BOARD OF LAND AND NATURAL RESOURCES

STATE OF HAWAII

In re Petition Requesting a Contested Case Hearing Re Conservation District Use Permit(CDUP) MA-3542 for the Advanced Technology Solar Telescope at the Haleakalā High Altitude Observatories Site on Puu Kolekole, Makawao, Maui, TMK (2)2-2-007:008,	DLNR File No. MA-11-04 FINDINGS OF FACT, CONCLUSIONS OF LAW, DECISION AND ORDER; CERTIFICATE OF SERVICE

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FINDINGS OF FACT

I. INTRODUCTION

1. This contested case hearing involves Conservation District Use Permit (CDUP) MA-11-04 for the construction of the Advanced Technology Solar Telescope (ATST) at the Haleakalā High Altitude Observatories site (HO site) on Pu'u Kolekole, Makawao, Maui (ATST Project).

II. PARTIES

2. The University of Hawaii Institute for Astronomy (UHIfA) was established in 1967 as an Organized Research Unit at the University of Hawaii at Manoa. UHIfA conducts research and educational programs in most areas of modern astronomy; it develops and manages observatory facilities on Haleakalā and Mauna Kea; and it constructs state-of-the-art astronomical instrumentation. (Maberry, Direct Written Testimony [DT] pgs. 1-2.)

3. Petitioner Kilakila 'O Haleakalā (Kilakila) is an organization that is dedicated to the protection of the sacredness of the summit of Haleakalā. One of Kilakila's objectives is the protection of traditional and customary practices as well as natural resources. (Kilakila's Proposed Findings of Fact ["KOH FOF"] 37 and 38.) The directors of Kilakila 'O Haleakalā state that they engage in traditional and customary practices on Haleakalā. (KOH FOF 39.) Among the practices exercised by the directors of Kilakila `O Haleakalā are: mālama 'āina, the burying of piko, offering ho'okupu (including pule, oli and materials), connecting with their ancestors and participating in religious ceremonies. (Id.) The directors of Kilakila 'O Haleakalā enjoy views of and from the summit of Haleakalā and the beauty of the area. (KOH FOF 40.)

III. PROCEDURAL BACKGROUND

A. Conservation District Use Application

4. On March 10, 2010, UHIfA submitted its Conservation District Use Application (CDUA) for the ATST Project together with a copy of the Final Environmental Impact Statement (FEIS) for the ATST. (UHIfA's Proposed Finding of Fact ["UH FOF"] 5; Exs. A-1 and A-2.)

5. Notice of the UHIfA's CDUA was published by the Office of Conservation and Coastal Lands (OCCL) in the June 23, 2010, issue of the Environmental Notice published by the Office of Environmental Quality Control. (UH FOF 6.)

6. The Chairperson of the Board of Land and Natural Resources (Chairperson) determined that that the scope of the proposed use or the public interest required a public hearing to be held on UHIfA's CDUA. The public hearing on UHIfA's CDUA was held on August 26, 2010. (Ex. A-15 at 10.)

7. The Board of Land and Natural Resources (Board) approved the CDUA on December 1, 2010, at a regular Board meeting. (Ex. A-4.)

8. By letter dated December 2, 2010, the OCCL notified UHIfA that the Board approved the CDUA at the Board's December 1, 2010 meeting, subject to 18 conditions. (Ex. A-4.)

9. On May 24, 2010, Kilakila submitted its written request for a contested case hearing on the UHIfA's CDUA, which request was resubmitted on July 8, 2010, and December 2, 2010. (Exs. B-15, B-16, and B-17.)

10. At a regular Board meeting held on February 11, 2011, the Board authorized the appointment of a hearing officer to conduct a contested case hearing in this matter and delegated authority to the Chairperson to appoint a hearing officer. (UH FOF 18 and 19.)

B. Appointment of Hearing Officer

11. The Chairperson appointed Steven Jacobson as the contested case Hearing Officer. (UH FOF 19.)

12. On March 29, 2012, Steven Jacobson was discharged as the Hearing Officer. (Minute Order No. 15.)

13. On April 11, 2012, Rosemary T. Fazio was appointed as the Hearing Officer. (Minute Order No. 16.)

14. On May 1, 2012, Rosemary T. Fazio withdrew as the Hearing Officer. (Minute Order No. 20, Ex. A.)

15. On May 2, 2012, Lane Ishida was appointed as the Hearing Officer. (Minute Order No. 20.)

C. Site Visits

16. The parties and Hearing Officer Jacobson visited the site of the proposed ATST and the surrounding area on July 15, 2011. They observed the views from the area, the proximity of the structures to each other, the ahu[1] in the HO site and views from them, the view from Pu`u `Ula`ula, the view from the Haleakalā National Park Visitor Center and the area around the Visitor Center, the view from the road driving up to the HO site, and the historic sites in the HO site. (KOH FOF 31.)

17. On May 25, 2012, Hearing Officer Ishida and the parties followed the same protocols and visited the same sites. (Minute Order Nos. 21 and 22.)

[1] There are two ahu or shrines that were erected in the HO site, an east-facing *ahu* and a west-facing ahu. (FOF 155 and 156.)

D. Standing Hearing

18. A standing hearing was held on April 4, 2011. At the standing hearing, testimony on the issue of Kilakila's standing was received from Mikahala Helm ("Ms. Helm"), Edwin Robert Naleilehua Lindsey, III ("Mr. Lindsey"), Leiohu Ryder and Stanley (Ki'ope) Herbert Raymond, II ("Mr. Raymond"). (Tr. 4/4/11.)

19. Kilakila was found to have standing. (Minute Order No. 24.)

E. Contested Case Hearing

20. A contested case hearing on the merits was held on July 18, 19, and 20, 2011, and August 26, 2011. (Tr., 7/18/11, 7/19/11, 7/20/11, and 8/26/11.)

IV. PROJECT DESCRIPTION

A. Lands in the Summit Area

21. The summit of Haleakalā is made up of three volcanic cones. The tallest of the cones, Pu'u Ula'ula, is the site of one of Haleakalā National Park's most popular overlooks. Next to Pu'u Ula'ula is Pu'u Kolekole, the volcanic cone where the HO site is located. The third volcanic cone in the summit area houses county, state and federal telecommunications and other facilities. (Ex. A-17; Ex. A-2, Vol. I at ES-2, 7, and 25; Maberry DT at 13.)

22. The uses of land within the summit area include, among others, wilderness area, scenic overlooks, visitor centers, astronomy facilities, space surveillance and research facilities, air traffic control repeater stations, broadcast and relay substations and a U.S. Department of Energy research facility. (Ex. A-2, Vol. I, at ES-2 and 25, and 1-25.)

1. Haleakalā National Park

23. The largest of the land divisions on Haleakalā is the Haleakalā National Park which encompasses approximately 33,230 acres. Haleakalā National Park is made up of three

primary visitor areas that include the Summit Area, containing two visitor facilities, the Haleakalā Visitor Center and the Pu'u Ula'ula overlook; the Wilderness Area, containing hiking trails from two major trailheads, the Leleiwi and Kalahaku Overlooks, and the Park Headquarters Visitor Center; and the Wilderness Area near the coast known as Kipahulu where hiking, swimming and camping are available. (Ex. A-2, Vol. I, at ES-25.)

24. The distance from Pu'u Ula'ula in Haleakalā National Park to the boundary of the HO site is approximately two hundred yards. (Tr. 7/18/11 at 193 (Maberry).)

25. Major portions of Haleakalā National Park designated as wilderness are acclaimed for their beauty, serenity and tranquility. This wilderness area begins just below the site proposed for the ATST. (KOH FOF 46; Declaration of Donald Reeser ["Reeser WT"]; Declaration of Marilyn H. Parris ["Parris WT"]; Ex. A-2, Vol. IV, App. A at 31.)

26. Haleakalā National Park is a land of spectacular scenery and great cultural importance. (KOH FOF 47; Parris WT; Reeser WT; Ex. A-2, Vol. IV, App. A at 30.)

27. Approximately 1.7 million people visit Haleakalā National Park's various lookouts and vantage points annually. (Ex. A-2, Vol. I at 3-45 and Vol. IV, Appendix ["App."] A at 30.) Most of these visitors arrive by vehicle, an estimated 600 passenger cars and 16 buses each day. (Ex. A-2, Vol. I at 4-111, 4-206).

2. HO Site

28. The HO site is made up of 18.166 acres of land that was set aside on December 12, 1961, by Governor William Quinn under Executive Order No. 1987 for the University of Hawaii Haleakalā High Altitude Observatory Site to be under the control and management of the Board of Regents of the University of Hawaii. (Ex. A-26.)

29. Executive Order No. 1987 was subject to the condition that the lands set aside shall be used for the Haleakalā High Altitude Observatory Site purposes only. (Ex. A-26.)

30. Approximately 40% of the HO site is currently developed with roads, buildings, parking areas, and walkways. (Ex. A-17.)

31. Of the 18.166 acres, approximately 4.5 acres have been leased out to the United States Army Corps of Engineers for the United States Air Force Maui Space Surveillance Complex (MSSC). (Ex. A-9 at 1.)

32. Since the early 1950's, the HO site has housed numerous astronomical facilities including: Reber Circle (1951); Mees Solar Observatory (1957 to 1976; 1964 to present); Airglow and Zodiacal Light Programs (1962); Airglow Facility (1972); Lunar Ranging Experiment (LURE) Observatory (1974 to 2004); Cosmic Ray Neutron Monitor Station (1991 to 2007); Multi-color Active Galactic Nuclei Monitor Project (MAGNUM) (1998 to 2008); Faulkes Telescope Facility (2004); Maui Space Surveillance Complex (1963 to present); Panoramic-Survey Telescope and Rapid Response System (Pan-STARRS) (2006; 2010). (Ex. A-6 at p. 33-34.)

33. Between the period of 1973 to 2009, 10 conservation district use permits (CDUP) have been issued for various facilities located at the HO site. (Ex. A-1, part 1 at 6.)

34. Current observatories include the U.S. Air Force Maui Space Surveillance Complex; the Ground-based Electro-optical Deep Space Surveillance (GEODSS); C. E. Kenneth Mees Solar Observatory; the Zodiacal Observatory; the Panoramic-Survey Telescope and Rapid Response System; the Faulkes Telescope Facility; and the Haleakalā Amateur Astronomers. (Ex. A-6 at 35.)

35. Existing access to the HO site is exclusively through Haleakalā National Park on the Haleakalā National Park road ("Park Road"). (Ex. A-2, Vol. I at 3-4.)

36. The HO site is closed to the general public with the exception of native Hawaiian cultural practitioners who are welcomed to the HO site by a sign posted in the Hawaiian language welcoming such practitioners. (Maberry DT at 11-13.)

37. The HO site is located in the general subzone of the conservation district. (Ex. A-17.)

38. The area proposed for the ATST Project is located within the HO site on a portion of currently unused, but previously disturbed, land approximately .86 acres in size adjacent to the Mees Solar Observatory, known as the Mees site. (Ex. A-1, part 1 at 12.) The ATST Project site is in close proximity to other previously developed facilities for astronomy and advanced space surveillance. (Ex. A-2, Vol. I at ES-17.)

39. The ATST Project would not be located in the Special Management Area, as documented on the County of Maui's Planning Department map entitled "Island of Maui," which the ATST Project team obtained from the County of Maui GIS Program Office of the Managing Director, dated July 2002, and located in the Zoning and Administration Enforcement Division of the Planning Department, Wailuku, Maui. (UH FOF 59; Ex. A-1 at 15.)

3. Other Surrounding Uses

40. There are more than 25 separate federal, state and private entities with land interests in the summit area of Haleakalā. The list includes, among others, the Federal Aviation Administration (FAA), Maui County, Department of Land and Natural Resources (DLNR), various television stations, the Pacific Tsunami Warning Center, the U.S. Air Force, U.S. Coast Guard, U.S. Customs and U.S. Navy. (Maberry DT at 13.)

41. The FAA operates and maintains a 2.96-acre property along the southwest boundary of the HO site, referred to as the Haleakalā Peripheral Hi Site, which is dedicated to remote

air/ground interisland and trans-Pacific communications to and from aircraft. (Ex. A-2, Vol. I at ES-18.)

B. Long Range Development Plan and Management Plan

42. In January 2005, UHIfA published its Long Range Development Plan (LRDP) for the HO site. (Ex. A-9.)

43. The LRDP describes the general environmental, cultural, and historic conditions and the site characteristics that guide UHIfA's future development of the HO site. (Ex. A-9 at 2.)

44. The LRDP reflects the goals of University of Hawaii (UH) to provide high quality research and training facilities, with special emphasis on programs that have distinctive attributes, to maximize both the educational and scientific benefits for UH and the State of Hawai'i while preserving, protecting, integrating, and balancing cultural, natural, and education/research values on Haleakalā. (Ex. A-9 at 10.)

45. The approach to astronomy development on Haleakalā suggested by the LRDP is to focus on projects that benefit UH directly by enhancing research and educational opportunities. These programs should be of high caliber - sufficiently large to attract a staff that can aggressively lead the scientific development of Haleakalā, and make sustainable contributions to education at all levels. (Ex. A-9 at 31.)

46. The LRDP describes current environmental conditions at the HO site, including geologic history, botanical resources, and faunal resources. Historic and cultural resources, including cultural resources, cultural practices and an archaeological inventory, are described, and education and research programs are defined and identified. The LRDP describes existing facilities, and potential new facilities at the HO site. The content of the LRDP is informed by the various appendices attached to it, which include geological and botanical surveys, assessments of Hawaii

petrels and arthropods, an evaluation of cultural resources, an assessment of cultural practices, an archaeological inventory survey, and a traffic report. The LRDP ends with a discussion regarding management planning. (Maberry DT at 8.)

47. The LRDP concludes that the ATST Project meets the criteria to be sited at the HO site. (Ex. A-9 at 36 and 42-50.)

48. While the long range planning aspect of the LRDP is current, the management planning tools in Section 9.0 of the LRDP are superseded by the more comprehensive management plans in the Management Plan. (UH FOF 160; Ex. A-6.)

49. The Management Plan was created by UHIfA to reflect improvements in the management of the HO site from the management practices, policies and procedures described in the LRDP. (Maberry DT at 9.) To formalize and implement the improvements in management planning, a draft Management Plan was prepared in June 2010. The draft Management Plan was submitted to the DLNR on June 8, 2010. (Maberry DT at 10; Ex. A-6.)

50. The Management Plan includes policies and practices for the long-term preservation of archaeological and cultural resources within the HO site. These policies and practices were developed based on recommendations in the Cultural Resources Assessment[2], the Supplemental Cultural Impact Assessment (Supp. Cultural Assessment)[3] and by interested agencies and the Maui community. (Ex. A-6 at 42.)

[2] "Cultural Resource Evaluation and Traditional Practices of the Proposed Advanced Technology Solar Telescope (ATST) at Haleakalā High Altitude Observatories" and was prepared in January 2006 by CKM Cultural Resources LLC (Cultural Assessment). (Ex. A-2, Vol. II, App. F(1).)

[3] "Supplemental Cultural Assessment for the Proposed Advanced Technology Solar Telescope (ATST) at Haleakalā High Altitude Observatories Papa'anui Ahupua'a, Makawao District, Island of Maui," prepared in May, 2007, by Cultural Surveys Hawaii, Inc. (Supp. Cultural Assessment). (Ex. A-2, Vol. II, App. F(2).)

51. On December 1, 2010, the Board approved UHIfA's Management Plan for the HO site after finding that the Management Plan met the requirements of HAR chapter 13-5. (Ex. A-5.)

52. The Management Plan proposes a physical plan and management structure that balances astronomy, with its associated scientific and economic benefits, with protection of cultural and environmental resources and values within the HO site. (Ex. A-6 at 48.)

53. The Management Plan also provides resource protection and guidelines intended to prevent desecration or over-development of the HO site. (Ex. A-6 at 48.)

54. The Management Plan contains sections relating to information such as: existing conditions on the HO site, including the ownership of the HO site, resources, including cultural and historic resources, archaeological resources, topography, geology and soils, biological resources, visual resources, and water resources; proposed land uses on the HO site; requirements regarding cultural and historic preservation management, environmental protection of site resources and facility design criteria; and a reporting schedule. (Ex. A-6; Maberry DT at 10.)

55. The Management Plan is the approved management plan required under HAR § 13-5-24.

C. ATST Project Description

56. The ATST Project is the result of a grass-roots proposal to the National Science Foundation (NSF) that has been in the making for a long time. (Keil DT at 5.)

57. The need for a large aperture solar telescope was recognized by the solar community in two previous decadal surveys of astronomical needs. Several community workshops led to the concept of a large aperture solar telescope. Starting in the late 1990's a large portion of the solar community (22 institutions) came together to develop a proposal for the ATST which was then submitted to NSF. (Keil DT at 5.)

58. The NSF is providing the funding for the ATST. NSF responds to proposals from the scientific community as well as to reports from the National Research Council and comparable groups. The concept of the ATST did not originate from within the NSF. Instead the solar physics community perceived the need for such an instrument in the 1990's and developed a set of science cases and high-level performance specifications. In response to a proposal from a broad segment of the solar physics community, NSF has supported the refinement of the design and development effort of the ATST since 2001. In 2004, NSF received a proposal from the Association of Universities for Research in Astronomy, Inc. (AURA) to fund the construction and operation of the ATST. (Foltz DT at 7.)

59. Since the ATST is a large construction project by NSF standards, the decision to fund it or not required a number of very intensive reviews of the project feasibility and design, construction and operations plans, and the project's management. These reviews were conducted by panels of experts chosen from academia, laboratories, industry, and other federal agencies. The panel reports were scrutinized by special committees and groups within NSF composed of both NSF staff and external scientists. The recommendation to fund the project was forwarded to the Director of the Directorate of Mathematical and Physical Sciences. Upon endorsement of the Director of the Directorate of Mathematical and Physical Sciences, it was then forwarded to the National Science Board for approval. (Foltz DT at 7.) On August 6, 2009, the National Science Board authorized the Director of the NSF, at his discretion, to approve funding for construction of the ATST, subject to completion of the Federal environmental compliance requirements. On December 3, 2009, the Director of the NSF approved the funding of the construction of the ATST Project at the Mees site. (Ex. A-11 at 77-78.)

