

127. See Appendix D, starting at Doc. 785 filed on July 27, 2017, for a summary of all motions filed after the Proposed FOF, COL, D&O.

FINDINGS OF FACT

I. THE DEVELOPMENT OF MODERN ASTRONOMY ON MAUNA KEA

A. THE GENERAL LEASE, THE MAUNA KEA SCIENCE RESERVE AND THE UNIVERSITY MANAGEMENT AREA

128. In 1968, the State of Hawai‘i, through the BLNR, entered into a lease with the University of Hawai‘i for the Mauna Kea Science Reserve ("**MKSR**"), General Lease No. S-4191 (the "**General Lease**"). By its terms, the General Lease terminates on December 31, 2033. Written Direct Testimony ("**WDT**") Nagata at 1; Ex. B.17f; (Dr. McLaren) Tr. 11/02/16 at 179:20-23.
129. The General Lease allows the University to use the leased land as follows:
4. Specified Use. The land hereby leased shall be used by the Lessee as a scientific complex, including without limitation thereof an observatory, and as a scientific reserve being more specifically a buffer zone to prevent the intrusion of activities inimical to said scientific complex.

Activities inimical to said scientific-complex shall include light and dust interference to observatory operation and certain types of electric or electronic installation on the demised lands, but shall not necessarily be limited to the foregoing.

Ex. B.17f at 3-4.
130. The MKSR includes approximately all of the land on Mauna Kea above the 12,000-foot elevation, except for certain portions that lie within the Mauna Kea Ice Age Natural Area Reserve ("**NAR**"). WDT Nagata at 1; Ex. A-9 at 6-1.
131. The entire MKSR is designated as part of the State of Hawai‘i Conservation District Resource Subzone. Uses on the land are subject to the DLNR’s Conservation District Rules (HAR Chapter 13-5) and any associated permit conditions. WDT Nagata at 1; Ex. C-2 at 2 (WDT Dr. Sanders).
132. The MKSR is administered by the DLNR as State land under the authority and direction of the BLNR. The MKSR is comprised of 11,288 acres, which the University’s Master Plan describes as a 10,763-acre cultural and natural preserve and a 525-acre Astronomy Precinct. The University manages the MKSR, the Hale Pōhaku mid-level facilities, and the Summit Access Road (between Hale Pōhaku and the MKSR, including 400 yards on either side of the road, excluding the NAR). Collectively, those areas are referred to as the "**UH Management Area.**" WDT Nagata at 1, 4-5.

B. DEVELOPMENT OF MODERN ASTRONOMY FACILITIES ON MAUNA KEA PRIOR TO 2000

133. The first road to the summit area of Mauna Kea – referred to as the Mauna Kea Access Jeep Trail – was established in 1964 to support astronomical testing. Ex. A-3/R-3 at 3-208.
134. The University began operating an observatory on Mauna Kea in 1968. Thereafter, a series of world class astronomical observatories were built in the summit region of Mauna Kea:
 - a. The University 2.2-meter Telescope, which became operational in 1970;
 - b. The United Kingdom Infrared Telescope ("UKIRT"), which became operational in 1979;
 - c. The NASA Infrared Telescope Facility ("IRTF"), which became operational in 1979;
 - d. The Canada-France-Hawai'i Telescope ("CFHT"), which became operational in 1979;
 - e. The Caltech Submillimeter Observatory ("CSO"), which became operational in 1986;
 - f. The James Clerk Maxwell Telescope ("JCMT"), which became operational in 1986;
 - g. The Very Long Baseline Array ("VLBA"), which became operational in 1992;
 - h. The W. M. Keck Observatory, the first phase of which ("Keck I") became operational in 1992, and the second phase of which ("Keck II") became operational in 1996;
 - i. The Subaru Observatory ("Subaru"), which became operational in 1999;
 - j. The Gemini North Observatory ("Gemini"), which became operational in 1999; and
 - k. The Submillimeter Array ("SMA"), which became operational in 2002. Ex. A-3/R-3 at 3-208 to 3-210.
135. The past construction of these observatories has had cumulative impacts on cultural, archaeological, and historic resources that are considered substantial, significant, and adverse. Ex. A-3/R-3 at 3-214.
136. Existing astronomical observatories are prominent visual elements in the summit area of Mauna Kea. At least one of the existing observatories on the summit ridge is visible from approximately 43 percent of Hawai'i Island. According to 2000 U.S. Census data, 72 percent of the Island's population reside within that viewshed area. At the summit ridge, the existing observatories obscure portions of the 360-degree panoramic view from the summit area. Overall, the existing level of the cumulative visual impact from past

observatory construction projects at the summit ridge area has been considered to be substantial, significant, and adverse. Ex. A-3/R-3 at 3-217 to 3-218; Tr. 11/15/16 at 24:1-8; Ex. A-5/R-5, App. M at 50-54; Ex. A-54 at 50-54.

