumulative impacts on air quality within the ROI, predominantly as a result of fugitive dust generated on Haleakalā during construction and other infrastructure construction upgrades. The proposed project changes, particularly those resulting from changes to the vehicle fleet and earth-moving activities associated with the FAA tower upgrades, would emit low-level exhaust emissions and fugitive dust. These emissions would be negligibly higher than those realized in the FEIS analysis and cumulatively consistent with the FEIS analysis (page 4-213). Meteorological conditions contribute to rapid dispersion and offsite transport of airborne pollutants.

### 3.10.9 Noise

Construction activities at HO, including the ATST Project, SLR 2000, and other facility upgrades; the FAA and USCG tower upgrades; hunting and other recreational activities within the Park; and continued traffic along the Park road corridor would all contribute to cumulative noise impacts within the ROI. As noted in the FEIS, the current ambient noise level within the ROI is low; however, some users of Haleakalā may be particularly concerned about noise, including traditional cultural practitioners. These disturbances are generally low-level, not affecting the overall ambient noise condition. Construction activities, including repairs along the Park road, would require the use of construction vehicles and equipment. The USFWS and NPS recommend that activities in this area adhere to noise restrictions, including limiting construction work periods to between 30 minutes after sunrise and 30 minutes before sunset (FEIS Mitigation Measure MIT-6). As noted in the FEIS, the resulting increase in noise levels would be intermittent and generally would result in a minor, adverse, and long-term cumulative impact. Contributions from the proposed Project changes, particularly larger diesel-powered vehicles, would be noticeable if not for the implementation of FEIS Mitigation Measure MIT-13, which would require noise-reduction technologies. With this mitigation, the cumulative noise impact, with the proposed changes, would remain minor, adverse, and long-term.

SECTION 4

# Other Required Analyses

In addition to the analyses discussed in Section 2.0, Affected Environment, and Section 3.0, Environmental Consequences, NEPA requires additional evaluation of the Project's impacts on the relationship between local short-term uses of the environment and long-term productivity, irreversible or irretrievable commitment of resources, and unavoidable adverse impacts (40 CFR 1502.16).

## 4.1 Relationship between Local Short-Term Uses of the Environment and Long-Term Productivity

Impacts associated with proposed changes to construction vehicle loads would be short-term, lasting only during ATST Project construction. These impacts would primarily affect traffic flow, visitor access, and historic resources. These proposed changes would allow for a more efficient and safer construction process for the Project. The ATST Project would implement FEIS-prescribed mitigation measures necessary to minimize or avoid disruption of traffic and visitor access. The NSF is committed, through its funded AURA agent, to pay for repairs to any damage to roadways attributable to the Project, as well as contribute to a future road repair project to compensate for regular wear and tear to the Park road from ATST Project activities. Although the proposed change to construction vehicle loads would result in potentially additive impacts to these resources, employment of the FEIS mitigation measures would adequately address the effects and no additional mitigation would be necessary to reduce short-term effects or to promote long-term productivity.

Upgrades to the FAA RCAG towers would be very short-term and would improve long-term productivity of interisland air traffic control communications, which could otherwise be compromised without this measure. The Project would initiate whatever actions are reasonable and practicable to minimize impacts on biological resources and the environment during the upgrade and subsequent operation of the upgraded antennas.

## 4.2 Irreversible and Irretrievable Commitments of Resources

NEPA requires consideration of how the Project may commit non-renewable resources to uses that would not be irreversible or irretrievable to future generations. This consideration does not replace or reverse the analysis given in the FEIS (NSF, 2009); rather, it focuses on those irreversible and irretrievable commitments of the two proposed Project changes considered in this supplemental EA: modification of the construction vehicle load and upgrades to the FAA towers. No new commitments would result from these two actions. Vehicles and equipment would use petroleum, oils, and fuels. There would be no increase in demand on other environmental resources, local resources, or human resources that were not accounted for in the FEIS.

## 4.3 Unavoidable Adverse Impacts

Unavoidable adverse impacts include both short- and long-term impacts.

Modification of the construction vehicle load would result in unavoidable short-term impacts on traffic flow. While mitigation is proposed to limit the impact, at certain times, construction vehicles would still require temporary road closures and oncoming traffic to pull off to the side of the road. This short-term impact affects traffic and visitor use and experience. A TMP is being developed to manage traffic flow and communication and to coordinate emergency vehicle access during these periods of traffic congestion.