60. AURA is a consortium of universities, educational and other non-profit institutions, which operates world-class astronomical observatories. AURA is NSF's awardee for the ATST, and AURA's role in the ATST Project is to provide management oversight for the National Solar Observatory (NSO), which AURA operates under a cooperative agreement with the NSF. (UH FOF 73; Foltz DT at 7.)

61. The NSO, which is an organization of AURA, has the responsibility for construction and operation of the ATST. (UH FOF 74; Foltz DT at 8.)

62. NSO is a federally funded national laboratory. It is funded primarily by the NSF, but also receives grants from National Aeronautics and Space Administration (NASA) and the U.S. Air Force. NSO's mission is to provide state-of-the-art observing facilities and instruments, provide research opportunities to the U.S. solar research community, maintain archives of solar observations and make them available to researchers and the space weather prediction community, and conduct its own solar research program into the fundamental physical processes occurring on and in the Sun and the causes of solar and stellar variability and activity. (Keil DT at 1.)

63. NSO has a strong record of outreach programs that span from public, K-12, to undergraduate and graduate students, to workforce development. While some NSO programs are stand alone, many of them include strong partnerships. On Maui, AURA is currently developing a partnership with the Akamai Internship program[4] which includes workshops on Maui and bringing Akamai Internship graduates to work at NSO. The ATST Project will also involve a

[4] The Akamai Internship Program is designed for all community college and university undergraduates in Hawai'i, and kama'āina studying on the mainland, who are interested in pursuing a career in science, technology, engineering or math (STEM) fields and have had to overcome barriers to achieve their educational and/or career goals. Each student is matched with a mentor and is integrated as a member of the mentor's group with daily guidance. (Ex. A-2, Vol. I at 1-24.)

program at Maui College to improve the achievement success of native Hawaiians in math and science. (Foltz DT at 29-32; Keil DT at 6.)

64. The physical construction of the ATST involves an open-air, off-axis Gregorian telescope with a 4-meter (13.1 ft) primary mirror. The telescope will sit above a rotating instrument turntable. Relay optics will transmit the image from the secondary mirror to science instruments on the rotating instrument turntable. The telescope and instruments will rotate simultaneously to track the Sun across the sky and thus provide a stable image of the Sun. (Foltz DT at 4.)

65. The ATST facilities would include: (1) the observatory facility, which includes the telescope, its pier, and the rotating instrument platform; (2) the telescope enclosure; (3) the Support and Operations Building (S&O Building) adjacent to the observatory; (4) a Utility Building attached to the S&O Building by an underground utility conduit; (5) parking for the facility as a whole; and, (6) modifications to the existing Mees Solar Observatory.[5] (Ex. A-2, Vol. I at ES-8.)

66. The entire ATST facility would include approximately 43,980 square feet of new building space (including the telescope enclosure), within a site footprint of 0.74 acres. (Ex. A-2, Vol. I at ES-9.)

67. The height of the telescope, defined as the distance from ground level to the rotation center of the telescope, will be 28 meters (92 feet). The telescope height dictates an observatory structure that is no taller than 43.5 meters (142.7 feet) in height and 25.6 meters (84 feet) in diameter. (Foltz DT at 4; Ex. A-1 at 11.)

[5] The proposal includes using some of the facilities in the existing Mees Solar Observatory to reduce the need to construct new building space to support some of the construction and operational requirements of the ATST. The potential modifications include renovation of the shop space to serve as a general machine shop for both the Mees facility and the ATST. (Ex. A-2, Vol. I at 2-21.)

68. The S&O Building would be a multi-story structure attached to the lower enclosure of the observatory which accommodates observing-related activities that require direct adjacency to the telescope. The building would contain a large docking bay with a 20-ton crane, equipment and equipment storage, telescope maintenance facilities, offices, workrooms, laboratories, and the control room for the telescope. The S&O Building would also contain the large-scale platform lift (elevator) needed to move telescope parts between levels. Other equipment in the building would include a helium compressor, vacuum pump, and liquid nitrogen tanks. (Foltz DT at 5.)

69. The Utility Building would be a metal structure that would provide space for mechanical and electrical equipment that requires complete thermal and vibration isolation from the telescope. The Utility Building would be connected to the S&O Building by an underground utility tunnel. A preliminary list of the equipment to be housed in the Utility Building includes a 500 KVA generator and associated automatic transfer switchgear, two 40-ton chillers, one 15-ton chiller, three 78-ton heat recovery chillers, a fluid cooler, an air compressor, a vacuum pump, and three uninterruptible power supply units. Because this equipment generates significant levels of audible noise, sound-abatement devices would be built into the equipment, and the walls and roof of the Utility Building would incorporate effective sound blocking materials. An electrical transformer and three ice storage tanks would be located outside, adjacent to the Utility Building. (Foltz DT at 5.)

70. Some of the additional facilities associated with the telescope facility would include the following: a grounding field consisting of a shallow trench around the facility, filled with conductive concrete and counter poise to provide an electrical ground for the observatory, which is in an environment where lightning strikes may occur; a wastewater treatment plant, designed in

compliance with Hawaii Department of Health regulations; a storm water management system; an electrical transformer; and a diesel generator for use in case of power outages. (Foltz DT at 6.)

71. The proposed ATST Project construction would involve land clearing, demolition, grading/leveling, excavation, soil retention and placement, construction, remodeling of the Mees Solar Observatory (MSO), paving, and other site improvements. (Ex. A-2, Vol. I at ES-9.)

72. Land clearing using bulldozers and other heavy machinery would be required. Existing vegetation is very sparse and no federally threatened silverswords or other protected species have been identified on the Mees site. (Ex. A-2, Vol. I at ES-9.)

73. Minimal removal of vegetation would be necessary to clear the primary site for the proposed ATST Project. Facilities to be demolished or removed at the MSO facility include the ATST test tower foundation, tower and weather station, driveway, parking area, rock wall borders, generator and other selective demolition at the shop/utility area, and a facility underground cesspool. Demolition would be staged, beginning with the removal of on-site structures and continuing later with the interior work in the MSO facility after the proposed ATST structure is nearly complete. The total duration of demolition activities conducted at different times during the course of the project would be approximately two months. (Ex. A-2, Vol. I at ES-9-10; HO Site visit.)

D. Site Selection

74. Because of the small land area available for development in the HO site, projects located at the HO site must be carefully selected to maximize the scientific productivity and benefits to the UH and the State. UHIfA's planning must be aimed at reserving the limited number of sites at the HO to facilities that can make the greatest scientific use of the excellent site attributes, and to

those that will play a major role in the University's programs of education and public outreach. (Ex. A-9 at 1.)

75. There are three primary science objectives to be achieved by the ATST. Objective 1 is the ability to efficiently observe the solar atmosphere at or near the diffraction limit of the telescope (in other words, correcting for the turbulence in the Earth's atmosphere). Objective 2 is the ability to efficiently observe the faintest outer layers of the solar atmosphere, the corona, adjacent to the very bright photosphere. Objective 3 is the ability to observe the solar atmosphere at wavelengths from visible through mid-infrared wavelengths. (Foltz RT at 1-2; A-1, part 1 at 10; Ex. A-2, Vol. I at ES-4.)

76. In 2000/2001, a working group was formed to translate the science goals into design specifications for the telescope and site characteristics that would permit the telescope to obtain data that could meet the science objectives. A conceptual design for the telescope was developed that could fulfill the design specifications and, hence, meet the science goals if properly sited. (Foltz Rebuttal Written Testimony ["RT"] at 2; Ex. A-2, Vol. II, App. O.)

77. In 2001, the Site Survey Working Group was formed to evaluate potential sites based on whether the sites would meet the scientific objectives and, thus, the purpose and need of the proposed ATST Project. (Ex. A-11 at 6.)

78. There were two primary criteria used to determine whether the six sites would meet science requirements: 200 annual hours of excellent "seeing" conditions (referring to conditions under which the images delivered through the atmosphere are very sharp) and 480 annual hours of low sky brightness (defined as less than 25 millionths of the brightness of the solar disk) immediately adjacent to the "limb" of the solar disk (the "limb" of the Sun is defined as the edge of the Sun's disk). (Ex. A-2, Vol. I at 2-4 to 2-5; Foltz RT at 3.)

79. Additional criteria considered by the Site Survey Working Group included precipitible water vapor, which is important for observations at infrared wavelengths, dust levels, temperature extremes, the feasibility of construction, and proximity to support facilities for telescope operations. These additional criteria are set forth in more detail on pages 1 and 2 of the Site Selection Report. (Foltz RT at 3; Ex. A-2, Vol. II, App. O.)

80. The "seeing" criterion is important because it is affected by turbulence in the Earth's atmosphere at all levels. Since solar telescopes operate during the day, a dominant issue is turbulence driven by the solar heating of the ground near the telescope structure. The warm ground heats the air, creating turbulence at low elevation that blurs the image of the Sun. This is referred to as "ground effects." It is vital that daytime astronomy, such as solar observations, take place in locations that limit these effects. (Ex. A-11 at 8; Foltz RT at 4.)

81. The best way to reduce ground effects is to build the telescope in a windy place near large bodies of water, both of which act to equalize air temperature. The shape of the topography around the telescope site also has a strong influence on the effects of wind and water in reducing ground effects. (Ex. A-11 at 9; Foltz RT at 4.)

82. The Site Survey Working Group established the criteria of minimal required conditions, such as the 200 hours of excellent seeing and the 480 hours of low sky brightness, to name two, by means of probabilistic arguments. That is, the joint probability of, for example, a solar flare occurring during the day, the probability of the sky being clear, and the probability of the seeing being excellent when the flare occurred, was calculated. This can then be used to estimate the probability that a flare will be observable in any given hour, which can then be inverted to give the minimum number of hours required to ensure that a successful observation can be carried out. (Foltz RT at 5.)

83. The sky brightness criterion is important for studies of the tenuous outermost layer of the Sun's atmosphere, the corona. The corona is intrinsically very faint, significantly fainter than the disk, or photosphere of the Sun. Light from the photosphere scattered by dust or other aerosols in the Earth's atmosphere makes the sky adjacent to the Sun look bright. Accordingly, the brighter the sky, the more difficult it is to study the faint corona, as the coronal light is overwhelmed by the scattered photospheric light. (Foltz RT at 5.)

84. Using probabilistic calculations analogous to those described above, the Site Survey Working Group estimated the minimum number of hours of low sky brightness that are required in order to carry out the critical measurements. Such observations include the evolution of prominences, the measurement of the magnetic fields in coronal structures and their evolution with time. (Foltz RT at 5.)

85. The Site Survey Working Group first developed an initial list of 72 candidate sites. (Ex. A-2, Vol. II, App. O at 14.)

86. The 72 potential sites were reduced to six candidate sites based primarily on considerations of feasibility and observing conditions. The six sites were Big Bear Solar Observatory, California; Observatorio Roque de los Muchachos, La Palma, Canary Islands, Spain; Panguitch Lake, Utah; Sacramento Peak Observatory, Sunspot, NM; Observatorio Astronomico Nacional, San Pedro Martir, Baja California, Mexico, and Haleakalā.[6] (Ex. A-2, Vol. II, App. O at 1.)

[6] Mauna Kea and Mauna Loa were also evaluated. Mauna Kea was eliminated from further consideration because only one area within the science reserve was available, and it was revealed from a prior site survey to have poor daytime seeing. (Ex. A-2, Vol. I at 2-4; Ex. A-11 at 8.) As a younger cinder cone, Mauna Kea also has higher ambient winds and is a dustier location. For studies of the Sun's corona, dust reduces the contrast and could potentially reduce the ATST's capability as a coronagraph, as a telescope specifically to study the Sun's corona. (Tr. 7/18/11 at 36-37 (Foltz).) Mauna Loa was eliminated from

87. The six candidate sites were instrumented for detailed study to determine if they met the purpose and need of the proposed project. The test towers were instrumented with devices that measured the overall quality of the "seeing," which is the turbulence in the Earth's atmosphere as a function of height above the ground, the sky brightness, dust levels, the amount of water vapor above the sites, and meteorological conditions. The instruments collected measurements for 12 to 18 months at each site, allowing a uniform comparison of the sites with respect to the evaluation criteria. (Ex. A-11 at 7-8; Foltz RT at 2-3.)

88. After the initial testing, the six candidate sites were divided into two groups based on observing conditions. (Ex. A-11 at 9; Ex. A-2, Vol. I at 2-5.)

89. The first group, consisting of three locations (Sacramento Peak, San Pedro Martir, and Panguitch Lake), were eliminated because measurements demonstrated that the atmospheric conditions were never of sufficient quality for achievement of the ATST science goals. (Ex. A-2, Vol. I at 2-5; Foltz RT at 6.)

90. The three remaining locations, Big Bear Lake (California), La Palma (Canary Islands, Spain) and Haleakalā, were tested for an additional year. (Foltz RT at 6.)

91. La Palma and Big Bear Lake were ultimately found to have demonstrated deficiencies in one or more of the primary scientific evaluation criteria. Because siting the telescope at either La Palma or Big Bear Lake would substantially and irrevocably reduce the telescope's scientific output, and thus not meet the purpose and need of the ATST, both were eliminated from further consideration. (Foltz RT at 6.)

further consideration because the plot size was too small to accommodate the proposed ATST. (Ex. A-2, Vol. I at 2-4; Ex. A-11 at 8.)

92. La Palma was found to meet the requirement for hours of highest-resolution seeing, but was deficient in meeting the required level for one of the primary science outputs – sufficient available hours of dark daylight sky close to the Sun's limb. This is largely due to dust in the atmosphere blown by the prevailing winds from Saharan Africa. (Foltz RT at 6.)

93. Big Bear Lake was eliminated because it was deficient in meeting the required levels for both of the primary science requirements – sufficient hours of highest resolution seeing and sufficient available hours of dark daylight sky close to the Sun's limb. (Foltz RT at 6.)

94. Haleakalā met or exceeded the primary scientific evaluation criteria for both sufficient hours of highest resolution seeing and sufficient available hours of dark daylight sky. (Foltz RT at 6.)

95. One alternative suggested was to have the telescope based in space, however, the type of solar research to be conducted by the ATST cannot be conducted using space technology. (Foltz RT at 7.)

96. The ATST is designed to measure and understand the influence of solar magnetic fields on the outer solar atmosphere on the interplanetary plasma between the Earth and the Sun. (Foltz RT at 7.)

97. Virtually all of the Sun's dynamic effects on the Earth can be traced back to solar magnetic fields and the ATST would measure these fields for the first time at the required level of detail throughout the solar atmosphere. The technology simply does not exist for doing the required measurements from space. (Foltz RT at 7.)

98. The critical issues are the ability to discern detail, which is limited by the diameter of the primary light-collecting optic and the ability to collect sufficient light which is limited by the area of the primary optic. With regard to detail, the expected size of the smallest magnetic features

on the solar surface or "photosphere" is about 20-30 kilometers. Resolving such a size at the Earth-Sun distance requires a telescope with a four meter diameter light-collecting optic. The Hubble Space Telescope only has a 2.5 meter diameter primary mirror. With regard to the light-gathering power, the colleting area of the ATST primary mirror makes it the first and only instrument that will have the sensitivity to detect and measure the magnetism in the Sun's corona that reaches into space and eventually to the Earth. There is currently no instrument either ground or space-based that can carry out these critical measurements. (Foltz RT at 7; Tr. 7/18/11 at 128-130.)

99. Scientists are decades away from having the technical capability to launch a solar telescope with the necessary 4-meter mirror, like the ATST, into space, and to maintain and service it for approximately 50 years, the operations lifetime required to adequately sample the 22 year periodic cycle of solar activity. (Foltz RT at 7.)

100. Compared to existing solar telescopes, the ATST will be superior. (Foltz RT at 7.)

101. There are several new solar observatories, of which the Solar Dynamics Observatory (SDO), a space-based instrument, and the New Solar Telescope (NST), at Big Bear Observatory, have the highest performance. (Foltz RT at 7.)

102. The overall performance of a telescope is largely a function of the diameter of its primary mirror. The ATST primary mirror will be 4 meters in diameter, as compared to the SDO at 0.5 meters and the NST at 1.5 meters. (Foltz RT at 7.)

103. Specifically, the detail that these instruments can discern is inversely proportional to the diameter of their primary mirrors and the light-gathering power is directly proportional to the diameter squared. Compared to SDO, the ATST will be able to observe a feature in the solar atmosphere 64 times faster and will discern detail 8 times smaller. The ATST will be 6.3 times faster than NST and will resolve features 2.5 times smaller. (Foltz RT at 7-8.)

104. Furthermore, the ATST's optical design will allow it to observe an area on the Sun (the telescope's "field of view") 64 times larger than SDO and 6.3 times larger than NST. The ability to measure phenomena quickly is extremely important since the Sun's atmosphere is dynamic and changes on timescales of minutes to hours. (Foltz RT at 8.)

105. Slower telescopes, like the SDO or NST, are not able to observe the time evolution of a feature as well as the ATST. Simply put, the feature will change while the observations are being made, blurring the image. The ATST's performance will greatly exceed any instrument on the ground (NST) or in space (SDO) in these areas. (Foltz RT at 8.)

106. Although there are other solar telescopes, none can achieve the science objectives of the ATST. (Tr. 7/18/11 at p. 127-28 (Foltz).)

107. The ATST would be the largest and most capable solar telescope in the world. (Ex. A-1 at 9.)

108. Haleakalā is the ideal location for studying the Sun. The existing NSF-funded, ground-based solar telescope facilities operated by the NSO were built more than a generation ago. They are no longer capable of providing the data needed to test and challenge evolving models and understanding of the Sun. (Keil DT at 5.)

109. The ATST represents a once-in-a-lifetime investment of significant expense and as such the selection of the site is critically important. The two primary science drivers – excellent seeing and dark daylight sky close to the Sun's corona – were critical when evaluating potential sites for the telescope. To measure small features on the Sun requires very high spatial resolution, which in turn requires a telescope with a large mirror. However, if the telescope is placed at a site where the Earth's atmosphere is very turbulent, the resulting images will be blurred. Haleakalā has the least turbulence of all tested sites. To see the outer layers of the Sun which are extremely dim, sky

conditions at the observing site need to be extremely dark, that is, the amount of dust that can scatter light needs to be at a minimum. Haleakalā is the ideal clean air site. (Keil DT at 5.)