137. Development of the existing observatories also significantly modified the preexisting terrain. The tops of certain pu‘u, or cinder cones, were flattened to accommodate the foundations for observatory facilities. Some materials removed from the pu‘u were pushed over the sides of the cinder cones, creating steeper slopes that are more susceptible to disturbance. Consequently, the existing level of cumulative impact from preexisting observatories on geology, soils, and slope stability is considered to be substantial, significant, and adverse. Ex. A-3/R-3 at 3-218 to 3-219.

C. DEVELOPMENT AND IMPLEMENTATION OF THE 2000 MASTER PLAN AND THE OFFICE OF MAUNA KEA MANAGEMENT

138. In response to the concerns raised in an audit performed in 1998 that was critical of the University’s management of the cultural and environmental resources in the MKSR, the University began preparing a new master plan for the MKSR. Ex. B.17e. On June 16, 2000, after nearly two years of work by an advisory committee and two series of public meetings, the University Board of Regents ("**BOR**") adopted the Mauna Kea Science Reserve Master Plan ("**Master Plan**"), which established management guidelines for the UH Management Area. The process reflected the Hawai‘i Island community’s deeply rooted concerns over the use of Mauna Kea, including respect for Hawaiian cultural beliefs and practices, protection of environmentally sensitive habitat, recreational use of the mountain, as well as astronomical research. The Master Plan is an internal policy and planning guide for the University to promote the goal of balanced stewardship of the UH Management Area through on-island community based management. WDT Nagata at 2; (Nagata) Tr. 12/8/16 at 27:6-8, 28:3-9; WDT Judge Heen at 1; Ex. A-48 at Chapter XII.
139. The purpose of the Master Plan is to guide the University towards achieving the Plan’s goals, which include: (1) preserving and protecting the cultural, natural, educational/scientific, and recreational resources in the managed areas of Mauna Kea; (2) preserving and protecting the cultural and natural landscape; (3) preserving and managing the cultural resources for future generations, protecting opportunities to engage in cultural practices; (4) defining areas for the use of cultural, natural and recreational resources; (5) protecting the right to exercise traditional cultural practices; (6) allowing for sustainable, integrated planning and management; and (7) protecting and enhancing astronomy research. The Master Plan recognized Mauna Kea as a community resource and that community involvement should be part of the management of Mauna Kea. A major feature of the Master Plan was the establishment of a community-based management entity to achieve the plans’ goals. WDT Nagata at 2; Ex. A-48 at X-7 to X-8.
140. The Master Plan’s community-based management entity is composed of the Office of Mauna Kea Management ("**OMKM**"), the Mauna Kea Management Board ("**MKMB**"), and Kahu Kū Mauna ("**KKM**") ("Guardians of the Mountain"). The Master Plan recognized the need for a single entity to manage the MKSR and suggested the name **OMKM** and that it be housed in UH Hilo under the Chancellor. **MKMB** and Kahu Kū

Mauna are composed of volunteers who live on the island of Hawai‘i with a strong desire to see that the lands under the University responsibility are properly managed. Both the MKMB and Kahu Kū Mauna advise OMKM and the UH Hilo Chancellor. The management entity oversees the management of the UH Management Area on Mauna Kea. WDT Nagata at 2-3; (Nagata) Tr. 12/8/16 at 28:3-9; (Nagata) Tr. 12/8/16 at 101:3-102:6, 105:9-105:14; WDT Judge Heen at 1-3; Ex. A-9 at 3-9 to 3-11; Ex. A-48 at X-3 to X-8.