## 4.4 Agency Consultation and Public Involvement

Since completion of the FEIS planning process in 2009, NSF has continued consultation with NPS, the State of Hawai'i DLNR, and the USFWS, which resulted in the preparation of a subsequent EA to address the issuance of an Incidental Take License and implementation of a series of conservation measures to mitigate potential biological impacts beyond those mitigated in the FEIS. These conservation measures were developed as a component of a habitat conservation plan. The public was given the opportunity to review the draft document pursuant to NEPA regulations. The final EA was published in March 2011 and a Finding of No Significant Impact/Decision Document followed. The habitat conservation plan was approved by the State Board of Land and Natural Resources on May 27, 2011. The USFWS is preparing a BO for the ATST Project including the proposed Project changes analyzed in this supplemental EA (USFWS, 2011a; 2011b). The findings and relevant analysis of the BO are included herein.

Further, in accordance with Section 106 of the NHPA, NSF consulted with the SHPO during the EIS process for the ATST project and the subsequent PA, and continues consultation on the proposed Project changes analyzed in this supplemental EA. As previously stated, NSF will seek to modify the PA to reflect the additional 200 wide-load vehicles. Formal meetings with the public and the ATST Native Hawaiian Working Group have allowed additional opportunities to provide input on potential effects of the proposed Project changes. The next ATST Native Hawaiian Working Group meeting will be scheduled during the week of June 13, 2011.

Pursuant to NEPA regulations, this supplemental EA is being made available to affected and interested agencies and stakeholders, based on the ATST planning process, to notify landowners, land users, and interested parties about proposed Project changes, and to solicit feedback on potential impacts. A 30-day public review of the draft supplemental EA will begin on June 2, 2011 and end on July 5, 2011. A public meeting is scheduled for June 16, 2011.

SECTION 5

# References


Bailey, Cathleen Natividad. 2003. *Hawaiian Petrels near the Haleakalā Observatories.* A Report to KC Environmental, Inc. for Preparation of a Long-Range Development Plan. Haleakalā National Park, Endangered Species Management.

Bordenave, I. Personal communication 2011. April 5, 2011, Discussion of Newell's shearwater sightings in east Maui.

CKM Cultural Resources, LLC. 2006. *Cultural Resources Evaluation and Traditional Practices of the Proposed Replacement of the Existing 70 foot (Rainbow) Communications Tower on Haleakalā with a 100 foot (Anuenue) Tower. Tax Map Key 222-007-007, 2.956 Acres.* January.

Conant, S. and M. Stemmermann Kjargaard. 1984. "Annotated Checklist of Birds of Haleakalā National Park, Maui, Hawaiʻi." *Western Birds* Volume 15, Number 3, 1984.

Cowan, David. 2011. Personal communication. May 5, 2011. Telephone conversation discussing the results of First Wind's Newell's shearwater surveys in west Maui. David Cowan, First Wind LLC., Environmental Vice President. Maine.

FHWA (Federal Highway Administration). 2008. *FHWA Vehicle Types*. http://www.fhwa.dot.gov/policy/ohpi/vehclass.htm. Last updated April 1. Accessed on March 1, 2011.

FHWA (Federal Highway Administration). 2009. *Federal Highway Administration Haleakalā National Park Road Report*. March 2. Revised April.

Fretz, S. Personal communication 2011. April 6, 2011, Discussion of Newell's shearwater sightings in east Maui.

NSF (National Science Foundation). 2009. *Final Environmental Impact Statement (FEIS): Advanced Technology Solar Telescope, Haleakalā, Maui, Hawaiʻi.* July.

NSF (National Science Foundation). 2010a. *Programmatic Agreement.* Agreement among the National Science Foundation, the National Park Service, the Advisory Council on Historic Preservation, the Hawaiʻi State Historic Preservation Officer, the Association of Universities for Research in Astronomy, and the University of Hawaiʻi (for the benefit of its Institute for Astronomy) Regarding the Advanced Technology Solar Telescope Project, Haleakalā, Maui, Hawaiʻi. Final signature October 10.

NSF (National Science Foundation). 2010b. *Habitat Conservation Plan for the Construction and Operation of the Advanced Technology Solar Telescope at the Haleakalā High Altitude Observatory Site – Maui, Hawaii*. October.

NSF (National Science Foundation). 2011. *Environmental Assessment: Issuance of an Incidental Take License and Proposed Conservation Measures Associated with the Advanced Technology Solar Telescope, Haleakalā, Maui, Hawaiʻi.* February.