110. After careful examination of many ground-based sites, Haleakalā was the only site that provided the conditions that allow the large aperture ATST to meet its scientific objectives. Haleakalā provides the best skies for high resolution observations, and is the only site allowing the ATST to achieve its highest resolution of time scales needed to examine the evolving solar magnetic filed. Haleakalā has the cleanest and darkest daytime skies of all sites examined, allowing the ATST to examine the important outer layers of the Sun's atmosphere where activity is triggered. (Keil DT at 6.)

V. SECTION 106 CONSULTATION

111. The National Historic Preservation Act (NHPA), 16 U.S.C. § 470f, and its implementing regulations, 36 C.F.R. Part 300, requires federal agencies to consider whether its undertakings will have impacts on historic properties eligible for listing in the National Register of Historic Places.[7] The core of the NHPA process is the Section 106 consultation process. (Ex. A-2, Vol. I at ES-20.)

112. Section 106 consultation is a requirement of the NHPA. (Foltz DT at 25; Ex. A-10.)

113. Section 106 of the NHPA requires federal agencies to take into account the impacts of the agencies' undertakings on historic properties and to afford the Advisory Council

[7] An "undertaking" means a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval. 36 CFR § 800.16(y).

on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings. (Ex. A-2, Vol. I at ES-71.)

114. The goal of the Section 106 consultation process is to identify historic properties potentially affected by the federal agency's proposed undertaking, assess the effects of the undertaking on historic properties and seek ways to avoid, minimize or mitigate any adverse effects on historic properties. This goal is accomplished through consultation among the federal agency and other interested parties regarding the potential impacts of the undertaking on historic properties. In the State of Hawaii, where historic properties of significance are involved, a federal agency engaging in this process is required to consult with the DLNR's State Historic Preservation Officer (SHPO), and all interested Native Hawaiian Organizations (NHOs)[8] and individuals. (Ex. A-2, Vol. I at ES-20 to ES-21.)

115. The Section 106 consultation process may result in a programmatic agreement which represents the final result of consultations between the federal agency proposing the undertaking, the SHPO, and interested NHOs and individuals and agreement on measures to avoid or mitigate the adverse effects of the federal agency's undertaking. The signing of the programmatic agreement by the ACHP represents the conclusion of Section 106 compliance obligations. (Foltz DT at 27.)

116. The Section 106 consultation process has assisted the NSF in determining the affected environment and identifying mitigation measures. (Ex. A-2, Vol. I at ES-20 and ES-46.)

117. The "proposed undertaking" by the NSF includes the construction and the initial phase of the operation of the ATST Project including an observatory facility, telescope enclosure,

[8] A Native Hawaiian Organization means any organization which serves and represents the interests of Native Hawaiians; has as a primary and stated purpose the provision of services to Native Hawaiian; and has demonstrated expertise in aspects of historic preservation that are significant to Native Hawaiians. 36 CFR § 800.16(s).

support and operations building, utilities building and parking area (proposed Undertaking). The proposed Undertaking will also include activities in support of the ATST Project construction and operation including land clearing, demolition activities, grading/leveling, excavation, soil retention and placement, construction, remodeling of the Mees Solar Observatory building, paving, and other site improvements. The proposed Undertaking further includes the use of the Park Road. (Ex. A-10 at 1.)

118. The NSF defined the Area of Potential Effects (APE) for the proposed Undertaking to include the HO site and a fifty foot corridor along the historic Park Road. (Ex. A-10 at 1.)

119. The NSF, through the Section 106 consultation process, has determined that the summit of Haleakalā is a historic property that has spiritual and cultural significance to Native Hawaiians and that the summit is also a Traditional Cultural Property (TCP) that is eligible for listing on the National Register of Historic Places. (Ex. A-10 at 2.)

120. The Section 106 consultation process for the ATST Project began in July 2005 with a public invitation for interested parties to participate in the process, published both in the Federal Register and the State of Hawaii, Department of Health's Office of Environmental Quality Control Bulletin. (Foltz DT at 26.)

121. An invitation letter was also sent to potentially interested parties. Invitations were sent for the first formal consultation meeting and notice of the meeting was published in Maui newspapers. (Foltz DT at 26.)

122. Once the NSF determined that there were historic properties within the APE that were eligible for or listed on the National Register of Historic Places, and that the ATST would result in adverse effects on those historic properties, the NSF entered into extensive consultations,

both formal and informal, to determine ways in which to address those effects through avoidance, minimization, or mitigation. (Foltz DT at 26-27.)

123. At the consultation meetings, the public was invited to participate in the Section 106 consultation process through discussions among NSF and the consulting parties, by providing testimony at the public hearings, by providing written testimony, and through informal meetings. (Foltz DT at 28.)

124. Members of Kilakila were invited to participate in the Section 106 consultation process. The very first invitations to participate were sent to Ms. Helm and Mr. Raymond. Kilakila, along with other Native Hawaiian Organizations, continued to be invited to participate throughout the consultation process. (Foltz DT at 27.)

125. All Native Hawaiian Organizations and individuals who wished to participate in the process were included. In other words, participation was not by invitation only nor was there an effort to exclude any person or organization from the process. As more Native Hawaiian Organizations became known to NSF, they were added to the list of Native Hawaiian Organizations receiving notice of consultation and other public meetings. (Foltz DT at 27.)

126. The first formal consultation meetings were held in March 2006. Over 30 formal and informal consultation meetings were held with consulting parties. (Foltz DT at 27.)

127. As of December 2009, the consulting party list had grown to over 141 persons and entities. Additional people have been added to the consulting parties list following the finalization of the Programmatic Agreement (Ex. A-10) and issuance of NSF's Record of Decision (Ex. A-11)[9]. (Foltz DT at 28; UH FOF 130.)

[9] The Record of Decision is a written discussion of the record developed by the NSF in connection with its consideration of anticipated environmental impacts, public input, and the NSF's decision to approve funding of the construction of the ATST. (Foltz DT at 45.)

128. Invitations to submit Section 106 resolution proposals were issued throughout the process. Ms. Helm, Mr. Lindsey and Mr. Raymond were included on that distribution list. (Foltz DT at 28-29.)

129. Written proposals for mitigation were submitted during the consultation process, during the period of 2006 to 2009. (Ex. A-2, Vol. I at 5-48.)

130. The Section 106 consultation process resulted in ten proposals for mitigating adverse effects, though one was subsequently withdrawn.[10] (Foltz DT at 29; Ex. A-2, Vol. I at 5-48 to 5-90.)

131. Although many of the consulting parties stated that the mountain is sacred and spirituality cannot be mitigated, other consulting parties recognized the cultural significance of the mountain but supported mitigation of adverse effects through educational programs or workforce development programs. (Ex. A-11 at 69.)

132. The various mitigation proposals were considered between June 2008 and June 2009. Following the June 2009 consultation meeting, a draft Programmatic Agreement incorporating as many mitigation proposals as possible was circulated amongst the consulting parties. On September 21, 2009, a final draft was sent to all consulting parties and the Programmatic Agreement was fully executed by the primary signatories (NSF, ACHP, the National Park Service (NPS) and the SHPO) on November 13, 2009. (Foltz DT at 32; Ex. A-11 at 73.)

[10] The Advisory Council on Historic Preservation (ACHP) advised that the proposal submitted by Maui Community College (now known as the University of Hawaii Maui College) requesting funding to improve the achievement success of native Hawaiians in math and science was not appropriate mitigation for purposes of Section 106. The proposal was later adopted as mitigation under the NSF's Record of Decision. (Foltz DT at 30; Ex. A-11 at 63.)

133. The Programmatic Agreement represents the final result of those consultations and reflects how NSF has committed to addressing the adverse effects identified in the Section 106 consulting process. (Foltz DT at 27; Ex. A-10.)

134. The Programmatic Agreement was signed by the NSF and the consulting parties, including the Native Hawaiian Organizations identified in Exhibit C to that Agreement. (Ex. A-10.)

135. The Programmatic Agreement allows for continued opportunities for Native Hawaiian Organizations, consulting parties, and members of the public to consult regarding the treatment of historic properties associated with the construction or operation of the ATST. (Foltz DT at 27.)

136. The NSF's commitment to fund and implement the mitigation measures contained in the Programmatic Agreement is contained in the Record of Decision. (Foltz DT at 45.)

137. The Record of Decision covers numerous subjects. The NSF's Record of Decision describes environmental compliance with the National Environmental Policy Act (NEPA) and summarizes anticipated environmental impacts. The NSF sets forth its commitment to mitigation of environmental consequences. Compliance with Section 106 of the NHPA and the Endangered Species Act is also discussed. (Ex. A-11; Foltz DT at 45.)

138. The Record of Decision considered the scientific merit of the ATST Project, the project management plan, the environmental consequences and the mitigation measures associated with the construction of the ATST at the Mees site, and concluded that the benefits to be derived from the ATST Project outweighed the environmental impacts. The Record of Decision approved the funding of the construction of the ATST Project, including the mitigation measures. (Ex. A-11 at 77-78.)

139. Under the Record of Decision, besides the mitigation measures contained in the Programmatic Agreement, the NSF adopted the Maui College proposal as additional mitigation. (Foltz DT at 30.)

VI. ENVIRONMENTAL REVIEW

140. The NSF prepared a joint federal and state Final Environmental Impact Statement (FEIS) for the ATST Project. (Ex. A-1, part 1, Executive Summary; Ex. A-2, Vols. I - IV.)

141. The purpose of the FEIS is to identify the environmental impacts and cumulative environmental impacts associated with the construction and operation of the ATST. (Ex. A-2, Vol. I at 4-1 to 4-226.)

142. The FEIS also proposes measures to mitigate the impacts of the construction and operation of the ATST. (Ex. A-2, Vol. I at 4-227 to 4-232.)

143. The FEIS studied the proposed action at the Mees site, at the alternate Reber Circle site, and a no-action alternative. (Ex. A-2, Vol. I at 4-1.)

144. The NSF published the FEIS in July 2009. On July 30, 2009, the FEIS was accepted by Virginia Hinshaw, Chancellor of the University of Hawaii at Manoa. Notice of acceptance of the FEIS was published in the Office of Environmental Quality Control's publication, The Environmental Notice, on August 8, 2009. (Ex. A-3.)

A. Anticipated Impacts of the ATST Project

145. The FEIS identifies likely impacts on the environment, including short- and long-term impacts, and direct, indirect, and cumulative impacts. (Ex. A-2, Vol. I at 4-1.)

146. Direct impacts would be caused by the proposed ATST Project's implementation at either the Mees site or the Reber Circle site, and would occur at the chosen site when the project is implemented. Indirect impacts would be caused by the proposed ATST Project at

either the primary or alternative sites, but would occur later in time or at a distance from the proposed ATST Project. Cumulative impacts would result from adding the total impacts of past, present, and reasonably foreseeable future actions to impacts likely caused by the proposed ATST Project. (Ex. A-2, Vol. I at 4-2.)

147. Each resource has its own impact intensity standards even though the impacts are described by the same levels of significance. (Ex. A-2, Vol. I at 4-2.)

1. Cultural, Archaeological and Historic Impacts

148. The NSF commissioned two cultural assessments to be conducted in connection with the ATST Project. The Cultural Resources Assessment and the Supp. Cultural Impact Assessment were conducted in connection with the Draft EIS and the FEIS for the ATST Project. (Ex. A-2, Vol. II, App. F(2) at 1.) The Supp. Cultural Assessment was commissioned as a result of specific concerns raised by the commenting public to the cultural and historical evaluation included in the Draft Environmental Impact Statement.

149. Historical research, public testimonies and community consultations[11] confirm that Haleakalā is a well known wahi pana (storied place). (Ex. A-2, Vol. II, App. F(2) at 104.)

150. The cultural assessments also revealed that Haleakalā is considered one of the most sacred sites on Maui as the summit and crater of Haleakalā was considered wao akua "where the gods live." (Ex. A-2, Vol. II, App. F(1) at iii.) According to the Supp. Cultural Assessment, religious pursuits and ceremonies were among the primary activities occurring atop Haleakalā during traditional Hawaiian times. The summit of Haleakalā is an area that is

[11] The historical research, public testimony and community consultations were conducted by Cultural Surveys Hawaii, Inc. for the NSF in connection with the Supp. Cultural Impact Assessment for the ATST Project EIS. (Ex. A-2, Vol. II, App. F(2).)

described to have been "kapu in traditional times, to all but ali'i, kahuna and their haumana." (Ex. A-2, Vol. II, App. F(2) at 24 and 105.)

151. In an interview with Kahu Charles Maxwell, Sr., Principal Researcher for CKM Cultural Resources LLC, Ms Hokulani Holt-Padilla describes Haleakalā to be wao akua and explains that "as a wao akua, that is where the gods live and whenever we go as humans, we must go in a sense of humbleness and in a sense of asking and in a sense of not disturbing unduly." (Ex. A-2, Vol. II, App. F(2) at 105-106.)

152. Testimony described the cinder and rock of Haleakalā as being the kino lau or the physical, body form of the goddess Pele. The excavation required for the proposed ATST is thought of, by some, as digging into Pele, into her kino lau, which is believed to be a desecration of Pele and, therefore, a desecration of one of the sacred aspects of the mountain. (Ex. A-2, Vol. II, App. F(2) at 106.)

153. Testimony revealed a deep sense of a protective nature over Haleakalā and the idea that it is the Hawaiian people's responsibility to properly care for Haleakalā, not just for themselves but for future generations. (Ex. A-2, Vol. II, App. F(2) at 106.)

154. According to historical research, testimonies, formal letters and community consultations, some people believe that construction of the ATST Project will have an adverse impact on a very important cultural site that will destroy the character of the area, disrupt the sanctity of the mountaintop, interrupt views, disturb the quiet and violate the tranquility. (Declaration of Lilikala K. Kame`eleihiwa ["Decl. of Kame`eleihiwa"] at 7; Ex. A-2, Vol. II, App. F(2) at 105.)

155. Letters and testimony portrayed Haleakalā as a sacred place of prayer to the Gods and a place to connect to ancestors. (Ex. A-2, Vol. II, App. F(2) at 72-79; Tr. 7/19/11 at 131 (Raymond).)

156. Comments were received that the summit of Haleakalā was used by native Hawaiians both as a place of burials of the dead as well as a place for the burying of piko (umbilical cord). Burial places of the dead at Haleakalā include Makaopalena, Kealaohia, Puukilea, Hamohamo, Alalakeiki and Niuaiaawa. (Ex. A-2, Vol. II, App. F(2) at 103; Decl. of Kame`eleihiwa at 8.)

157. Throughout the development of the LRDP, the Management Plan, the FEIS, the Section 106 consultation process and the process of obtaining the CDUP, some native Hawaiians expressed that they believed that impacts from the ATST can and should be mitigated while others believed that impacts to cultural resources can never be mitigated. (Maberry RT at 9.)

158. In 2005, UHIfA contracted with native Hawaiian stonemasons to erect a west-facing ahu within the HO site set aside area A.[12] (Maberry DT 12.)

159. In 2006, in the spirit of makana aloha for the ATST Project, the UHIfA contracted the same stonemasons to erect an east-facing ahu near the Mees Solar Observatory. (Maberry DT 12.)

160. The east-facing ahu is dedicated as Pā ele Kū Ai I Ka Moku and the west-facing ahu is dedicated as Hinala'anui. (Ex. A-2, Vol. I at ES-5.)

[12] The University set aside in perpetuity an area within the HO site consisting of approximately 24,000 square feet (0.55 acre), located southwest of the Air Force Maui Space Surveillance Complex for the sole reverent use of native Hawaiians for religious and cultural purposes. (Ex. A-6 at 42.) This area is shown as "Area A" on Figure 2-2 of the Management Plan. (Ex. A-6 at 12.)

161. The consecration of the east-facing ahu at the HO site by a kahu has allowed Mr. Raymond to practice his religion at the ahu and to make a connection to his ancestors and/or Hawaiian deities. (Tr. 7/19/11 at 128-31 (Raymond).)

162. The proposed ATST would be located approximately 90 feet away from the east-facing ahu and the ATST would sit slightly above the east-facing ahu. (Decl. of Raymond at 5.)

163. Mr. Raymond testified that he had buried his daughter's piko near the summit of Haleakalā, but he did not testify that the piko was buried within the HO site nor did he state that the piko must be buried within the HO site. (Decl. of Raymond at 20.)

164. Mr. Raymond did not testify that his traditional practices at the east-facing ahu will cease if the ATST Project is constructed.

165. Members of Kilakila testified that they go to Haleakalā, especially during significant times such as the solstices and equinoxes, to welcome the sun. In particular, Ms. Helm testified that she believed the cultural practice of going to the summit during these significant times started prior to 1892, although she could not say for sure. In addition, Ms. Helm testified that she goes to the summit, to the parking area of the National Park Service, to conduct these practices. (Tr. 4/4/11 at 22-23 (Helm).)

166. With the exception of testimony regarding the use of the east and west-facing ahu, no evidence was presented by Kilakila that traditional and customary practices were being conducted in the HO site or at the proposed ATST site.

167. Kilakila did not provide evidence of any native Hawaiian usage of the summit of Haleakalā or the HO site that was established in practice prior to November 25, 1892.

168. Several people provided testimony as part of the Supp. Cultural Assessment that conducting Native Hawaiian traditional cultural practices often requires an uninterrupted view of

the summit area to make an emotional and physical connection to a place of importance. (Ex. A-2, Vol. II, App. F(2) at 109-10.)

169. The presence of manmade structures on the summit already creates an interruption of the view. The addition of the proposed ATST Project would only slightly increase the degradation of the summit as a traditional cultural property. (Ex. A-2, Vol. I at 4-177.)

170. The FEIS determined that although the size and color of the ATST would have a major impact on native Hawaiians conducting traditional cultural practices, which often requires an uninterrupted view of the summit, because of the past construction of man made structures on the summit and the current view, which is already interrupted, the addition of the ATST Project would be incremental in degradation of the summit as a traditional cultural property. The addition of the ATST Project would result in readily detectable, localized effects, with consequences at the regional level to traditional cultural practitioners within greater Hawai'i. The cumulative effects on traditional cultural resources of past actions combined with the ATST Project would be major, adverse, long-term and direct. (Ex. A-2, Vol. I at 4-177.)