141. Judge Walter Heen (ret.) was the first Director of the OMKM, appointed by Chancellor Rose Tseng in the summer of 2000. He is a retired Judge of the Hawai‘i State Intermediate Court of Appeals and, subsequent to his one year at OMKM, served as a trustee of the Office of Hawaiian Affairs ("**OHA**") from November 2006 to November 2010. WDT Judge Heen at page 1. Judge Heen describes his work at OMKM as: "The OMKM staff, with advice from the Mauna Kea Management Board ("MKMB"), immediately began developing a program to carry out the provisions of the 2000 Mater [sic] Plan. Our subsequent planning was consistent with the legal framework set out by the Hawai‘i Supreme Court for identifying cultural and natural resources, assessing the potential impacts to those resources by existing and proposed uses, and considering feasible measures to mitigate such impacts to significant resources. Close contacts were established with the astronomy community on the mountain and at UH Manoa, as well as with the Native Hawaiian and environmentally concerned communities." WDT Judge Heen at page 1. Since leaving OMKM in 2001, Judge Heen has maintained close contact with office personnel and the UHH Administration, and he is "satisfied [sic] that UH Hilo and OMKM continue to accord theutmost [sic] concern for the protection of Native Hawaiians` access to Mauna Kea and the mountain’s environment." WDT Judge Heen at page 3.
142. The MKMB is comprised of seven members of the community. It conducts regular meetings using the state’s sunshine law as guidelines for noticing of meeting agendas six days prior to the meeting. Written minutes are taken and approved at subsequent meetings. In carrying out its advisory function, the MKMB, with input from Kahu Kū Mauna, reviews and approves management policies, programs and actions, and makes recommendations to the UH Hilo Chancellor on proposed major projects. WDT Nagata at 3; Tr. 12/8/2016 at 185: 25-187: 23; Ex. A-9 at 3-11; Ex. A-111; Ex. A-62; Ex. A-133.
143. Kahu Kū Mauna is an assembly of native Hawaiians who advise OMKM, MKMB and the Chancellor of UH Hilo on cultural matters pertaining to the UH Management Area. Kahu Kū Mauna serves as important advisors on matters affecting the cultural integrity of Mauna Kea, including land uses on Mauna Kea and assists with the development of rules and management guidelines, and developing programs to educate visitors about the cultural, historical, spiritual and archaeological values of Mauna Kea. Kahu Kū Mauna conducts regular monthly meetings. Written minutes are taken and then approved at subsequent meetings. In addition to these regular meetings, the members of Kahu Kū Mauna attend retreats and visit specific sites. Tr. 2/27/17 at 117:20-119:7. OMKM includes input from Kahu Kū Mauna in its recommendations to the MKMB for decision making. WDT Nagata at 2-3; Tr. 12/2/16 at 80:3-80:8; Ex. A-9 at 3-9, 3-11; A-11 at 3-3; Ex. A-48 at X-8, XI-4; A-52; A-62 at 4; A-133 at 4; Tr. 11/16/16 at 133:4-133:8; 12/2/16

- at 41:15-41:19; (Nagata) Tr. 12/8/16 at 102:12-102:18, 105:9-105:14, 249:6-249:9; Tr. 12/12/16 at 203:18-204:4, 208:8-208:10; WDT Judge Heen at 2; Tr. 10/27/16 at 215:3-216:15 and 326:16-327:1, 328:9-331:7; Tr. 2/27/17 at 119:14-120:22.
144. There are no *per se* qualifications to be a member of Kahu Kū Mauna. Applicants are interviewed by Kahu Kū Mauna council members. Council members look for individuals with love and connection to Mauna Kea and the Hawaiian community. Members also have an awareness of Hawaiian cultural practices, traditions and significant landforms as applied to traditional and customary use of Mauna Kea. There is a conscious effort to have island-wide representation. Council members present selected candidates to MKMB, which then confirms membership on the Kahu Kū Mauna council. (Nagata) Tr. 12/8/16 at 102:12-20; Tr. 12/12/16 at 203:18-24; Tr. 2/27/17 at 119:20-120:7; A-9 at 3-11
145. Kakalia, who served as a member on Kahu Kū Mauna for two 4-year terms, vouched for the integrity of Kahu Kū Mauna and expressed her opinion that Kahu Kū Mauna was formed with high integrity and has evolved into a council that has discussions and provides recommendations about appropriate cultural and native Hawaiian issues affecting Mauna Kea. PHS/WDT Kakalia at 1; Tr. 2/27/19 at 148:4-148:8. Nevertheless, Kakalia is opposed to the TMT Project being built on Mauna Kea. She believes that the mountain is sacred and that there will be irreversible damage to an area in which deities reside. Vol. 41, Tr. 2/27/17 at 209:8-210:8.
146. In addition, an environmental advisory group was established by MKMB which provides input and guidance on environmental issues and management. In particular, the Environment committee was instrumental in assisting with the development of the Natural Resources Management Plan ("NRMP") and the Mauna Kea Invasive Species Management Plan ("MISMP"), sub-plans of the CMP. WDT Judge Heen at 2; Tr. 1/31/17 at 59:17-59:20; A-9 at 3-11; Ex. A-10 at Acknowledgements; Ex. A-40 at 4; Ex. A-48 at X-7; Ex. A-133 at 5; Ex. A-136; WDT Ward at 4-5. Ward testified that she was a member of the Environment Committee. Tr. 1/31/17 at 32:6-32:9.
147. OMKM's primary mission is the protection, preservation, and enhancement of cultural and natural resources in the UH Management Area on Mauna Kea. WDT Nagata at 2-3; Ex. A-9. OMKM is charged with and concerned about how to reasonably and rationally protect Mauna Kea from uncontrolled and unwarranted intrusion and how to preserve native Hawaiian traditional and customary rights and the mountain's natural environment, as required by the Hawai'i State Constitution, state statutes, and court decisions. OMKM's activities have sought to conform to the DLNR's laws, rules and regulations. WDT Judge Heen at 1; Ex. A-9.
148. After adoption of the Master Plan, OMKM, with guidance from MKMB, developed a program to carry out the provisions of the Master Plan. OMKM and MKMB's subsequent planning was guided by cases from the Hawai'i Supreme Court to identify cultural and natural resources, assess potential adverse impacts to those resources by existing and proposed uses, and consider feasible measures to those mitigate impacts. WDT Judge Heen at 1.