Pacific Analytics, LLC. 2003. *Arthropod Inventory and Assessment, Haleakalā High Altitude Observatory Site, Maui, Hawai'i*. Prepared for KC Environmental Co., Inc. Makawao, Hawai'i.

Pacific Analytics, LLC. 2009. Arthropod Inventory and Assessment at the Haleakalā National Park Entrance Station and at the Haleakalā High Altitude Observatories, Maui, Hawai`i. July.

Pacific Analytics, LLC. 2010. Arthropod Habitat Reconnaissance and Assessment at a Proposed Conservation Area on Haleakalā, Maui, Hawai`i. Included as Appendix A.

Simons, T. R., and C. Natividad Hodges. 1998. "Dark-rumped Petrel." *The Birds of North America*, No. 13. A. Poole and F. Gill, eds. Academy of Natural Science, Philadelphia, and American Ornithologists' Union, Washington, D. C.

Spencer, Greg. Personal communication 2011. April 6, 2011. Discussion of detections of six downed Newell's shearwater on Maui in the past 10 years.

Thielen, Laura H./ State Historic Preservation Officer. 2009. Letter. Subject: National Historic Preservation Act Section 106 Concurrence Determination of Adverse Effects for the Advanced Technology Solar Telescope, Haleakalā High Altitude Observatories, Pu'u Kolekole, Waiakoa District, Papaanui Ahupua'a, Makawao District, Island of Maui. TMK: (2) 2-2-007:008. Dated July 21.

UH IfA (University of Hawai'i Institute for Astronomy). 2005. "Haleakalā High Altitude Observatory Site Long Range Development Plan (LRDP)." KC Environmental, January 2005. Web site: http://www.ifa.hawaii.edu/Haleakalā/LRDP/.

UH IfA (University of Hawai'i Institute for Astronomy). 2010. *Haleakalā High Altitude Observatory, Haleakalā, Maui, Hawai'i. Management Plan*. June 8.

USCG (U.S. Coast Guard). 2006. Environmental Assessment – Proposed Anuenue Haleakalā Microwave Radio Tower, Haleakalā, Maui, Hawai'i. September.

USFWS (U.S. Fish and Wildlife Service). 1998. *Terrestrial Mammal, 'Ōpe'ape'a or Hawaiian Hoary Bat, Lasiurus cinereus semotus.* Species Status: Federally listed as Endangered, State listed as Endangered, State recognized as Indigenous (at the species level and endemic at the subspecies level) Nature Serve Heritage Rank G2/T2 – Species secure/Subspecies imperiled, Recovery Plan for the Hawaiian Hoary Bat – USFWS 1998.

USFWS (U.S. Fish and Wildlife Service). 2011a. Draft Biological Opinion for the Construction and Operation of the Advanced Technology Solar Telescope (ATST) at the Haleakala High Altitude Observatory Site on Maui, Hawaii. May.

USFWS (U.S. Fish and Wildlife Service). 2011b. Summary of Findings of the Biological Opinion for the Construction and Operation of the Advanced Technology Solar Telescope (ATST) at the Haleakala High Altitude Observatory Site on Maui, Hawaii. May 27.

SECTION 6
# List of Preparers

The preparers of this supplemental EA for the ATST Project are listed in Table 6-1.

TABLE 6-1
List of Preparers

| | | |
|---|---|---|
| National Science Foundation | Caroline Blanco | Assistant General Counsel |
| KC Environmental, Inc. | Charlie Fein, Ph.D. | Program Manager |
| | Laurie Allen | Technical Manager |
| CH2M HILL | Leslie Tice | Project Manager |
| | Paul Luersen | Senior Consultant |
| | Lisa Kettley | Quality Assurance Reviewer |
| | Cindy Salazar | Environmental Planner |
| | Greta Kirschenbaum | Environmental Planner |
| | Grahm Satterwhite | Traffic Engineer |
| | Suzanne Christensen | Technical Editor |
| | Heather Rand | Technical Editor |
| | Nancy Michaelis-Rambin | Document Designer |