171. The FEIS determined that although the No-Action Alternative would not contribute to changes in traditional cultural, historic, or archeological resources within the HO site, for those who believe that any man-made development in the summit area constitutes a form of desecration, those people would continue to find that the current development results in major, adverse, long-term, direct effects to traditional cultural resources. (Ex. A-2, Vol. I at 4-179.)

172. A comprehensive archaeological inventory survey (AIS) of the HO site was completed in 2002. The AIS was reviewed and approved by State Historic Preservation Division (SHPD) on July 10, 2006. The AIS identified 29 new features and 5 excavation units which

were used to sample selected features that were located in some of the previously undocumented sites. Most of the newly identified features are temporary habitation areas or wind shelters. Two features at one site are petroglyphs and one new site was interpreted as a possible burial. Two small platforms thought to have ceremonial functions were also identified, as was a possible trail segment. (Ex. A-2, Vol. I at 3-28.)

173. The general lack of material culture remains suggests that the area comprising the HO site was utilized for short term shelter purposes, rather than extended periods of temporary habitation use. The newly identified sites are tentatively interpreted as indigenous cultural resources. (Ex. A-2, Vol. I at 3-29.)

174. One historic site is present at the HO site. It is identified as the Reber Circle site, which is a remnant of early 1950's astronomy construction that lies at the peak of Pu'u Kolekole. It is designated by the State Inventory of Historic Places (SIHP) as Site 5443 (UHIfA 2005) and is eligible for listing on the NRHP under Criterion "A" because of its association with mid-20th century scientific studies at Haleakalā, and under Criterion "D" for its information content. The bulk of this structure was dismantled about 18 months after the facility was completed. This site is composed of a concrete and rock foundation. (Ex. A-1, Pt. 1 at 35.)

2. Visual Resources and View Planes

175. Areas of potential visibility of the proposed ATST Project were identified through the use of a viewshed analysis – a computer generated process. (Ex. A-2, Vol. I at ES-39.)

176. From within Haleakalā National Park, the prominence of the proposed new structure at the Mees site, in views from within two miles of the proposed ATST Project site (including Pu`u Ula`ula Overlook, areas of Haleakalā National Park adjacent to the HO site, and the upper Park Road corridor), the ATST would be visible to the point of co-dominance with

other nearby structures. It would intensify the already developed appearance in its immediate surroundings, and would also appear to increase slightly the amount of horizontal space occupied by structures in views from within the Park. The new structure would not substantially alter the existing visual character visible in any view. (Ex. A-2, Vol. I at 4-56.)

177. In views from further away in the Park (namely portions of land within the Crater and the lower Park Road corridor, including Hosmer Grove), the ATST Project would be barely detectible, if visible at all from these locations. (Ex. A-2, Vol. I at 4-48 to 4-49.)

178. During the construction phase, however, crane equipment may be visible from outside the Park. (Ex. A-2, Vol. I at ES-39.)

179. From the Pu'u Ula'ula Overlook, approximately .3 miles from the Project site, the construction cranes, when raised into operating position, would be readily visible when extended during daytime working hours and the cranes would obstruct a small portion of the horizontal landscape. The ATST structure itself would become visible from the Overlook when the structure reaches a height of a little over 30-feet. (Ex. A-2, Vol. I at 4-44.)

180. From areas adjacent to the HO site but outside of the Pu'u Ula'ula Overlook, the construction crane would be visible on cloudless days from the extreme western edge of the parking area of the Haleakalā Visitor Center. The ATST structure would be visible from Pa Ka'oao and Magnetic Peak when it reaches 30-feet, but would not be visible from other areas adjacent to the HO site until the structure reaches 78 feet. (Ex. A-2, Vol. I at 4-44 to 4-45.)

181. In views from further away in the Park (along the Upper Park Road corridor, including the Haleakalā Visitor Center, and the lower Park Road corridor, including Hosmer Grove), on clear days, the construction cranes associated with the ATST Project would be visible

but not necessarily identifiable within a cluster of other structures. (Ex. A-2, Vol. I at 4-45 to 4-46.)

182. From outside of the Park, in views from throughout Maui (including windward, upcountry, central valley and south Maui locations), the proposed ATST Project at the Mees site would be visible atop distant ridgelines from a number of viewing locations and indistinguishable in views from other locations. Because of the distance of these views, regardless of whether the HO site is presently visible from these locations, the proposed ATST Project would not substantially alter the visual quality of the views. (Ex. A-2, Vol. I at ES-40.)

3. Noise

183. Construction noise emissions from the ATST Project would increase the existing ambient noise levels at the summit but are anticipated to be temporary and intermittent. Trucks and mobile construction machinery would also raise ambient noise above background levels during the construction period. (Ex. A-2, Vol. I at ES-43.)

184. The expected noise levels from ATST operations would be similar to other existing noise sources within the HO site. (Ex. A-2, Vol. I at ES-43; Ex. A-2, Vol. I at 4-142.)

185. UHIfA has changed the construction plans so that caissons will not be used in the construction of the ATST. (Foltz DT at 19-20.) There will be a reduction in construction noise because "rock hammers" will not be used, although "jackhammers" may still be used. (Tr. 7/18/11 at 52 (Foltz).)

186. When two sources of noise of similar level are added together, the resulting increase is 3dBA (e.g. 20 dBA + 20 dBA = 23 dBA; 50 dBA + 50 dBA = 53 dBA). (Ex. A-2, Vol. I at 4-142.)

187. Because the expected levels from ATST operations would be similar to those already present, a 3 dBA increase is reasonably expected. This would result in a minor adverse, long-term noise impact. (Ex. A-2, Vol. I at 142.)

188. For some native Hawaiians, silence is important when trying to understand things, but that type of silence was silence on the part of the person. Gaining true understanding requires a native Hawaiian to look, listen, and keep quiet to become a part of the place, not above it or in any way outside of it. (Coleman RT at 6.)

4. Visitor Experience

189. Viewer sensitivity was assumed to be relatively high within Haleakalā National Park based on the fact that viewers in the area are predominantly visitors to Haleakalā National Park with an expectation of high visual quality in the area. (Ex. A-2, Vol. I at 4-43.)

190. Impacts on visitor use and experience would be anticipated if the proposed ATST Project were constructed. (Ex. A-2, Vol. I at ES-40.) These impacts would result from changes in the quality of recreational activities such as sightseeing, hiking, backpacking, photography, and camping associated with changes in view from construction activity at the proposed ATST Project site and along the Park Road corridor. (Ex. A-2, Vol. I at ES-40.)

191. Impacts on air quality associated with increased construction vehicle traffic and use would be minor, adverse, and short-term. These impacts would occur over the short-term, would be mitigated to the greatest possible extent, as set forth herein, and the impacts on visitor use and experience would diminish in the long-term. (Ex. A-2, Vol. I at ES-40.)

192. Changes in the view would, however, continue to result in moderate and long-term impacts on the visitor use and experience from locations where the proposed ATST Project would be prominently seen. (Ex. A-2, Vol. I at ES-40.)

193. The small increase in traffic during construction would have a negligible impact on travel time and visitor use and experience. During operations, the increased traffic would be even less and would have a negligible, long-term impact on visitor use and experience. (Ex. A-2, Vol. I at ES-41.)

5. Biological Resources

194. From 2002 to 2009 surveys were conducted at the HO site to assess its botanical and invertebrate habitats and to map the visitation flight patterns of avian fauna. The surveys were done as part of the LRDP for the HO site and as part of the NEPA process for the ATST Project. (Ex. A-2, Vol. I. at ES-21.)

195. The results of the surveys generally indicated that the diversity and density of biological populations at the HO site are dynamic from season to season and over longer temporal periods, depending on a number of factors such as rainfall, temperature variations, and less well-understood factors. Human activities play a role in these dynamic variations. (Ex. A-2, Vol. I. at ES-21.)

196. The predominant vegetation type at the HO site is alpine desert/shrubland. At the HO site, shrubs consist of interspersed ʻahinahina (Haleakalā silversword, *Argyroxipbium sandwicense*) and naʻenaʻe (*Dubautia menziesii*). Vegetation cover is restricted by harsh environmental conditions to 10 percent of the surface area or less. Some areas have little as one percent coverage. The vegetation is also low, generally less than three feet high. (Ex. A-2, Vol. I. at ES-21 and 3-31.)

197. According to the HO site botanical surveys conducted in 2005 and 2009, there were more non-native plants on the HO site, relative to adjacent "pristine" areas of Haleakalā National Park, Kahikinui Forest Reserve, and Kula Forest Reserve, due, in part, to development,

i.e. disturbance to the soil from construction, additional water sources from discharge pipes and gutters, and protection from the elements by objects such as building foundations and sidewalks. (Ex. A-2, Vol. I at 4-22.)

198. A June 2009 botanical survey (Ex. A-2, Vol. II, App. E) indicated that, in general, the number of botanical species within the HO site has increased over time and it appears the distribution and abundance of both native and non-native plants has increased. (Ex. A-2, Vol. I. at ES-22.)

199. Earlier construction of facilities at the HO site has had a detectable effect on botanical resources, with an increase in weeds and non-native species. Since native species still flourish at the HO site, however, and since small incidental benefits such as protection from the elements do occur at the HO site, the predicted overall impacts on botanical resources from construction of the proposed ATST Project at the Mees site would likely be detectable but of little consequence. (Ex. A-2, Vol. I at 4-22.)

200. Within the HO site and Park Road corridor several species that are listed as endangered or threatened have been observed. These are the ʻahinahina (Haleakalā Silversword), the ʻuaʻu (Hawaiian Petrel), the nēnē (Hawaiian goose); and the ʻopeʻapeʻa (Hawaiian hoary bat). (Ex. A-2, Vol. I. at ES-21.)

201. There are approximately thirty known ʻuaʻu burrows along the southeastern perimeter of the HO site and several burrows northwest of the HO site, with a large number of burrows within two miles of the HO site. There are up to 1,000 known ʻuaʻu burrows within Haleakalā National Park, including a large number along the Park Road corridor. (Ex. A-2, Vol. I. at ES-22.)

202. Impacts from construction would include the potential for disturbance of the habitat, in which the ʻuaʻu would not remain in their burrows during the nesting season. Construction noise, vibration, or human proximity could affect the nesting habits of the ʻuaʻu to the extent that they may not return to, remain in, or otherwise utilize the burrows that are inhabited each year. Construction activity also has the potential of causing burrow collapse, directly related to excavation, vibration, or other human activities. Collapse of a burrow could result in ʻuaʻu mortality. (Ex. A-2, Vol. I at 4-24.)

203. The risks to ʻuaʻu from construction of the proposed ATST Project at the Mees site may be summarized as follows:

1. Collision of petrels with equipment and buildings,
2. Burrow collapse from construction vibration,
3. Harm from noise for nesting and incubating petrels,
4. Increase in predator population,
5. Invasive species brought to the site, and
6. New burrows that may be occupied closer to construction than previously surveyed.

(Ex. A-2, Vol. I at 4-24 to 4-25.)

204. Few studies exist that have investigated the effects of construction adjacent to burrowing petrel colonies. (Ex. A-12 at 47.) Exposure of ʻuaʻu chicks to noise and vibration associated with the Park Road and past construction projects has not resulted in a documented decrease in chick survival or in chick nest abandonment. (Ex. A-12 at 49.)

205. The lack of a significant difference in ʻuaʻu burrow activity and nesting success between sites near the HO site and those away from the HO site suggest that current operations do not have any significant impacts on nesting ʻuaʻu. (Ex. A-2, Vol. I at 4-30.)

206. On June 15, 2011, the United States Fish and Wildlife Service (USFWS) issued a biological opinion in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. § 1531, *et seq.*). (Ex. A-35.)

207. The biological opinion concluded that the direct and cumulative effects of the proposed ATST Project are not likely to jeopardize the continued existence of the ʻuaʻu and the nēnē. (Ex. A-35.)

208. The USFWS incidental take statement, which allows the take of a threatened or endangered species that is incidental to, and not the purpose of, carrying out an otherwise lawful activity, is included in the biological opinion. [13] (Ex. A-35 at 91-92.)

209. Nēnē may be affected by human activities through the application of pesticides and other contaminants, ingestion of plastics and lead, collisions with stationary or moving structures or objects, entanglement in fishing nets, loss of habitat, disturbance at nest and roost sites, attraction to hazardous areas through human feeding and other activities, and mortality or disruption of family groups through direct and indirect human activities. None of these activities are anticipated to occur within the normal habitat of the nēnē in connection with the construction or operation of the proposed ATST Project. Therefore, negligible impacts on the nēnē are anticipated from the construction of the proposed ATST Project at the Mees site. (Ex. A-2, Vol. I at 4-28 and 4-30.)

[13] Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including, breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. (Ex. A-35 at 91.)

210. The 'ope'ape'a are subject to impacts from pesticides, predation, alteration of prey availability (introduced insects) and roost disturbance. The ATST Project is not anticipated to have any impacts to pesticides, predation, or prey availability and as such it is not anticipated to change the current impacts on the ecosystem of the 'ope'ape'a. (Ex. A-2, Vol. I at 4-29 and 4-31.)

6. Topography, Geology, and Soils

211. Construction of the ATST Project would require excavation and would result in excess soil placed at locations outside the ATST footprint. The material would be spread over a soil disposal area and would not affect the topography. (Ex. A-2, Vol. I at ES-39.)

212. If no best management practices are used, minor adverse impacts on soils from construction activities and potential erosion could be possible during construction. Because best management practices in accordance with approved storm water management plans are to be used during construction of the proposed ATST Project at the Mees site, no adverse impacts on soils from construction activities and potential erosion are anticipated. (Ex. A-2, Vol. I at ES-39.)

7. Water Resources

213. The proposed ATST Project would be designed so that most onsite storm water would be captured for reuse in an existing cistern reducing the potential adverse impacts on the infiltration basin. Storm water that does not reach the cistern would be filtered through onsite French drains where water would percolate to the natural subsurface environment. (Ex. A-2, Vol. I at ES-41.)

214. The ATST Project also proposes to remove the existing cesspool and replace it with an advanced aerobic individual wastewater system (IWS). Groundwater could potentially

be adversely impacted by wastewater discharges during system installation, maintenance, or in the even of system failure. The likelihood of discharge is minimal and the impacts would be negligible. Site personnel would also be trained on handling wastewater and operating the IWS to prevent discharges to groundwater. Replacement of the cesspool would result in a minor, beneficial impact on groundwater. (Ex. A-2, Vol. I at ES-41 and 4-115.)

215. Temporary, localized, minor impacts to surface water and drainage are anticipated during construction and standard best management practices which are required to be implemented during construction would minimize said impacts. (Ex. A-2, Vol. I at ES-41.)

8. Hazardous Materials and Solid Waste

216. There would be no change from the current management of solid waste at the HO site. Similar to the Mees site, the ATST facility would be responsible for its waste. Solid waste generated on-site would be carried out of the building and kept in covered refuse containers. Non-hazardous trash and recyclable material would be disposed of off-site at a Maui licensed landfill. There would be no change from the current management of solid waste under the No-Action Alternative. Negligible adverse impacts on solid waste management would be experienced. (Ex. A-2, Vol. I at ES-41 to ES-42 and 4-120 to 4-121.)

217. Operations at HO facilities sometimes require the use, handling, storage, and disposal of hazardous materials (HAZMAT) performed in compliance with 40 CFR § 260-299, Solid Wastes, and the Resource Conservation and Recovery Act. (Ex. A-2, Vol. I at ES-13.) A HAZMAT management plan specific to the proposed ATST Project has been prepared. (Ex. A-2. Vol. I at ES-13; Ex. A-2, Vol. II, App. D.)

218. The transportation of HAZMAT for the proposed ATST Project would be fully consistent with Title 49 CFR Parts 100-185 Hazardous Materials Regulations – Hazmat

Transportation, as prescribed by the Federal Department of Transportation. Only properly licensed companies and individuals would be contracted to transport HAZMAT. (Ex. A-2, Vol. I at ES-13.)

219. Transportation of the mirror stripping, cleaning and recoating materials and the effluent from this process would occur approximately once every two years. Transportation of the heat transfer fluid concentrate would occur as needed for replenishment of the system, approximately once per year. None of the mirror coating materials or heat transfer fluids is defined as hazardous under Title 49 CFR Federal Department of Transportation. Liquid nitrogen and helium would be transported to the ATST facility on a periodic basis approximately four times per year. (Ex. A-2, Vol. I at ES-13; Ex. A-2, Vol. I at 2-36.)

220. Although the potential for a release would still exist, the reduction in the chemicals required for operation of the ATST Project, and handling and storage of HAZMAT pursuant to the ATST Hazardous Materials and Hazardous Waste Management Program, no appreciable impact on health and safety and waste management is expected. During ATST operation, all applicable inspection, maintenance, and safety regulations related to the various HAZMAT will be required to be followed. (Ex. A-2, Vol. I at ES-42 and 4-121 to 4-123.)

9. Air Quality

221. Vehicle traffic accessing the facility via the Park Road corridor would temporarily increase during the construction of the ATST due to construction vehicles and crews. The additional traffic, however, would not significantly add to the current level of vehicle emissions associated with existing HO operations and visitor traffic. (Ex. A-2, Vol. I at ES-43.)

222. Excavation and grading would generate some hazardous and nuisance air emissions. Use of construction vehicles and heavy equipment would also result in low-level,

intermittent exhaust emissions. Other site development activities, such as welding and metalworking, would generate small quantities of hazardous air pollutants. (Ex. A-2, Vol. I at 4-145.)

223. Actual adverse impacts on air quality at the HO site, based on proposed operations and the presence of the summit's persistent northeasterly trade winds, are expected to be temporary, intermittent, and at levels substantially below both human health and hazardous air pollutant industrial hygiene criteria. (Ex. A-2, Vol. I at ES-43 and 4-145 to 4-146.)

224. To minimize fugitive dust emissions, contractors working on construction of the ATST would be required to comply with applicable State regulations under HAR § 11-60.1-33, which require the implementation of "reasonable precautions" for controlling fugitive dust and implement strict dust control measures and best management practices, as mandated by the LRDP. (Ex. A-2, Vol. I at ES-43 and 4-146.)

225. The ATST Project would also be required to employ procedures and practices that have been employed successfully for past projects to minimize fugitive dust such as establishing a written duct control plan to be observed by all contractor personnel; expose the smallest open excavation and stockpile areas where possible and halt dust generating activities during high winds and storms; sprinkle or use similar water application methods to keep disturbed finer material from becoming airborne; use catchments or filtering systems/devices when sanding, using power tools, or scraping structural surfaces to be painted; and where practical, erect a designated on-site facility with wash racks to clean equipment and machinery before they are removed from construction zones. (Ex. A-2, Vol. I at 4-146.)