149. The management entity's roles and responsibilities include: (1) implementing the Master Plan and the CMP and its sub-plans; (2) developing and implementing management policies; (3) reviewing project proposals; and (4) overseeing day-to-day management of public activities, commercial tours, filming, research, and outside-the-dome observatory activities within the UH Management Area. WDT Nagata at 3; Ex. A-52; (Nagata) Tr. 12/8/16 at 28:10-28:19; Tr. 10/27/16 at 215:3-216:18, 326:16-327:1, and 328:9-331:7.
150. The management entity is also responsible for reviewing project proposals including major projects such as the TMT Project. The MKMB, with input from Kahu Kū Mauna, makes recommendations to UH Hilo Chancellor to approve or disapprove major projects presented to them by OMKM. WDT Nagata at 2-3; WDT: Judge Heen at 2; Ex. A-62 at 2-6; Ex. A-133 at 3-5; Ex. 111; (Nagata) Tr. 12/8/16 at 105:9-105:14; Tr. 128/2016 at 249: 6 to 249:9; Ex. A-9 at 39 to 3-11.
151. The University recognizes the importance of maintaining compatibility and consistency of recommendations between the Master Plan and the Comprehensive Management Plan ("CMP") and subplans, which is described in greater detail below. Ex. A-9 at 7-58; A-73. Provisions of the Master Plan that were subsequently incorporated by reference into the CMP and its sub-plans. For example: the management structure including OMKM, MKMB, and the native Hawaiian advisory council, Kahu Kū Mauna; conditions for siting telescopes; allowable development; and major project review process. Ex. A-9 at 3-9 and 3-11; A-13 at D-2; A-60 Ex. A-9 at 7-43 to 7-44, Table 7-11 at 7-45, and 7-46 to 7-47. The BLNR has approved the CMP and sub-plans in full. WDT Nagata at 4; Ex. A-9, A-11, A-12, A-13, A-50, A-60.

D. DEVELOPMENT OF THE COMPREHENSIVE MANAGEMENT PLAN AND ITS SUB-PLANS

152. In the summer of 2005, UH Hilo began developing the CMP to govern its internal management of the MKSR. The CMP contains:
 - (1) a summary of the description of the resources within the UH Management Area;
 - (2) identification of uses and activities;
 - (3) identification of threats to Mauna Kea's resources; and
 - (4) a total of 103 management actions and associated reporting requirements to mitigate threats and to protect various resources in the UH Management Area on Mauna Kea.