# Appendix
# Vehicle Load Comparison Calculations

TABLE A-1
Estimated Vehicle Loads
*Advanced Technology Solar Telescope Project*

| Duration | Activities | Use of Park Road Descriptions | Vehicle Class (FHWA) | Construction Year | | | | | | | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | |
| 3 months | Contract start-up, mobilization, demolition and clearing | Excavation equipment | 10 | 4 | | | | | | | **4** |
| | | Trailers, temporary services | 8 | 6 | | | | | | | **6** |
| | | Haul out, water, paving equipment, asphalt material | 9 | 12 | | | | | | | **12** |
| | | Miscellaneous equipment | 5 | 8 | | | | | | | **8** |
| | | Pick-up trucks, vans | 3 | 360 | | | | | | | **360** |
| | | Passenger vehicles | 2 | 360 | | | | | | | **360** |
| 3 months | Major earthwork and leveling, utility trenching, testing as required | Grading and excavation equipment | 10 | 6 | | | | | | | **6** |
| | | Water(dust control), smaller excavation equipment, MECO vaults, rebar, asphalt, masonry, conduit | 9 | 40 | | | | | | | **40** |
| | | Trailers and temp equipment | 8 | 4 | | | | | | | **4** |
| | | Concrete Delivery | 7 | 30 | | | | | | | **30** |
| | | Dumpster | 7 | 5 | | | | | | | **5** |
| | | | 6 | | | | | | | | |
| | | Miscellaneous equipment | 5 | 12 | | | | | | | **12** |
| | | Pick-up trucks, vans | 3 | 360 | | | | | | | **360** |
| | | Passenger vehicles | 2 | 360 | | | | | | | **360** |
| 4 months | Foundation- grade, excavation, retention<br>Utility building, ice tank platform foundations | Excavator, crane, loader | 10 | 6 | | | | | | | **6** |
| | | Backhoe, concrete pump, lift machine, rebar, water, templates and embeds, tunnel pcs | 9 | 36 | | | | | | | **36** |
| | | Concrete -retaining wall, utility building, Ice tank platform, dumpster | 7 | 43 | | | | | | | **43** |
| | | | 6 | | | | | | | | |
| | | Miscellaneous equipment | 5 | 12 | | | | | | | **12** |
| | | Pick-up trucks, vans | 3 | 360 | | | | | | | **360** |
| | | Passenger vehicles | 2 | 360 | | | | | | | **360** |

TABLE A-1
Estimated Vehicle Loads
*Advanced Technology Solar Telescope Project*

| Duration | Activities | Use of Park Road Descriptions | Vehicle Class (FHWA) | Construction Year | | | | | | | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | |
| 6 months | Support building foundations, lower enclosure foundation, | Concrete delivery | 6 | 160 | 120 | | | | | | **280** |
| | | Rebar and embedded steel items, water, utility materials, equipment, form material | 9 | 16 | 10 | | | | | | **26** |
| | Utility building, ice tank platform steel | Utility building steel – structural, doors, stair siding, roof | 9 | | 10 | | | | | | **10** |
| | | Main electrical, generator, UPS | 9 | | 6 | | | | | | **6** |
| | | Concrete pump, dumpsters | 7 | 30 | 20 | | | | | | **50** |
| | | | 6 | | | | | | | | |
| | | Miscellaneous equipment and materials | 5 | 10 | 10 | | | | | | **20** |
| | | Pick-up trucks, vans | 3 | 180 | 180 | | | | | | **360** |
| | | Passenger vehicles | 2 | 180 | 180 | | | | | | **360** |
| 5 months | Pouring of telescope pier | Concrete delivery | 6 | | 50 | | | | | | **50** |
| | | Crane | 10 | | 6 | | | | | | **6** |
| | | Concrete pump, water | 9 | | 6 | | | | | | **6** |
| | | Concrete waste removal, Dumpster | 7 | | 16 | | | | | | **16** |
| | | Rebar and embedded steel items, Scaffolding and concrete formwork | 9 | | 24 | | | | | | **24** |
| | | | 5 | | | | | | | | |
| | | Pick-up, vans | 3 | | 600 | | | | | | **600** |
| | | Passenger vehicles | 2 | | 600 | | | | | | **600** |
| 2 months | Completing slabs, Operations building | Concrete | 6 | | 50 | | | | | | **50** |
| | | Concrete waste removal, concrete pump | 7 | | 14 | | | | | | **14** |
| | | Rebar and embedded steel items, water | 9 | | 12 | | | | | | **12** |
| | | Miscellaneous equipment | 5 | | 20 | | | | | | **20** |
| | | Pick-up trucks, vans | 3 | | 360 | | | | | | **360** |
| | | Passenger vehicles | 2 | | 360 | | | | | | **360** |
| 3 months | Steel structure – Operations and Support | Cranes | 10 | | | 4 | | | | | **4** |
| | | Steel-lower enclosure, operations, doors, stairs | 9 | | | 30 | | | | | **30** |
| | | Lift machines, scaffolding, water, bracing | 9 | | | 20 | | | | | **20** |
| | | Trailers, temp services | 8 | | | 8 | | | | | **8** |
| | | Miscellaneous equipment and materials | 5 | | | 30 | | | | | **30** |
| | | Pick-up trucks, vans | 3 | | | 600 | | | | | **600** |
| | | Passenger vehicles | 2 | | | 600 | | | | | **600** |