226. Since construction of the ATST Project would be taking place adjacent to dust-sensitive optical systems at other HO facilities, implementing dust control measures would be a high priority. (Ex. A-2, Vol. I at 4-146.)

B. Mitigation of Impacts

227. Included in the CDUA were mitigation commitments that had already been made by UHIfA and the NSF. (Ex. A-1, pt. 1.) Mitigation measures for the impacts from the ATST Project are contained in the LRDP, the Management Plan, the Programmatic Agreement and the Record of Decision. (Ex. A-9; Ex. A-6; Ex. A-10; Ex. A-11.) Mitigation measures are intended to reduce the duration, intensity or scale of impacts or to compensate for the impact by replacing or providing substitute resources or environments.. (Ex. A-2, Vol. I at 4-1 and 4-11.)

228. UHIfA and NSF have committed to mitigation measures to reduce the impact to all resources. (Ex. A-2, Vol. I at ES-62 to ES-68.)

1. Mitigation of Cultural Impacts

229. Cultural mitigation measures that the NSF and the University have agreed to undertake are listed below. Most of these mitigation measures are summarized in Table 2 of the CDUA. (Ex. A-1, part 1 at 20-24.)

a. East-Facing Ahu

230. Because of the gathering of people in the Haleakalā National Park, there was no place where native Hawaiians could go to and have privacy from the crowds. The east-facing ahu was built as a way to ask permission to build the ATST. The east-facing ahu is mitigation for the ATST. The construction of the east-facing ahu started after work on the ATST Project had commenced. (Tr. 7/19/11 at 41–42 (Maberry).)

b. The Native Hawaiian Working Group

231. The Programmatic Agreement requires the establishment of the ATST Native Hawaiian Working Group ("NHWG") to further the development of working relationships between NSF and Native Hawaiian Organizations. (Foltz DT at 33; Maberry DT at 30; Ex. A-10 at 5; Ex. A-2, App. F(2) at 113; Tr. 7/18/11 at 142-143 (Foltz).)

232. The NHWG was established even though the Programmatic Agreement is not yet effective. The Programmatic Agreement will not become effective until all of the following occur: 1) final execution of the Programmatic Agreement; 2) issuance of NSF's Record of Decision; 3) issuance of the National Park Service's Special Use Permit; 4) issuance of the Conservation District Use Permit; and 5) execution of the lease between the University and NSF for the property within the HO site upon which the ATST would be built. The NSF decided to establish the NHWG over a year and a half ago and has hosted at least 5 meetings of the group. (Ex. A-10 at 14; Foltz RT at 12-13.)

233. The NHWG held its first meeting on December 15, 2009. Native Hawaiian Organizations, regardless of whether they served as consulting parties in the Section 106 consultation process, were invited to become members of the NHWG. [14] (Ex. A-10 at 5) Subsequent to the completion of the Programmatic Agreement, membership in the NHWG was also opened to individuals. (Foltz DT at 33.)

234. The NHWG continues to address issues of concern to native Hawaiians. NSF established the NHWG following the kupuna group model implemented by the NPS. The NHWG has discussed matters outlined in the Programmatic Agreement as well as matters outside the scope of the Programmatic Agreement. These matters include access issues of

[14] A list of the Native Hawaiian Organizations that were consulted in connection with the Section 106 consultation process is attached to the Programmatic Agreement as Exhibit C. (Ex. A-10.)

concern to native Hawaiians who wish to engage in cultural practices during construction, the development of the mitigation proposal that Maui College submitted to NSF as part of the ATST mitigation, and better avenues for communication between native Hawaiians, the ATST Project team, and NSF. (Foltz RT at 12.)

235. Membership in the NHWG is open to all. (Tr. 7/18/11 at 30 (Foltz).) Although they are not presently members of the NHWG, Kilakila's members, along with all other Native Hawaiian Organizations and individuals, are welcome to become members of the NHWG. (Ex. A-10 at 5.)

236. The NHWG's role in providing input on the ATST is not limited to feedback on implementation of the Programmatic Agreement. Maui College Chancellor Clyde Sakamoto provided a presentation at a meeting of the NHWG regarding Maui College's anticipated submission of its formal mitigation proposal to NSF. Participants of the NHWG provided feedback on the presentation. (Foltz DT at 35.)

237. The Programmatic Agreement requires the NHWG to continue to formally meet twice a year, and informal contact may occur at any time on an as-needed basis. (Ex. A-10 at 5.) The formal meetings of the NHWG will continue throughout the duration of the Programmatic Agreement, which is for ten years from the effective date of the Programmatic Agreement. (Ex. A-10 at 11; Foltz DT at 35-36.)

238. Additional mitigation measures continue to be identified and evolve through discussions with the project's Cultural Specialist and the NHWG. (Foltz DT at 46-47; Foltz RT at 12-13; Maberry RT at 10.)

239. The NHWG is a valuable source of input from the native Hawaiian community. Continued consultation with the members of the NHWG offers opportunities for input as to new

ways to carry out the construction and operation of the ATST in a manner that is sensitive to the concerns of interested people. The NHWG provides insight both on how to be sensitive to concerns of the native Hawaiian community, but also in the identification and formulation of further mitigation measures to reduce the impacts of the ATST Project. (Foltz DT at 46-47; Foltz RT at 12-13; Maberry RT at 10.)

c. Education Initiative at Maui College

240. In September 2005, the Office of Hawaiian Affairs (OHA) sent a letter to NSF which stated, "OHA therefore requests that should the proposed project go forward, part of the project include a guarantee of training and education for Hawaiians, perhaps through the Maui Community College [now the University of Hawai'i Maui College], University of Hawai'i Institute [for] Astronomy, to allow them the opportunity to gain jobs at the Haleakalā High Altitude Observatories site." (Ex. A-2, Vol. I at 5-48.) OHA also made a similar request in letters to NSF dated June 22, 2009 and June 29, 2009. (Ex. A-2, Vol. I at 5-82 to 5-90; Foltz DT at 29.)

241. Maui College submitted a mitigation proposal in May 2007 in which it requested grant funding to improve the achievement success of native Hawaiians in math and science. (Ex. A-2, Vol. I at 5-27 to 5-68.) The mitigation proposal involved: (1) development and implementation of an innovative math and science curriculum and program based on Hawaiian cultural knowledge and worldview; (2) building up relevant coursework and dedicated programs at Maui College; (3) significantly increasing the number and retention of native Hawaiian students in Science, Technology, Engineering and Math ("STEM") courses and programs at Maui College; and (4) cultivating and developing an experienced, highly skilled native Hawaiian workforce for STEM related industries and careers. (Foltz DT at 30; Coleman RT at 7; Ex. A-2, Vol. I at 5-27 to 5-68.)

242. A copy of the Maui College proposal was sent to all consulting parties to the Programmatic Agreement. (Ex. A-11 at 67; Foltz DT at 30.)

243. Astronomer Dr. Paul Coleman, who is native Hawaiian, supported the Maui College proposal because it would prepare Hawaiians for the high technology job opportunities that will become available when ATST is operational. Dr. Coleman believes that a true measure of success of the grant would be if a significant portion of ATST staff (science and otherwise) were native Hawaiian. (Coleman RT at 8; Tr. 7/20/11 at 67-68 (Coleman).)

244. The Maui College Hawaiian Studies Department "basically wrote the entire proposal." (Tr. 7/20/11 at 66 (Coleman).)

245. Dr. Coleman will serve as one of the co-principal investigators for the grant. He will assist in the progress and evaluation of programs being supported by the grant as the program progresses and will emphasize having more Hawaiians involved in the ATST at all levels. (Coleman RT at 8.)

246. NSF has refined and adopted the Maui College proposal as part of its Record of Decision, and will make $20 million ($2 million per fiscal year for ten years) available to support this educational initiative to address the intersection between traditional native Hawaiian culture and science and to foster a better understanding of the relationship between native Hawaiian culture and science. (ROD, Ex. A-11 at 5, 54, and 63 ; Foltz DT at 30-32; Coleman RT at 4, 7-8.)

d. Cultural Specialist

247. The use of a cultural specialist in connection with the HO site was first adopted in the LRDP to aid in the protection of historic and cultural resources. In particular, the LRDP requires that any construction within the HO site requiring a permit from the DLNR shall require the consultation and monitoring of a cultural specialist. The cultural specialist is to be engaged at the earliest stages of the planning process, monitor the construction process, and consult with

and advise the on-site construction project manager with regard to any cultural or spiritual correction. The cultural specialist must be a native Hawaiian, preferably a kupuna (elder) and a kahu (clergyman, caretaker), and one who has personal knowledge of the spiritual and cultural significance and protocol of Haleakalā. (Ex. A-9 at 62-63.)

248. The LRDP also required that the cultural specialist conduct periodic monitoring of all cultural and archaeological sites and features identified. (Ex. A-9 at 63.)

249. The Management Plan for the HO site incorporated the same provisions regarding the use of a cultural specialist. (Ex. A-6 at 42.)

250. The use of a cultural specialist was further incorporated into the Programmatic Agreement which required a cultural specialist, as defined in the LRDP, to be hired to help ensure protection of existing historic properties and their traditional cultural values during construction. (Ex. A-10 at 6.)

251. In February of 2010, the NHWG provided a list of proposed requirements for the Cultural Specialist. A Statement of Work was developed and the NHWG participants were asked to provide the names of people/entities who they would recommend for the position of Cultural Specialist. Three names of people/entities were ultimately recommended. Following the conclusion of AURA/NSO's procurement process, CKM Cultural Resources LLC (CKM), was retained.[15] (Ex. A-28; Ex. A-29; Ex. A-30; Foltz DT at 17, 33-34.)

252. The hiring of CKM as the Cultural Specialist fulfilled the Management Plan requirement that:

[15] Kahu (Rev.) Charles Kauluwehi Maxwell, Sr. initially fulfilled the role on behalf of CKM. Kahu Charles Maxwell has passed away. Another individual will be appointed to perform the duties of the Cultural Specialist on behalf of CKM.

> Any construction within HO requiring a permit from DLNR requires the consultation and monitoring of a Cultural Specialist. This person will be engaged at the earliest stages of the planning process, will monitor the construction process, and will consult with and advise the onsite project manager about any cultural or spiritual concerns. For the purposes of this section, a Cultural Specialist must be a Native Hawaiian, preferably a kupuna (elder) and a Kahu (clergyman, caretaker), and one who has personal knowledge of the spiritual and cultural significance and protocol of Haleakalā.

(Ex. A-6 at 42; Foltz DT at 16-17, 34.)

253. Kahu Maxwell had been involved with projects at HO for approximately 15 years. He produced several cultural impact statements for UHIfA, U.S. Air Force, and the Faulkes Telescope Facility. One of these was the Cultural Resources Assessment for UHIfA for the HO site. (Ex. A-6 at App. A.) Kahu Maxwell also produced the "Sense of Place" video and had plans to revise the video. (Foltz DT at 17.)

254. The Cultural Specialist will be involved in the ATST planning process in terms of cultural practices, will monitor the construction process, and will consult with and advise the onsite ATST construction site supervisor regarding any spiritual concerns. (Foltz DT at 17; Ex.A-28.)

255. CKM's specific responsibilities as the Cultural Specialist are set forth in the Work Plan. (Ex. A-35.) Under the Work Plan, the Cultural Specialist will consult with the ATST Project construction supervisor and engineers, document existing conditions in a preconstruction site visit, oversee culturally appropriate groundbreaking ceremony/service, conduct "Sense of Place" training for all on site construction workers, and ensure the presence of an on-site cultural monitor during outside construction activities, and for surprise inspections thereafter. In addition, the Cultural Specialist will also be available for consultation with the construction monitor(s), prepare written weekly activity reports that include documentation of any instances of

construction activity inconsistent with native Hawaiian belief, custom or practice, and any actions taken in response. (Ex. A-35; Foltz RT at 19-20.)

256. The Cultural Specialist has the authority to order that work be stopped. (Tr. 7/18/11 at 115 (Foltz).)

257. The Cultural Specialist will help mitigate the effects of the construction and operation of the ATST Project by providing oversight of all construction projects and set-aside areas for exclusive use by native Hawaiians to practice cultural and spiritual ceremonies. The Cultural Specialist will ensure protection of Haleakalā as a Traditional Cultural Property during construction of the ATST Project and has jurisdiction over all matters regarding preservation and/or reparation of the sacred nature of Haleakalā. (Ex. A-2, Vol. I at 4-11; Ex. A-23 at 7.)

e. Acknowledgement in Scientific Publications

258. The Programmatic Agreement requires all scientific publications and scholarly work utilizing data obtained with the ATST to acknowledge the significance of Haleakalā and NSF's gratitude for the use of this important site to the Kanaka Maoli (native Hawaiian people). Once the specific language of the acknowledgement is finalized and approved by the NHWG, it will be included in the publication acknowledgement information on the ATST web site: http://atst.nso.edu/node/193. (Ex. A-10 at 8; Foltz DT at 41.)

f. Cultural Practitioners' Shelter

259. The Programmatic Agreement requires the NSF, along with UHIfA and AURA/NSO and in consultation with the SHPO, ACHP, and the NHWG, to determine the feasibility of a shelter at the HO site, with access to restroom facilities, for use by native Hawaiian cultural practitioners. (Ex. A-10 at 8.) A shelter would facilitate access to the summit and to the ahus for native Hawaiian cultural practitioners by providing a place for practitioners to be sheltered in inclement weather and also to provide a place for practitioners to change clothes

for ceremonial purposes. This provision of the Programmatic Agreement is still in the process of being implemented. (Foltz DT at 40.)

260. The NHWG members suggested having a sink, an enclosed viewing area for those who do not wish to be outside, a seating area for educational purposes, as well as a changing room and meeting space, for the shelter. This suggestion is still under discussion. (Ex. A-29; Ex. A-30; Foltz DT at 40.)

g. Sense of Place Training and Safety and Environmental Compliance

261. The NSF will implement the "Sense of Place" training, as described in the Programmatic Agreement, which consists of the mandatory viewing of the "Sense of Place" video by all personnel and contractors who will be working within the HO site. The "Sense of Place" video educates the viewer about the cultural importance and sensitivity of Haleakalā. (Ex. A-10 at 7; Foltz DT at 10 and 38.)

262. AURA is required to also provide Safety and Environmental Compliance briefing to anyone working within the HO site. The Safety and Environmental Compliance briefing is a presentation that addresses personal safety for working in high altitude conditions, the cultural and environmental requirements associated with the HO site, and information about driving the Park Road corridor. (Foltz DT at 10; Ex. A-23 at 7.)

263. NSF will ensure that AURA/NSO complies with the "Sense of Place" training by requiring that all personnel receiving the "Sense of Place" and the Safety and Environmental Compliance training sign a declaration prior to working at the ATST Project site. AURA and UHIfA will also maintain a list of personnel who have attended the required training. (Ex. A-23 at 7.)

264. The "Sense of Place" training and the Safety and Environmental Compliance requirements are also to be included in the Contract Specifications. (Ex. A-23 at 7; Foltz DT at 16; Maberry DT at 29.)

265. The NHWG has had input regarding the "Sense of Place" training. (Ex. A-28; Foltz DT at 33.) The NHWG suggested that the Cultural Specialist be included in working on updates of the video. (Ex. A-29.)

266. The use of cultural training for personnel working on the ATST Project is part of UHIfA's commitment to reducing impacts to and preserving the cultural resources at the site. (Ex. A-6 at 42.)

h. Reservation of ATST Usage Time for Native Hawaiian Scientists

267. Members of the native Hawaiian community suggested that mitigation could be achieved through education and workforce development. Comments from the Maui Native Hawaiian Chamber of Commerce, Office of Hawaiian Affairs, the Grand Master of the Royal Order, a native Hawaiian individual representing the Hawai'i Carpenters Union, and private individuals advocated for an educational program to serve as mitigation for adverse impacts to the summit by assuring a future for the native Hawaiian people and their sovereignty as well as expressing a deep respect for the past and a firm foundation for the continuity of the native Hawaiian culture and identity. (Ex. A-2, Vol. I at 4-12 to 4-13; Ex. A-2, Vol. IV, App. B2 at 170-173.)

268. The NSO will reserve up to 2% of total ATST usage time for native Hawaiian scientists qualified to conduct research at the ATST. (Ex. A-11 at 62.)

269. Dr. Coleman testified that native Hawaiian astronomers, other than solar astronomers, can conduct research using the ATST during the reserved time. (Tr. 7/20/11 at 68 (Coleman).)

i. Decommissioning of the ATST

270. NSF's Record of Decision and the Programmatic Agreement require the NSF to decommission and deconstruct the ATST Project within fifty (50) years from the date operations commence, unless, after consultation by NSF with NHOs, the NSF decides otherwise, in which case NSF shall notify the ACHP, the SHPO, and the NPS. (Ex. A-11 at 56; Ex. A-10 at 6; Foltz DT at 36-37; Foltz RT at 13-14.)

271. The mitigation measure originally suggested was solely for the ATST to be decommissioned at the end of the ATST's operational life. As a result of comments from the Maui Native Hawaiian Chamber of Commerce, the language in the Programmatic Agreement regarding decommissioning of the ATST was modified to require deconstruction of the ATST after 50 years unless a NHO was in a position to take control of the telescope. The NSF will be required to consult with NHOs to determine whether the NSF could transfer management and operation of the ATST to a NHO. (Tr. 7/18/11 at 137-39 (Foltz); Tr. 7/18/11 at 80-81 (Foltz).)

272. The Programmatic Agreement requires the NSF's commitment to deconstruct the ATST to be included in all cooperative agreements governing the operation of the ATST. (Ex. A-11 at 34; Foltz RT at 14.)

273. Two awards have been made by NSF to AURA/NSO for the ATST construction. These award instruments include specific language that requires the awardee to comply with all relevant requirements in the Programmatic Agreement and Record of Decision. The decommissioning requirement is included in the award language. (Ex. A-10 at 6; Foltz DT at 36-37.)

274. Decommissioning and deconstruction of the ATST would be a separate federal undertaking, which would require its own environmental review. (Tr. 7/18/11 at 84 (Foltz).)

j. Coating Surveys and Repainting

275. The Programmatic Agreement provides for regular, periodic reassessment of technological options for new types of exterior coatings, more efficient cooling methods, or improved compensation for thermal turbulence, which may allow the ATST buildings to be painted a color other than white to make the structures less noticeable, as requested by consulting parties during the Section 106 consultation process. (Ex. A-10 at 6.)

276. The options for coating of the enclosure (dome) and the support building are being studied as part of the detailed design efforts being conducted by external contractors. The exact nature of the coatings will be specified as part of the detailed design packages. (Ex. A-30; PA, Ex. A-10 at 6; Foltz DT at 37.)

277. NSF committed that it will not unilaterally decide to change the color of the ATST, but will consult with the NHWG before any changes are made. (Tr. 7/18/11 at 19 (Foltz).)

k. Removal of Unused Facilities

278. The Programmatic Agreement requires removal of unused facilities, poles, antennae, and lines at the HO site that are determined to be unused or in excess of what is needed, subject to funding and authorizations. (Ex. A-10 at 7.) This measure is based on comments received that encouraged the removal of unused facilities to allow for more space for worship and to appreciate the sacredness of the summit area. (Ex. A-2, Vol. III, App. C(3) at 164.)

279. The University has already removed the commercial broadcast facilities and equipment from the HO site and the site adjacent to the HO site. The University will continue to evaluate other unused facilities for possible removal. (Ex. A-10 at 6; Maberry DT at 21, 32.)

l. Naming of Roads in the HO

280. The Programmatic Agreement requires UHIfA to consult with the NHWG regarding renaming of the roads within the HO site. UHIfA is to take reasonable steps to pursue the naming of the roads. (Ex. A-10 at 6.) This measure is based on comments received in the Section 106 consultation process that encouraged the renaming of roads to more appropriate names to demonstrate a respect for the summit area. (Ex. A-2, Vol. III, App. C(1) at 66.)

281. NSF will consult with the UHIfA regarding the naming of the only road within the HO site. NSF will also consult with the NHWG. After receiving a recommendation from the NHWG, the University will identify the steps necessary to rename the road. (Ex. A-10 at 6; Foltz DT at 36.)

m. Removal of Reber Circle

282. The Programmatic Agreement requires removal of Reber Circle as part of the mitigation for the ATST Project. The term "Reber Circle" refers to a circular concrete ring which is the remnant of a former radio telescope facility at the HO site. (Ex. A-10 at 7.) This measure is based on comments received that encouraged the removal of Reber Circle to clean up the area and leave the land the way it was found. (Ex. A-2, Vol. III, App. C(3) at 9 and 42.)

283. An Archaeological Recovery Plan for the removal of "Reber Circle" already exists and was included in the FEIS. (Ex. A-2, Vol. II, App. B(1).) The DLNR approved this removal plan on June 14, 2006. (Ex. A-2, Vol. II, App. B(1); Foltz DT at 38.)

n. Exterior Design Artwork

284. The Programmatic Agreement requires that AURA/NSO work in consultation with the NHWG to incorporate a representation of traditional Hawaiian culture suitable to the Haleakalā setting. (Ex. A-10 at 8.) This measure is based on comments received during the Section 106 consultation process. (Ex. A-2, Vol. IV, App. B at 172.)

285. AURA/NSO is working in consultation with the NHWG and the NPS to incorporate a representation of Hawaiian culture, such as artwork depicting the demi-god Maui and the Sun or other appropriate motifs, on the exterior design for the lower portion of the ATST building. (Ex. A-10 at 6.)

286. The NHWG formed a subcommittee to develop artwork recommendations. The subcommittee includes Terri Freitas-Gorman, Kahu Lyons Naone and retired judge and former Office of Hawaiian Affairs trustee Boyd Mossman. (Foltz DT at 39; Ex. A-11 at 66.)

o. Historic Properties Assessment

287. The Programmatic Agreement requires an assessment of historic properties associated with State Road 378. The assessment will document the historic features (bridges/culverts) along the approximately 10 mile stretch of road that begins at the Crater Road junction to the entrance of Haleakalā National Park, as well as the historic Park Road that leads to the observatories. Documentation will begin just prior to construction to identify the current condition of the road as a baseline and will be used to later identify and address any damage that may occur as a result of construction. Documentation will be conducted using standards developed by the Historic American Buildings Survey and the Historic American Engineering Record. The statement of work for the assessment project was reviewed and approved by Haleakalā National Park and submitted to the State Historic Preservation Division (SHPD) for review and approval. As of the date of the hearing, SHPD approval remained pending. (Ex. A-10 at 8; Foltz DT at 40-41.)

288. Contractors would be made aware of the potential for road damage and would be required to take measures to minimize the damage. Any damage to HO roadways that does result from ATST construction traffic would be repaired so as to, at a minimum, restore those

roadways back its condition before construction of the proposed ATST Project. (Ex. A-2, Vol. I at 4-129 to 4-130.)

p. Additional Archaeological Survey

289. As part of the mitigation developed in NSF's Habitat Conservation Plan for the 'ua'u, NSF will construct a fence to protect 328 acres of habitat, which includes the smaller 18.2 acre HO site, where the 'ua'u nest in burrows (Ex. A-12 at 58-61). The Environmental Assessment for the fence identified archaeological resources that may be encountered when the fence is constructed. (Ex. A-12 at 3-5 to 3-6.) To mitigate these impacts, the Cultural Specialist will be on site during the staging and construction of the fence to identify the archaeological resources and adjust the location of the staging areas or fence alignment to avoid identified archeological resources, and staging areas will be moved to a more appropriate area. (Foltz RT at 46.)

290. NSF has also completed an archeological survey for the entire fenced area, which provides a detailed map of the resources to be avoided during fence construction and petrel monitoring. More importantly, the survey has determined eligibility of the resources found for inclusion on both the National Register of Historic Places and the Hawai'i State Register of Historic Places, so that these resources may be cataloged and be included in scholarly explorations of Hawaiian history. An archaeological survey for such a large area of state Conservation District land would not likely have been undertaken other than in connection with this project. (Foltz RT at 46-47.)

q. Changed Construction Schedule

291. Changes to the ATST Project have also reduced its impact. The overall time for exterior construction was shortened by one year to reduce the impacts from construction noise, traffic and other disturbances. (Foltz DT at 46; Maberry DT at 31-32.)

r. Reduction of Project Footprint

292. Changes in design have reduced cultural impacts, including the elimination of caissons, the elimination of a mirror coating facility at the ATST, the elimination of a hydrostatic bearing system and the addition of a pre-cooler section to the fluid cooler. These changes reduce the footprint of the ATST. (Maberry DT at 27; Foltz DT at 19-21; Foltz RT at 20.)

s. Accommodating Access During Construction

293. To further reduce the impact of noise on traditional cultural practitioners, the Cultural Specialist, in consultation with the members of the NHWG, will establish a protocol that allows for continued access to the site for cultural practitioners. Cultural practitioners will be required to notify the Cultural Specialist to request access, for safety reasons, and to allow for the Cultural Specialist to work with the ATST Project team to help accommodate reasonable requests for cultural practices requiring noise reduction. The Cultural Specialist, in discussion with the construction supervisor, will determine whether a request is reasonable. (Foltz RT at 19; Tr. 7/18/11 at 54, 57-58 (Foltz).) As a result of the protocol that will be established, a cultural practitioner may not be subject to construction noise impacts.

t. Preservation and Protection of Sites

294. The University also set aside in perpetuity the area within the HO site consisting of approximately 24,000 square feet (0.55 acre), located southwest of the Air Force Maui Space Surveillance Complex, for the sole reverent use of native Hawaiians for religious and cultural purposes, with the understanding that such use will not interfere with other uses and activities within the HO site. (Ex. A-6 at 42.) This area is shown as "Area A" on Figure 2-2 of the Management Plan. (Ex. A-6 at 12.)

295. The University has adopted a preservation plan for the 11 archaeological sites within the HO site. (Ex. A-6 at 42-43.) This preservation plan was coordinated with and

approved by SHPD. There is no signage proposed for any of these sites in order to prevent unwanted attention and potential adverse impacts. None of these sites will be disturbed by the ATST with the exception of the removal of Reber Circle, as discussed herein. (Ex. A-6 at 42-43.)

u. Signage at HO Entrance

296. The general public is not allowed in the HO site. However, the sign at the entrance to the HO site welcomes native Hawaiians who wish to engage in cultural and religious practices within the HO property. (Ex. A-6 at 42; Ex. A-1 at 32; Maberry DT at 13.)

2. Mitigation of Visual Resources Impacts

297. The ATST is as small as it can be. The design resulted from very careful scientific study that specifically looked at the detailed atmospheric conditions on Haleakalā. The telescope is sited at an elevation that most of the time is above the turbulence. (Tr. 7/18/11 at 139-140 (Foltz).)

298. An additional measure to avoid visual impacts was to locate the ATST at the Mees site rather than the Reber Circle site. Location at the Reber Circle site would have resulted in increased visibility of ATST from the Pu'u 'Ula'ula Overlook, since that location is not only closer to the Overlook, but it offers virtually no terrain shielding between it and ATST. The lower Mees site elevation reduces visibility of the ATST structure. The increased visibility of the Reber Circle site is also apparent after comparing the FEIS viewshed analyses for both sites. (Maberry RT at 4-5; Ex. A-2, Vol. I at 313-314; Tr. 7/19/11 at 36–37 (Maberry); Tr. 7/18/11 at 140 (Foltz).)

299. When possible, natural materials from the construction site will be used for building facings, walls, walkways or entryways. (Foltz DT at 10.)

300. The project team will conduct periodic surveys of the properties of coatings, and every two years will reassess technological options for new types of coatings, more efficient

cooling methods or improved compensation for thermal turbulence, which may allow the ATST enclosure and buildings to be painted a color other than white to make the structures less noticeable. (Foltz DT at 37; Tr. 7/18/11 at 27-28 (Foltz); Ex. A-10 at 6.)

301. Visual impacts have been mitigated to the greatest extent possible.

3. Mitigation of Noise Impacts

302. NSF and UHIfA have proposed limiting construction activities so they begin no earlier than 30 minutes after sunrise and end no later than 30 minutes prior to sunset in coordination with USFWS and NPS mitigation measures. (Ex. A-2, Vol. I at ES-43.) This measure will decrease the potential noise impacts from construction of the ATST on traditional cultural practitioners and visitors to the Haleakalā National Park who visit the summit at sunrise and sunset. (Foltz RT at 18-22.)

303. Other proposed mitigation would restrict slow-moving construction traffic from traveling along the Park Road corridor during peak recreational use (11:00 a.m. to 2 p.m. daily) to reduce the impact to recreational users. (Ex. A-2, Vol. I at ES-43.)

304. Further reasonable noise-reduction practices and abatement procedures will be incorporated into the construction plans to reduce noise impacts. (Ex. A-2, Vol. I at ES-43.) The ATST Project team will implement general construction noise control measures that require the contractor to ensure all equipment is in good working order, adequately muffled and maintained in accordance with the manufacturers' recommendations. Noisy construction activity will be limited to the strict daytime dates and hours. Appropriately sized equipment will be utilized for each task, and, where feasible, smaller/quieter equipment will be used. Semi-permanent stationary equipment (generators, lights, etc.) may be available in "quiet" packages and should be stationed as far from sensitive areas as possible. Equipment will be turned off or shut down

between active operations, and noise sources will be shielded where possible. (Ex. A-2, Vol. I at 4-140; Foltz RT at 22.)

305. During ʻuaʻu egg incubation period, construction noise shall not exceed ambient wind noise as measured at the nearest ʻuaʻu nests, as verified through monitoring by microphones installed at the closest burrow. Enforcement of this noise limitation will be based on an established threshold limit of 83 dBA measured at 5 feet away from any piece of equipment operated anywhere on the ATST construction site. This threshold was set by the USFWS and is expected to reliably limit the noise level that would be sensed at the burrow to below the natural wind sound. (Ex. A-23 at 13.)

306. The above restrictions on noise levels during certain hours of the day will be incorporated in the Contract Specifications for the project to mitigate for impacts to cultural practices and the ʻuaʻu. (Ex. A-23 at 13; Foltz DT at 20; Maberry DT at 35.)

307. Contractors will also be required to comply with Hawaiʻi noise regulations in Hawaiʻi Administrative Rules Chapter 11-46. (Maberry DT at 35-36.)

308. The Cultural Specialist selected for the ATST site and the NHWG will develop a protocol for access to the east-facing ahu during construction. (Foltz RT at 12; Maberry RT at 7.) The Cultural Specialist will work in consultation with the ATST Project construction site supervisor to ensure access to the east-facing ahu while construction is ongoing, subject to ensuring personal safety of visitors. The protocol will include measures to reduce or eliminate construction noise during visits by cultural practitioners. (Tr. 7/18/11 at 55-58 (Foltz).)

309. To control operational noise from the ATST, primary noise generating equipment is planned to be located within an acoustically engineered building or enclosures to minimize transmission of sound to the exterior environment. In addition, ventilation silencers and/or

acoustical louvers are planned to be incorporated to minimize operational noise. (Ex. A-2, Vol. I at 4-142.) Finally, because equipment in the Utility Building generates significant levels of audible noise, sound abatement devices are planned to be built into the equipment, and the walls and roof of the Utility Building. (Foltz DT at 5; Foltz RT at 20; Ex. A-2, Vol. I at 4-142.)

310. The telescope was redesigned to eliminate the need for hydrostatic bearings. A telescope supported on hydrostatic bearings produces an enormous amount of heat because it floats the structure of the telescope on a thin layer of oil that is under extraordinarily high pressure, and the oil has to be cooled. Elimination of the hydrostatic bearings also reduces the need for conditioned airflow through the telescope mount assembly area in which the bearings would have resided. Therefore, overall power consumption will be reduced by approximately 200-400 kW including heating, cooling and fan power. This will also result in a reduction of noise from the chillers and fans. (Foltz DT at 21; Tr. 7/18/11 at 74 (Foltz).)

4. Mitigation of Impacts to Visitor Experience

311. Much of the impact to the visitor experience will result from construction noise, visual impact, and traffic on the Park Road. (Ex. A-1 at 18.)

312. Mitigation measures for these impacts are included in the measures relating to reduction of construction noise and reduction of visual impact.

313. The NSF and UHIfA have agreed that slow moving vehicles and/or vehicles that are class 5 or larger should not travel through the Park between approximately 11:00 a.m. and 2:00 p.m. These are peak visitation hours. The ATST Project shall provide regular updates to appropriate NPS staff during the project so NPS staff can provide information to Park visitors. If the mitigation measures are followed the small increase in traffic would have a negligible impact on travel time and visitor use and experience. (Ex. A-2, Vol. I at ES-41.)

5. Mitigation of Impacts to Biological Resources

314. The ATST Project team, in coordination with NPS and USFWS, developed mitigation measures to reduce potential impacts to biological resources resulting from the ATST Project including monitoring, avoidance, and minimization measures. (Ex. A-2, Vol. I at Table 4-13; Foltz DT at 11.)

315. The ATST Project team will implement monitoring for invertebrates, flora and fauna. (Ex. A-2, Vol. I at 4-23 and 4-24; Foltz DT at 9; Maberry DT at 24.)

316. Required measures to prevent or avoid impacts to botanical resources are included in the Habitat Conservation Plan for the ATST Project (HCP) (Ex. A-12) and the Biological Opinion (Ex. A-25) for the ATST. The HCP includes eight specific alien arthropod control measures, such as a worker education program and inspections for materials going to the summit. The plan also requires that all inspections be documented, and that there be an annual inspection to identify any introduced species that may have eluded the cargo inspection process. (Foltz DT at 13.)

317. Funding from the ATST Project will provide an agreed upon and qualified person to conduct reasonable biological monitoring activities as outlined by the USFWS in its informal consultation. (Ex. A-2, Vol. I at Table 4-13; Foltz DT at 11.)

318. To prevent introduction of alien invasive species, NPS vehicle, equipment and materials washing and inspection protocol will be followed. (Ex. A-2, Vol. I at Table 4-13; Foltz DT at 11.)

319. The University has also implemented weeding throughout the HO site (Ex. A-6 at 43) which would alleviate introduction of alien invasive species if prevention is not successful. A wildlife biologist makes the recommendation as to how frequently weeding is done. The

UHIfA has followed his recommendations as to the frequency of weeding at the HO site. (Tr. 7/19/11 at 46 (Maberry).)

320. The Management Plan also contains various requirements for construction practices relating to inspection and washing of equipment, use of non-sterilized fill material, contractor education regarding unwanted introductions, the parking of construction equipment outside the HO property, and removal of trash (Ex. A-6 at 42-43.)

321. The NSF has also agreed to plant 300 Haleakalā silversword seedlings on Haleakalā state lands as a goodwill gesture. (Foltz DT at 48; Maberry DT at 25.)

322. A resource biologist was hired by NSF to work with Haleakalā National Park biologists to monitor activities to ensure protection of endangered species. The Management Plan established measures for the prevention of introduction of non-native and invasive species. Construction materials, equipment, and containers that originate from off island will also be checked for infestation of alien species, such as spider webs or egg masses, by Haleakalā National Park personnel prior to being transported through the Park and/or opened at the ATST Project site. (Ex. A-6 at 43-44; Foltz DT at 11.)

323. The Management Plan provides that importation of fill material is prohibited unless sterilized. NSF is required to make every effort to utilize existing on-site material. Any required importation of outside fill will comply with sterilization procedures and other required precautions against unintentional importation of invasive biological species. (Ex. A-2, Vol. I at ES-10 and 2-23.) Measures to prevent introduction of non-native species are also included in the Contract Specifications (Ex. A-23 at 9-10) and will be included in contract documents for contractors and subcontractors. (Foltz DT at 12.)

324. The USFWS issued the Biological Opinion for the ATST on June 15, 2011. The USFWS' Incidental Take Statement is included as section 9.1 of the Biological Opinion. (Ex. A-35; Foltz RT at 23-24.)

325. The Biological Opinion and Incidental Take Statement contain identified reasonable and prudent measures to minimize impacts to ʻuaʻu, as stated in NSF's HCP. Under the federal Incidental Take Statement, the ATST Project is responsible for a net recovery benefit to ʻuaʻu of more ʻuaʻu than might be lost to collision with any equipment and all other causes during construction. (Ex. A-12 at 52-76; Foltz DT at 13; Foltz RT at 23.)