TABLE A-1
Estimated Vehicle Loads
*Advanced Technology Solar Telescope Project*

| Duration | Activities | Use of Park Road Descriptions | Vehicle Class (FHWA) | Construction Year<br>Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 months | Roof and wall panel installation: Operations building electrical, mechanical, plumbing, wall finishes, lower enclosure pre-cast panels | Roofing, siding, electrical materials | 9 | | | 20 | | | | | **20** |
| | | Pre-cast panels, crane, miscellaneous material and equipment | 9 | | | 50 | | | | | **50** |
| | | Ancillary materials and equipment | 7 | | | 30 | | | | | **30** |
| | | | 6 | | | 100 | | | | | |
| | | Pick-up trucks, vans | 3 | | | 510 | | | | | **360** |
| | | Passenger vehicles | 2 | | | 510 | | | | | **360** |
| 8 months | Dome framing, major utility equipment installation, S&O, building interior construction | Dome contractor's trailers and containers | 9 | | | | 8 | | | | **8** |
| | | | 12 | | | | | | | | |
| | | Delivery of upper enclosure structure heavy, possibly wide loads on flatbeds | 9 and 10 | | | | 36 | | | | **36** |
| | | 275 ton crane | 9 | | | | 25 | | | | **25** |
| | | Delivery of platform lift and elevator | 9 | | | | 4 | | | | **4** |
| | | Delivery of building fixtures and materials | 9 | | | | 20 | | | | **20** |
| | | Ancillary materials and equipment | 9 | | | | 10 | | | | **10** |
| | | | 7 | | | | | | | | |
| | | | 6 | | | | 100 | | | | |
| | | Miscellaneous equipment | 5 | | | | 10 | | | | **10** |
| | | | 4 | | | | | | | | |
| | | Pick-up trucks, vans | 3 | | | | 870 | | | | **720** |
| | | Passenger vehicles | 2 | | | | 870 | | | | **720** |
| 8 months | Enclosure work: cladding mechanical, fit-up, testing all thermal equipment | Delivery of enclosure cladding panels, plate-coil, and mechanical equipment | 9 | | | | 12 | 12 | | | **24** |
| | | All thermal equipment | 9 | | | | 20 | 60 | | | **80** |
| | | Dumpsters | 7 | | | | 12 | 12 | | | **24** |
| | | | 6 | | | | 50 | 50 | | | |
| | | Ancillary materials and equipment | 5 | | | | 10 | 10 | | | **20** |
| | | Pick-up trucks, vans | 3 | | | | 690 | 690 | | | **1,080** |
| | | Passenger vehicles | 2 | | | | 690 | 690 | | | **1,080** |