326. On May 27, 2011, the Board approved NSF's HCP. (Foltz RT at 23.)

327. The HCP (Ex. A-12) contains mitigation and avoidance requirements, including minimization of impacts during construction, invasive species interdiction and control, and specific alien arthropod control measures. (Ex. A-12 at 52-57.) The HCP also contains mitigation measures including fencing and landscape-scale predator control to protect nearby ʻuaʻu populations. (Ex. A-12 at 58 to 64.) The HCP contains requirements for monitoring impacts of the Project, including those from construction, on the ʻuaʻu. (Ex. A-12 at 65 to 76). The overall intent of the HCP is to ensure that there is a net recovery benefit, such that there will be more petrels nesting within the conservation area subsequent to potential take from ATST construction, than population models predict there would be without the construction of the ATST. (Foltz DT at 13.)

328. Examples of the HCP's construction impact minimization measures include delineation of crane operation areas to protect ʻuaʻu burrows, lowering crane booms at night and, if the crane is not painted white, the use of reflective polytape to mark the crane. (Foltz DT at 13.)

329. The HCP (Ex. A- 12) requires monitoring, reporting, and adaptive management of mitigation to protect the petrel habitat throughout the entire construction of ATST. Predator control will be implemented by AURA/NSO or its successor for the entire lifetime of ATST. (Foltz DT at 19.)

330. Argument by Kilakila that lowering the crane lattices will not reduce risk to ʻuaʻu is not persuasive and is not supported by the evidence. Kilakila's reference to ʻuaʻu deaths from fencing were from barbed wire fencing that Haleakalā National Park had installed years ago. The barbed wire was subsequently removed and Haleakalā National Park has not experienced any bird deaths from fence strikes since that time. The relevant portion of the USFWS Biological Opinion states,

> According to Bailey (pers. comm. 2006b) the death of 26 of the 37 Hawaiian petrel mortalities are attributed to collisions (Hodges and Nagata 2001) with fences containing barbed wire. These fences were constructed to exclude ungulates from the Park in the 1980s. Two years after the fences were constructed, the barbed wire was removed from the fences. Park fences have been checked approximately once per month and, since the barbed wire was removed, no downed birds have been observed near Park fence lines (Bailey pers. comm. 2010).

(Ex. A-35 at 56; HCP, Ex. A-12 at 31; Foltz RT at 24.)

331. The fence approved by the USFWS in its Biological Opinion is an ungulate proof mitigation fence, which will enclose a 328-acre area where ungulates will be removed, and predator control will be implemented to increase the reproductive rate and adult survivorship of ʻuaʻu. (Ex. A-35 at 24-31.)

332. Kilakila's allegation that fencing around the ATST construction site contradicts the requirement in the Management Plan that construction of fences be avoided is not persuasive and is not supported by the evidence. The Management Plan provisions relate to construction fences; they do not relate to protective habitat fencing, as recommended by USFWS, that are

designed to be used in conjunction with ungulate removal and predator control to increase the reproductive rate and adult survivorship of the ʻuaʻu. (Ex. A-35 at 24.)

333. The Management Plan contains requirements such as worker training regarding vibration, noise and lighting hazards, minimizing risk to birds in adjacent areas and shielding noise sources where possible. (Foltz DT at 14.)

334. Contractors will be shown maps of ʻuaʻu burrow locations in and around the HO site during the Safety and Environmental Compliance briefing to assist with conservation measures. The petrels will also be protected by including measures to prevent the introduction of alien arthropods and measures to protect the petrels in the Contract Specifications. (Ex. A-23 at 9 to 12; Foltz DT at 14.)

335. The elimination of underground caissons, a change to the scope of work that was made subsequent to the release of the FEIS, will eliminate the need for heavy drilling for the caissons and it will decrease the potential for vibration disturbance and ʻuaʻu burrow collapse. (Maberry DT at 27; Foltz DT at 19-20.)

336. ATST funds will also be used to construct a larger permanent holding pen for nēnē near the Park entrance station, and NSF has agreed to fund portable and temporary traffic-calming measures including speed humps, speed monitoring signs and "Nēnē Crossing" signs. (Foltz DT at 47; Maberry DT at 27.)

6. Mitigation of Impacts to Topography, Geology, Soils, Water Resources and Air Quality

337. Little or no impacts are anticipated to the topography, geology, soils, water resources or air quality as a result of the ATST Project and as such no mitigation is required.

338. A change to the ATST Project since the FEIS was accepted is that a pre-cooler section has been added to the fluid cooler inside the Utility Building. This new system collects

excess rainwater to cool the area around the chillers. The use of rainwater for cooling reduces the risk of overflow at the cistern as rainwater is collected. Energy efficiency will also be improved by using excess rainwater for cooling. (Foltz DT at 21.)

7. Mitigation of Impacts from Hazardous Materials and Solid Waste

339. Although the impacts from hazardous materials and solid waste are anticipated to be minor and short term, aspects of the Project have been redesigned to further reduce the impact from hazardous materials and solid waste. The ATST mirror coating facility has been eliminated. The original project design included mirror coating equipment and space in the ATST facility for that equipment. The ATST will now use the mirror coating facility at the Advanced Electro-Optical System (AEOS) facility. This will reduce the number of trucks delivering material to the HO site for the coating chamber and related equipment at the ATST. There will also be a reduction in construction and maintenance activities, as well as a reduction in the size of the construction crew and number of vehicles. Because the existing AEOS mirror coating facility will be used, there will also be a reduction in hazardous material use and storage associated with the mirror coating operations. (Foltz DT at 20.)

340. An additional benefit of using the AEOS mirror coating facility is that hazardous waste is confined to a specific area and is therefore easier to control than having it distributed around the HO site. If hazardous materials can be reused or eliminated there will be less volume of hazardous materials on the summit. (Tr. 7/18/11 at 71-73 (Foltz).)

341. The use of other hazardous materials has been eliminated as well. The original project design included a hydrostatic bearing system as part of the telescope mount assembly. The ATST hydrostatic bearing system has since been eliminated. This means that synthesized hydrocarbon-based hydraulic oil will no longer be required. Eliminating the use of hydraulic oil

also eliminates the risk of spill or release in the transportation, storage or use of that oil. (Foltz DT at 20-21.)

VII. BENEFITS OF THE ATST PROJECT

342. The ATST presents an unparalleled opportunity to study the closest and most important star to the Earth. Providing a tool to give scientists the ability to significantly increase understanding of the Sun has the potential to help scientists predict major solar events having a profound impact on life on Earth. Solar flares and coronal mass ejections cause variations in the solar wind. The solar wind affects Earth's climate and determines the state of the Earth's atmosphere and magnetosphere which in turn affects communication, power transmission and presents hazards to humans in commercial air space. The ability to predict events such as a severe geomagnetic storm would place the world in a far better position to prepare for these types of solar events and address the consequences. (Ex. A-11 at 75.)

343. The HO site is the preeminent solar and space surveillance site in the world, and is also an excellent site for dedicated astronomical surveys. Hundreds of scientists come to Hawaii each year to participate in astronomy-related conferences, such as the Advanced Maui Optical and Space Surveillance Technologies ("AMOS") Conference, which is the premier technical conference devoted to space surveillance. An international cross section of more than 600 military, industry, and academic leaders attend AMOS annually. (Maberry DT at 4.)

344. Development of the ATST is anticipated to take approximately six to seven years with a preliminary associated cost of $298 million. During that time, approximately $50 million would be spent in Hawai'i for labor, planning and engineering services, construction materials, and infrastructure upgrades. The operating budget for the forty or more scientists, technicians, and engineers will be between $5-8 million per year to be spent on Maui. (Only a few personnel

will work at the facility; the remainder will be located at the new 20,000 square foot facility under construction in the Kulamalu subdivision in Kula.) (Foltz DT at 6; Ex. A-9 at 43.)

345. The ATST Project will be a public benefit as this project will benefit scientific research.

346. The basic physics of solar activity is not well understood. The ATST Project will benefit the study of the Sun by providing a facility with the capability to study the genesis of solar activity and to provide data required to unravel the generation, interaction, and destruction of the magnetic fields that are at the root of solar activity. (Ex. A-11 at 2-3.)

347. After a multi-year search, it was determined that Haleakalā was the only site to meet the criteria for the ATST Project. (Ex. A-11 at 9.)

348. There will be a benefit to native Hawaiian astronomers as they will have access to the ATST. (Ex. A-11 at 54 and 63.)

349. Native Hawaiians were interested in astronomy. Their lives were ruled by the kapu appropriate for the given phase of the moon. The time of year was determined by the stars and even the very beginning of the Hawaiian year was signaled by the rising of Makali'i (the Pleiades). Given Hawaiians' intimate connection to astronomy, pursuing a future in modern astronomy is a natural extension of Hawaiian culture. (Coleman RT at 3.)

350. There will be benefits to the 'ua'u as NSF undertakes a Habitat Conservation Plan. (Ex. A-12.)

351. There will be an assessment of historic properties associated with State Road 378. (Ex. A-10 at 8.)

352. Based on other astronomy facilities on Mauna Kea and Haleakalā, that have shown a capital investment of close to $1 billion and an economic impact of more than $100

million per year, the ATST Project is projected to provide economic benefits to the State of Hawaii. (Maberry DT 4.)

353. The observatories and other astronomy-related activities on Mauna Kea and Haleakalā provide approximately 500 quality jobs in a clean high-tech industry. (Maberry DT 4.)

354. There will be job opportunities not only for astronomers, but for technicians, and administrative and logistical service providers. (Maberry DT 4.)

355. The ATST Project will benefit many native Hawaiian students at Maui College. (Ex. A-11 at 54 and 63.)

356. AURA has memorialized its commitment to use local contractors and local labor by entering into a Developers Agreement. (Ex. A-24.)

357. To support an educational initiative at Maui College, NSF will make available $20 million ($2 million per fiscal year for ten years, commencing in FY 2011), subject to federal law. (Foltz DT at 32; Ex. A-11 at 63.)

VIII. GENERAL

358. Any proposed finding of fact submitted by the parties which is not specifically incorporated above is rejected for one or more of the following reasons:

1. They are repetitious or similar to the Board's own findings of fact or conclusions of law or decision and order, and/or

2. They are not supported by the reliable and/or probative evidence, and/or

3. They are in whole or in part not supported by and/or are contrary to the facts or law, and/or

4. They are immaterial, superfluous, and/or irrelevant to the material facts, issues, and/or law of this case.

359. If any of the above findings of fact is deemed a conclusion of law, it shall so be construed as a conclusion of law.

CONCLUSIONS OF LAW

I. JURISDICTION

1. Conservation District Use Application MA-11-04 to construct the ATST involves land designated in the General Subzone of the Conservation District.

2. The Board of Land and Natural Resources, State of Hawaii, has the authority and jurisdiction over lands designated in the Conservation District pursuant to Hawaii Revised Statutes (HRS) chapter 183C, and HAR chapters 13-1 and 13-5.

3. The Board of Land and Natural Resources, State of Hawaii, has the authority, pursuant to HRS chapters 183C and 205 to act upon and approve a Conservation District Use Application.

4. The Board of Land and Natural Resources has the authority and jurisdiction to approve CDUA MA-11-04 as a conditional use of the Conservation District.

II. BURDEN OF PROOF

5. UHIfA has the burden of demonstrating that a proposed land use is consistent with the criteria set forth in HAR §13-5-30(c).

III. LEGAL FRAMEWORK

A. Constitutional Authority and Administrative Rules

6. Article XI, Section 1 of the Hawai'i State Constitution provides in part:

> For the benefit of present and future generations, the State and its political subdivisions shall conserve and protect Hawai'i's natural beauty and all natural resources, including land, water, air, minerals and energy sources, and shall promote the development and utilization of these resources in a manner consistent with their conservation and in furtherance of the self-sufficiency of the State.

7. Article XII, Section 7 of the Hawai'i State Constitution provides:

> The State reaffirms and shall protect all rights, customarily and traditionally exercised for subsistence, cultural, and religious purposes and possessed by ahupua'a tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778, subject to the right of the State to regulate such rights.

8. Article XI, Section 9 of the Hawai'i State Constitution provides: "Each Person has the right to a clean and healthful environment, as defined by laws relating to environmental quality, including control of pollution and conservation, protection and enhancement of natural resources...."

9. The conservation district is the most restrictive of the four land use classifications authorized under Hawaii's Land Use Law, HRS chapter 205. Conservation districts are defined to include:

> areas necessary for protecting watersheds and water sources; preserving scenic and historic areas; providing park lands, wilderness, and beach reserves; conserving indigenous or endemic plants, fish and wildlife, including those which are threatened or endangered; preventing floods and soil erosion; forestry; open space areas whose existing openness, natural condition or present state of use, if retained, would enhance the present or potential value of abutting or surrounding communities, or would maintain or enhance the conservation of natural or scenic resources; areas of value for recreational purposes; other related activities; and other permitted uses not detrimental to a multiple use conservation concept. HRS § 205-2(e).

10. The Department of Land and Natural Resources (DLNR) administers public lands within the Conservation District pursuant to HRS chapter 183C. That chapter makes the following statement of public policy:

> [t]he legislature finds that lands within the state land use conservation district contain important natural resources essential to the preservation of the State's fragile natural ecosystems and the sustainability of the State's water

supply. It is therefore, the intent of the legislature to conserve, protect, and preserve the important natural resources of the State through appropriate management and use to promote their long-term sustainability and the public health, safety and welfare. HRS § 183C-1.

11. In evaluating the merits of a proposed land use in the conservation district, the Board evaluates eight criteria set forth in HAR § 13-5-30(c). The eight criteria are:

a. The proposed land use is consistent with the purpose of the conservation district;

b. The proposed land use is consistent with the objectives of the subzone of the land on which the use will occur;

c. The proposed land use complies with provisions and guidelines contained in chapter 205A, Haw. Rev. Stat., entitled "Coastal Zone Management," where applicable;

d. The proposed land use will not cause substantial adverse impact to existing natural resources within the surrounding area, community or region;

e. The proposed land use, including buildings, structures and facilities, shall be compatible with the locality and surrounding areas, appropriate to the physical conditions and capabilities of the specific parcel or parcels;

f. The existing physical and environmental aspects of the land, such as natural beauty and open space characteristics, will be preserved or improved upon, whichever is applicable;

g. Subdivision of land will not be utilized to increase the intensity of land uses in the conservation district; and

h. The proposed land use will not be materially detrimental to the public health, safety and welfare.

12. The conservation district lands are categorized into subzones. HAR § 13-5-10. Land uses for each subzone are limited to those uses identified in HAR chapter 13-5. The subzone in which the ATST Project is proposed is the general subzone. The objective of the general subzone is to designate open space where specific conservation uses may not be defined, but where urban use would be premature. HAR § 13-5-14.

13. Identified land uses for the general subzone are set forth in HAR § 13-5-25. In addition, all identified land uses and their associated permit or site plan approval requirements for the protective, limited, and resource subzones also apply to the general subzone, unless otherwise noted. HAR § 13-5-25.

14. Astronomy facilities are an identified land use in the resource subzone. HAR § 13-5-24. Accordingly, astronomy facilities are also an identified land use in the general subzone. HAR § 13-5-25(a).

15. Astronomy facilities in the resource subzone require a board permit and an approved management plan. HAR § 13-5-24.

16. The burden of proof is on the UHIfA to prove that it meets the requirements for the granting of the CDUA. The degree of proof is a preponderance of the evidence. HAR § 13-5-30(c); HRS § 91-10(5).

B. Case Law

17. In *Public Access Shoreline Hawai'i v. Hawai'i County Planning Commission*, 79 Hawai'i 425, 903 P.2nd 1246 (1995), (hereafter "*PASH*"), the Hawai'i Supreme Court of Appeals stated:

> The State's power to regulate the exercise of customarily and traditionally exercised Hawaiian Rights . . . necessarily allows the State to permit development that interferes with such rights in certain circumstances . . . . Nevertheless, the State is obligated to protect the reasonable exercise of customarily and traditionally exercised rights of Hawaiians to the extent feasible.

Id. at 450 n.43, 903 P.2d at 1271 n.43.

18. In *Ka Pa'akai O Ka 'Aina v. Land Use Commission* (hereafter "*Ka Pa'akai*"), 94 Hawai'i 31, 7 P.3d 1068 (2000), the Hawai'i Supreme Court provided an analytical framework to effectuate the State's obligation to protect native Hawaiian customary and traditional practices while

reasonably accommodating competing privates interests. In particular, the Court stated that findings and conclusions as to the following must be made:

a. The identity and scope of "valued cultural, historical, and natural resources" in the petition area;

b. The extent to which those resources - including traditional and customary native Hawaiian rights - will be affected or impaired by the proposed action; and

c. The feasible action, if any, to be taken to reasonably protect native Hawaiian rights if they are found to exist.

Id., 94 Hawai'i at 47, 7 P.3d at 1084.

19. The Intermediate Court of Appeals in *State v. Pratt*, (hereafter "*Pratt*"), 124 Hawai'i 329, 243 P.3d 289 (App. 2010) summarized the cases concerning the protections for customary and traditional native Hawaiian access, water, and gathering rights from *Kalipi v. Hawn Trust Co., Ltd.*, 66 Haw. 1, 656 P.2d 745 (1982), to *State v. Hanapi*, 89 Hawai'i 177, 970 P.2d 485 (1999). See *Pratt*, 124 Hawai'i at 342, 243 P.3d at 302. The Court expressed an "essential characteristic of protected native Hawaiian rights" as follows:

> Hawai'i law protects practices "associated with the ancient way of life" that have been continued, without harm to anyone. *Kalipi*, 66 Haw. at 10, 656 P.2d at 751. Put another way, the rights must have been "customarily and traditionally held by ancient Hawaiians." *PDF v. Paty*, 73 Haw. at 619, 837 P.2d at 1271. *PASH* reiterated the threshold requirement that "it is established that the application of a custom has continued in a particular area" and "stress[ed] that ... non-traditional uses are not permitted." 79 Hawai'i at 442, 447, 903 P.2d 1263, 1268. *PASH* reaffirmed that November 25, 1892 is the date by which Hawaiian usage must have been established in practice to fall within the protection of the law.

Id., 124 Hawai'i at 352-53, 243 P.3d at 312-13.

20. The Hawaii Supreme Court, in affirming the Intermediate Court of Appeals' decision in *Pratt*, clarified that consideration of the exercise of native Hawaiian rights requires a balancing of

the respective interests and the harm and consideration of the totality of the circumstances. *State v. Pratt*, 127 Hawai'i 206, 217, 277 P.3d 300, 311 (2012)(*Pratt II*).

21. *Pratt II* is instructive for the reminder that even when a customary and traditional practice has been shown to exist in an undeveloped area, that all of the circumstances must be considered in deciding whether to retain the exercise of such traditional and customary practice. *Id.*

22. When reviewing an application for a conservation district use permit, the Board of Land and Natural Resources must also consider mitigation measures set forth in the accompanying environmental impact statement. *Morimoto v. Bd of Land and Natural Resources*, 107 Hawai'i 296, 303-304, 113 P.3d 172, 179-80 (2005).

C. Board of Land and Natural Resources Decisions

23. The visual or other impacts of a project are site specific. *In the Matter of Conservation District Use Application for Hawaiian Electric Company, Inc. to Construct a 138-kV Transmission Line at Wa'ahila Ridge, Honolulu, Hawai'i*, DLNR File No. OA-2801 ("*Wa'ahila Ridge Decision*") at 65-66, fn. 17 (Ex. B-1.)

24. BLNR also takes into consideration whether limited alternatives may outweigh the obvious visual or other impacts. *Wa'ahila Ridge Decision* at 66, fn. 17 (discussing Zond windpower project, File No. MA-2902).

25. Where alternative sites for the project necessarily are limited by their nature, obvious visual or other impacts may be outweighed. *Wa'ahila Ridge Decision* at 66, n. 17 (discussing Zond windpower project, File No. MA-2902).

26. Structures and land uses which impact a public viewplane of a significant natural feature like a pu'u or ridge should propose adequate mitigation or make some showing of the lack of reasonable and practicable alternatives. *Wa'ahila Ridge Decision* at 64, fn. 13.

IV. DISCUSSION

27. The impacts of the ATST Project, which is the subject of the Conservation District Use Application, must be considered together with the proposed mitigation measures that UHIfA and NSF have already committed to put into effect as set forth in the FEIS. *Morimoto*, 107 Hawai'i at 303-304, 113 P.3d at 179-80.

28. The ATST Project satisfies the eight criteria set forth in HAR § 13-5-30(c) as follows:

a. HAR § 13-5-30(c)(1). The proposed land use is consistent with the purpose of the conservation district because the ATST Project is an allowed use within the conservation district and it is located within the HO site which already includes other astronomical facilities. The use of an already developed area promotes protection, preservation and long-term sustainability of the surrounding areas within the conservation district.

b. HAR § 13-5-30(c)(2). The ATST Project is not an urban use and is consistent with the uses allowed under Executive Order No. 1987. The proposed land use is a specific permitted use in the general subzone. The HO site is developed with roads, parking lots and astronomy facilities. The proposed ATST will occupy one of the last two developable sites at the HO site, and thus should have a negligible effect on open space at Haleakalā and is consistent with the objectives of the general subzone.

c. HAR § 13-5-30(c)(3). The goals of the Coastal Zone Management program are to address issues from an integrated ecosystem perspective, and as no lands in Hawai'i are more than 30 miles from the shore the entire State is considered to be in the Coastal Zone. (Ex. A-15 at 11.) The objectives and policies of the coastal zone management program relate to recreational resources, historic resources, scenic and open space resources, coastal ecosystems, economic uses, coastal hazards, managing development, public participation, beach

protection and marine resources. HRS § 205A-2. The implementation of mitigation measures, as discussed in part in section VI.B., is designed to reduce, minimize, eliminate, or compensate for the impacts of the ATST Project on surrounding areas. In particular, impacts of storm water runoff and effects on groundwater, which may directly affect the coastal zone, will be reduced to a negligible level. The ATST Project is consistent with the goals and objectives of HRS chapter 205A.

d. HAR § 13-5-30(c)(4). Natural resources is defined in HAR § 13-5-2, and includes plants, aquatic life and wildlife, cultural, historic, recreational, geologic, and archaeological sites, scenic areas, ecologically significant areas, watersheds, and minerals. The main areas of substantial adverse impact to natural resources that have been identified are impacts to cultural resources; impacts to endangered flora and fauna; and impacts to view planes. Specific measures have been proposed to mitigate these impacts.

The impacts of the ATST Project must be viewed in the context of the HO site. The HO site has housed astronomy facilities since the 1950's and was specifically created for astronomy uses. The ATST Project would be the eleventh astronomy or other facility currently located within the HO site. Only one other location within the HO site, Reber circle, would remain vacant if the ATST is built. Haleakalā is one of only three possible locations for the ATST in the world. Of the three possible locations, Halekalā is the best location. There are no alternative sites for the ATST in Hawaii.

The benefits to be derived from the ATST Project include not only the advancement of scientific knowledge that would be of significant benefit to the world, but it would also create economic benefits. Jobs and revenue for the economy would be created on Maui, both in the construction of the ATST and in the continued operation of the ATST. Educational

opportunities would be created for students at the Maui Community College as well as for native Hawaiian astronomers.

The mitigation measures discussed in section VI.B. include the minimization of construction and operational noise at the HO site and especially near the east-facing ahu. A process will be developed through which native Hawaiian cultural practitioners may obtain access to the HO site, including the east-facing ahu. Cultural practitioners may also request that construction noise be ceased during an approved access to reduce interference with cultural practices. After construction of the ATST, Kilakila may request that an additional ahu be constructed and consecrated to provide an additional location for practitioners to conduct cultural practices.

The impacts to endangered flora and fauna will be mitigated through the implementation of various monitoring programs, the HCP, and measures aimed at construction and visiting vehicles designed to reduce the introduction of alien and invasive species to the HO site.

The impacts to view planes will be mitigated through the choice of the location of the ATST Project within the HO site and the periodic evaluation of exterior paint options that could make the ATST less noticeable.

The proposed land use, when considered together with all minimization and mitigation commitments discussed above and with the additional conditions contained in this Decision, will not cause substantial adverse impact to existing natural resources within the surrounding area, community or region.

e. HAR § 13-5-30(c)(5). The HO site was specifically set aside for observatory site purposes under Executive Order No. 1987. Astronomical and observatory facilities have existed on the HO site since 1951. The ATST Project includes the construction of

astronomical facilities which are compatible with the locality and surrounding areas, appropriate to the physical conditions and capabilities of the specific parcel.

f. HAR § 13-5-30(c)(6). The HO site currently contains various astronomy facilities, including support buildings, roads and parking lots. The ATST will not enhance the natural beauty or open space characteristics of the HO site. However, because the proposed ATST is similar to the existing facilities at the HO site and surrounding areas, the ATST will be consistent with and will preserve the existing physical and environmental aspects of the land.

g. HAR § 13-5-30(c)(7). There is no proposed subdivision of land related to this application.

h. HAR § 13-5-30(c)(8). Adverse impacts from the construction and operation of the ATST Project, including impacts to noise, air quality, water resources, and hazardous materials and solid waste, will be minimized or mitigated such that these impacts will not be materially detrimental to the public health, safety and welfare.

Noise levels are required to be below levels required by the Department of Health and the construction personnel will be required to use appropriate safety procedures and equipment. Little impact is anticipated to air quality or water resources. The use of best management practices during construction and the construction of a storm water collection system and replacement of an existing cesspool will mitigate against any potential impacts to water quality.

Little impact is anticipated from the solid waste or hazardous materials related to the ATST Project. Solid waste will be handled consistent with current procedures for the existing facilities which calls for solid waste to be kept in covered containers until it is removed to a licensed Maui landfill. Handling and storage of hazardous materials will be in compliance with the ATST Hazardous Materials and Hazardous Waste Management Program (Ex. A-2, Vol. II,

App. D). Aspects of the ATST Project have been redesigned to reduce or eliminate the need for the use or storage of hazardous materials.

The ATST Project is designed to protect public health, safety and welfare by providing scientific data that will assist in learning more about the Sun's effects on our atmosphere and environment and how the Sun affects communication, power transmission and presents hazards to humans in commercial air space.

29. Under the Ka Pa'akai analysis set forth above, we conclude the following:

a. The identity and scope of cultural, historical and natural resources in the area of the ATST Project, and in particular within the HO site, is well documented in the CDUA, FEIS, and other exhibits that were submitted by UHIfA in this case. Although Kilakila has not shown that its directors or members engage in activities that are traditional and customary, according to *Pratt*, the Cultural Resources Assessment and the Supp. Cultural Assessment conducted in connection with the ATST Project have established that traditional cultural practices, such as religious prayer and ceremonies, the burying of piko, and connection with akua (gods) and ancestors, have occurred and continue to occur in the summit area. The practices engaged in by the directors and members of Kilakila are consistent with the cultural practices set forth in the cultural assessments and will be accepted as such. Many of these practices require solitude and quiet in the area of practice and an unfettered view from the summit.

b. The impacts to these resources are set forth above in section VI.A. These impacts must be considered together with the minimization and mitigation measures set forth in the LRDP, Management Plan, FEIS, Programmatic Agreement and Record of Decision, many of which were discussed in section VI.B. When considered with the minimization and mitigation

measure commitments, the effect of the ATST Project on the resources will be either minimal, temporary or both, with the exception of effects to visual resources and cultural practices.

The effect or impairment on the visual resources resulting from the ATST Project is that there will be another astronomy facility located within the HO site. When built, the ATST Project will be larger than the facilities currently located in the HO site, however, it will be just one of eleven such facilities located in the HO site. The ATST Project would intensify the developed appearance of the HO site, but it would not be unique to the HO site. From a distance the ATST Project will be indistinguishable from the other facilities located at the HO site.

The effect on, or impairment of, cultural resources is based in large part on the proximity of the ATST Project to the east-facing ahu.[16] Because the ATST would be located approximately ninety feet from the east-facing ahu, during construction the ATST Project would create intermittent sound impacts that would disturb the quiet and solitude characteristics of the east-facing ahu. During operation, the ATST Project could increase the amount of ambient noise that is perceived at the east-facing ahu. The ATST Project would also create the presence of a large structure near the east-facing ahu that could disturb a cultural practitioner at the east-facing ahu.

c. The effect on, or impairment of, traditional cultural practices by the astronomical facilities currently located on the HO site has, to a degree, already been mitigated by the construction and consecration of the east-facing ahu. Protection of the native Hawaiian practitioners' exercise of cultural practices in the HO site and near the ATST Project may be accomplished through the construction and consecration of a third ahu in a location to be agreed

[16] Much of the evidence of cultural practices was non-specific and referred only to the summit of Haleakalā. The only evidence submitted regarding use of the HO site for cultural practices focused mainly on the use of the ahu, in particular the east-facing ahu, for the cultural practices. (Section VI.A.1.)

upon by UHIfA and Kilakila in consultation with the Cultural Specialist and the Native Hawaiian Working Group. The implementation of this measure together with the conditions contained in the Long Range Development Plan, Management Plan, Record of Decision and the Programmatic Agreement, as discussed in section VI.B.1., will reasonably protect the exercise of cultural practices in the HO site and near the ATST Project.

30. Haleakalā is unique in the world as a site for astronomical research. Its isolated location in the middle of the Pacific Ocean, which creates a stable atmosphere with extremely low levels of turbulence and low dust, makes it particularly well suited as a site for solar astronomy facilities. In turn, the ATST Project would provide a unique opportunity for scientists to study the Sun and gain valuable knowledge that could have practical benefits for all people.

31. The use of the Haleakalā summit area for the development of the ATST Project would be in the public interest because the people of Hawai'i will be afforded a greater opportunity to participate in the activities provided to the astronomy community on Haleakalā through the conditions in the Programmatic Agreement and the Record of Decision.

32. The protection of the natural resources of the Haleakalā summit and the area covered by the application for the Conservation District Use Permit can be accomplished through implementation of the conditions contained in the Long Range Development Plan, Management Plan, Record of Decision, Programmatic Agreement, and the Habitat Conservation Plan and accompanying incidental take permits.

33. Based upon the evidence and testimony presented in this case, and the files and records herein, the Board finds that the applicant has met its overall burden of proof. HAR §13-5-30(c).

34. Therefore, the proposed land use meets the criteria for issuance of a conservation district use permit. The proposed land use also reasonably protects identified Native Hawaiian rights and practices.

35. Accordingly, the Board grants the CDUA, subject to the conditions noted below.

36. Any proposed conclusion of law which is not specifically included above is hereby rejected.

37. If any of the above conclusions of law shall be determined to be findings of fact, it is intended that every such conclusion shall be construed as a finding of fact.

DECISION AND ORDER

Based on the Findings of Fact and Conclusions of Law stated herein, it is the decision of the Board to conditionally grant the UHIfA a Conservation District Use Permit for the construction of the ATST Project, subject to the following conditions:

1. The UHIfA shall comply with all applicable statutes, ordinances, rules, regulations, and conditions of the Federal, State, and County governments, and applicable parts of the Hawaii Administrative Rules, Chapter 13-5;

2. The UHIfA shall obtain appropriate authorization from the Department for the occupancy of state lands, if applicable;

3. The UHIfA shall comply with all applicable Department of Health administrative rules;

4. Any work done or construction to be done on the land shall be initiated within two years of the approval of such use, in accordance with construction plans that have been signed by the Chairperson, and, unless otherwise authorized, shall be completed within seven (7) years of the approval. The UHIfA shall notify the Department in writing when construction activity is initiated and when it is completed;

5. Before proceeding with any work authorized by the Board, the UHIfA shall submit four copies of the construction and grading plans and specifications to the Chairperson or his authorized representative for approval for consistency with the conditions of the permit and the declarations set forth in the permit application.

Three of the copies will be returned to the UHIfA. Plan approval by the Chairperson does not constitute approval required from other agencies;

6. All representations relative to mitigation set forth in the Environmental Impact Statement, Record of Decision and Conservation District Use Application are incorporated as conditions of the permit, with the exception of the two strategies that were withdrawn during the review process concerning a star compass and construction during `ua`u incubation periods;

7. The UHIfA will follow the stipulations agreed upon in the Programmatic Agreement between the National Science Foundation, the National Park Service, the University of Hawaii, the State Historic Preservation Officer, and the Advisory Council on Historic Preservation. These include but are not limited to the establishment of a Native Hawaiian Working Group; the retention of a Cultural Specialist; reserving up to 2% of the total ATST usage time for Native Hawaiian scientists, when there are Native Hawaiians among the pool of qualified scientists; and providing support, including financial support, to an educational initiative addressing the intersection between Native Hawaiian culture and science. The UHIfA has also committed to continued mitigation of impacts on cultural resources in the Area of Potential Effects, as defined in the Programmatic Agreement. The UHIfA will provide a written annual report to the Board on the status of the implementation of the Programmatic Agreement, including: the implementation of the mitigation commitments contained in the Programmatic Agreement; listing any additional mitigations to impacts on cultural resources developed by the Native Hawaiian Working Group (NHWG); the response to those additional mitigations by the signatory parties to the Programmatic Agreement; and the implementation of any such additional mitigation measures by UHIfA;

8. The UHIfA will not initiate construction activities until it has obtained both a Federal Incidental Take Permit and State Incidental Take License. All mitigation measures that are agreed upon as part of the Take Licenses and associated Habitat Conservation Plan are incorporated as conditions of this permit, including but not limited to forbidding outdoor lighting at night, not exceeding ground vibration levels for burrow collapse, containing trash to control for rat predation, thoroughly inspecting cargo for alien invasive species, and educating drivers on the risk to avifauna;

9. The Programmatic Monitoring Activities discussed in the EIS are incorporated as conditions of this permit, including but not limited to botanical reconnaissance, invertebrate collections, field faunal surveys, video avian monitoring, and faunal radar surveys;

10. The Requirements set out in the Haleakalā Observatories Management Plan for Monitoring Strategies, Cultural and Historic Preservation Management,

Environmental Protection of Site Resources, Construction Practices, and Facility Design Criteria are incorporated as conditions of this permit;

11. When provided or required, potable water supply and sanitation facilities shall have the approval of the Department of Health and the County Department of Water Supply, if applicable;

12. The UHIfA understands and agrees that this permit does not convey any vested rights or exclusive privilege;

13. In issuing this permit, the Department and Board have relied on the information and data that the UHIfA has provided in connection with this permit application. If subsequent to the issuance of this permit, such information and data prove to be false, incomplete or inaccurate, this permit may be modified, suspended, or revoked, in whole or in part, and/or the Department may, in addition, institute appropriate legal proceedings;

14. Where any interference, nuisance, or harm may be caused, or hazard established by the use, the UHIfA shall be required to take measures to minimize or eliminate the interference, nuisance, harm, or hazard;

15. Should historic properties such as artifacts, burials, or concentration of charcoal be encountered during construction activities, work shall cease immediately in the vicinity of the find, and the find shall be protected from further damage. The contractor shall immediately contact the Historic Preservation Division (692-8015), which will assess the significance of the find and recommend an appropriate mitigation measure, if necessary; the UHIfA will also notify OHA at the same time;

16. During construction, appropriate mitigation measures shall be implemented to minimize impacts to off-site roadways, utilities, and public facilities;

17. Within 2 years of the completion of the construction of the ATST facility, Kilakila may require the construction and consecration of a new ahu in addition to the two currently present. Upon request by Kilakila, UHIfA will work with Kilakila, the Cultural Specialist and the Native Hawaiian Working Group to select an appropriate location for the new ahu which shall be built and consecrated in similar manner to the prior ahu;

18. Other terms and conditions as may be prescribed by the Chairperson;

19. Failure to comply with any of these conditions shall render this Conservation District Use Permit null and void; and

20. In order to protect the traditional and customary rights exercised in the HO site, during construction of the ATST Project and after, UHIfA shall allow access to the two ahu for the reasonable exercise of traditional and customary practices of native

Hawaiians to the extent feasible and safe, as determined by the Cultural Specialist and the ATST Project construction site supervisor.

DATED: Honolulu, Hawaii, NOV - 9 2012.

WILLIAM J. AILA, JR., Chairperson

SAM M. GON, III, Member

JERRY EDLAO, Member

ROBERT PACHECO, Member

DAVID GOODE, Member

JOHN MORGAN, Member