TABLE A-1
Estimated Vehicle Loads
*Advanced Technology Solar Telescope Project*

| Duration | Activities | Use of Park Road Descriptions | Vehicle Class (FHWA) | Construction Year | | | | | | | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | |
| 12 months | Telescope and coudé rotator installation. | Telescope contractor's trailers and containers | 9 | | | | | 4 | 4 | | **8** |
| | | Delivery of telescope assemblies to site often wide loads on flatbeds | 9 and 10 | | | | | 11 | 10 | | **21** |
| | | Construction crane other equipment disassembled and trucked away from site | 9 and 10 | | | | | | 25 | | **25** |
| | | | 12 | | | | | | | | |
| | | Dumpster | 7 | | | | | 5 | 5 | | **10** |
| | | Ancillary materials and equipment | 5 | | | | | 20 | 10 | | **30** |
| | | Pick-up trucks, vans | 3 | | | | | 870 | 720 | | **1,440** |
| | | Passenger vehicles | 2 | | | | | 870 | 720 | | **1,440** |
| 3 months | Finish site work: paving of apron and service yard. Concrete walks, finish utilities. | Water storage tanks, manholes, drywell sections, Rebar,embeds | 9 | | | | | | 14 | | **14** |
| | | Concrete delivery | 6 | | | | | | 50 | | **50** |
| | | Concrete waste removal, dumpster | 7 | | | | | | 12 | | **12** |
| | | Asphalt paving materials and equipment | 7 | | | | | | 10 | | **10** |
| | | Water for dust control | 9 | | | | | | 6 | | **6** |
| | | Pick-up trucks, vans | 3 | | | | | | 360 | | **360** |
| | | Passenger vehicles | 2 | | | | | | 360 | | **360** |
| 6 months | Primary mirror and other optics coated and installed. | Delivery of primary mirror | 9 and 10 | | | | | | 4 | | **9** |
| | | | 12 | | | | | | | | |
| | | | 9 | | | | | | | | |
| | | Delivery of coating chamber | 10 | | | | | | | | |
| | | Dumpster | 7 | | | | | | 6 | | **6** |
| | | Ancillary materials and equipment | 5 | | | | | | 8 | | **8** |
| | | Pick-up trucks, vans | 3 | | | | | | 720 | | **720** |
| | | Passenger vehicles | 2 | | | | | | 720 | | **720** |
| 2 years | Integration, Testing, and Commissioning | Deliveries | 6 | | | | | | | 204 | **204** |
| | | Pickup trucks, vans | 3 | | | | | | | 1,460 | **1,460** |
| | | Passenger vehicles | 2 | | | | | | | 1,460 | **1,460** |
| | | | **Total by year:** | **2,960** | **2,654** | **2,512** | **3,437** | **3,304** | **3,764** | **3,124** | **21,755** |

Assumptions:

1. Total vehicle trips will be equal to or less than what is shown in the FEIS.
2. Due to resource constraints on island, vehicle classes are updated to reflect vehicle availability on Maui.
3. Class 12s are double tractor trailers, which will not be used.
4. Class 9 tractor-trailers are the mainstay of island trucking and will be utilized in place of Class 5 to 8, even when load weights are far less than vehicles tare weight, but require greater length capacity.
5. Due to design completion, updated material estimates are assigned to each phase (year). The increase of structural detail allows a more detailed analysis of truck load counts.
6. New structural and design elements are not shown in schematic drawings presented in the FEIS, but within the scope and limits of the FEIS, increases load counts.
7. Re-assignment of loads to other vehicle Classes for better road safety and material handling.
8. Transoceanic shipping containers require Class 9 vehicles and reduce damage and handling of materials.
9. Exact activities and vehicle loads will be dependent on vehicles available and construction schedules.

| **Vehicle Class** | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** | **Year 7** | **Total** |
|---|---|---|---|---|---|---|---|---|
| 10 | 16 | 6 | 4 | 0 | 0 | 0 | | **26** |
| 9 | 104 | 68 | 120 | 99 | 76 | 24 | | **491** |
| 9 and 10 | 0 | 0 | 0 | 36 | 11 | 39 | | **86** |
| 8 | 10 | 0 | 8 | 0 | 0 | 0 | | **18** |
| 7 | 108 | 50 | 30 | 12 | 17 | 33 | | **250** |
| 6 | 160 | 220 | 100 | 150 | 50 | 50 | 204 | **934** |
| 5 | 42 | 30 | 30 | 20 | 30 | 18 | | **170** |
| 3 | 1,260 | 1,140 | 1,110 | 1,560 | 1,560 | 1,800 | 1,460 | **9,890** |
| 2 | 1,260 | 1,140 | 1,110 | 1,560 | 1,560 | 1,800 | 1,460 | **9,890** |
| ***Total by Year:** | **2,960** | **2,654** | **2,512** | **3,437** | **3,304** | **3,764** | **3,124** | **21,755** |
| Wide Load: 9 to 11 feet | 20 | 25 | 25 | 15 | 10 | 5 | 0 | |
| Wide Load: 11 to 12 feet | 10 | 10 | 20 | 30 | 15 | 15 | 0 | |
| X-Wide Load: 18 to 24 feet | 0 | 0 | 0 | 9 | 10 | 6 | 0 | |
| **Total by Year** | **30** | **35** | **45** | **54** | **35** | **26** | **0** | **225** |

*Wide and X-Wide Load totals included in Vehicle Class Total By Year, above.