The CMP is an integrated planning guide for resource management that is designed to promote the protection of Mauna Kea's unique cultural, natural, recreational, educational, and scientific resources. The CMP describes and identifies the resources, uses, and activities that occur on the mountain. The CMP also identifies threats to resources and provides management actions that would help mitigate the help preserve and protect the resources. Ex. A-9; (Nagata) Tr. 12/8/16 at 28:23-29:17. The CMP is an adaptive

- management plan that provides general management guidelines and does not provide full or complete details on all projects contemplated. WDT Nagata at 3-4; Ex. A-9 at 2-3; Ex. A-50.
153. The University presented the draft CMP to Kahu Kū Mauna for the council's comments and input on the document. Tr. 2/27/17 at 108:7-108:22. Pursuant to the University's review process, the CMP was thereafter submitted to MKMB for review, and then to the BLNR for approval. Ex. A-9 at A4-17.
 154. On April 8 and 9, 2009, the BLNR held its regular meeting in Hilo to consider the CMP. BLNR approved the CMP on April 9, 2009, on the condition that the University submit for approval four (4) additional sub-plans, a Project Development Framework, annual status reports on the development of each sub-plan, and status reports on the development of the various management actions. WDT Nagata at 3-4; Ex. A-9; Ex. A-50.
 155. Some of the Petitioners requested that a contested case hearing be held on the BLNR's decision to approve the CMP. After that request was denied, Petitioners appealed to the Third Circuit Court. *See Mauna Kea Anaina Hou v. Board of Land and Natural Resources*, Civ. No. 09-1-336, in the Circuit Court of the Third Circuit, State of Hawai'i. The Court ruled that Petitioners had failed to show that their rights, duties, and privileges had been adversely affected by the acceptance and adoption of the CMP. As a result, the Court had no jurisdiction under Haw. Rev. Stat. § 91-14 to hear the appeal and dismissed the appeal. Ex. A-98. The Petitioners then appealed that ruling to the Intermediate Court of Appeals on the limited question of whether the BLNR and the Third Circuit Court had correctly ruled that Petitioners were not entitled to a contested case hearing. The Intermediate Court of Appeals affirmed the Third Circuit Court's decision in *Mauna Kea Anaina Hou v. University of Hawai'i*, 126 Hawai'i 265, 269 P.3d 800 (App. 2012).
 156. To satisfy the conditions imposed by the BLNR, the University developed and submitted its Project Development Implementation Framework and the four sub-plans to the BLNR. OMKM held open houses in Waimea, Kona and Hilo on September 1, 2, and 3, 2009, respectively, presenting the Cultural Resources Management Plan ("CRMP") and the NRMP. Exs. A-92, A-93. The four sub-plans – the CRMP, the NRMP, the Decommissioning Plan for the Mauna Kea Observatories ("**Decommissioning Plan**"), and the Public Access Plan for the UH Management Area on Mauna Kea ("**PAP**") – were each approved by the BLNR on March 25, 2010. WDT Nagata at 4; Ex. A-52, Ex. A-60, WDT Dr. McLaren at 1; (Dr. McLaren) Tr. 11/02/16 at 161:12-17, 180:17-182:2; Exhibits A-10 to A-13; (Nagata) Tr. 12/8/16 at 29:18-30:8 WDT Nees at 2; (Nees) Tr. 12/05/16 at 24:12-16.
 157. The CRMP was developed as part of OMKM's efforts to create a comprehensive management plan for the UH Management Area on Mauna Kea. The CRMP provides OMKM and the University with the tools needed to meet their cultural resource management responsibilities and objectives in several ways, including:
 - (1) promoting a greater understanding of the rich cultural heritage of Mauna Kea;

- (2) preserving and managing cultural resources in a sustainable manner so that future generations will be able to share in and contribute to a better understanding of the historic properties that exist in the summit region, which is of major cultural significance to Hawaiians;
- (3) maintaining opportunities for native Hawaiians to engage in cultural and religious practices; and
- (4) preserving the cultural landscape for the benefit of cultural practitioners, researchers, recreationalists, and other users.

WDT Nagata at 4; Ex. A-11 at i-ii.

- 158. Cultural resource management under the CRMP involves archaeological inventory surveys of historic properties (archaeological sites including burials), development and implementation of a plan for long term monitoring of historic properties; development and implementation of a burial treatment plan; implementation of management actions related to access in general and specifically for cultural practices; education and outreach activities; and compliance with applicable state, federal rules and regulations. Ex. A-11 at Chapter 4; Ex. A-21 at 4, App. A at 11; Ex. A-22 at 8; (Rechtman) Tr. 12/20/16 at 177:2-7, 210:16- 22.
- 159. The CRMP considers specific activities in terms of the potential threats or impacts that each may have on historic sites and properties as well as objects of contemporary value, and presents appropriate management measures to avoid or minimize impacts. Consultation for the CRMP has focused on native Hawaiian organizations, including the Kahu Kū Mauna Council, Hawaiian Civic Clubs in Waimea, Kona, Hilo, and Pahala on Hawai‘i Island, the Office of Hawaiian Affairs ("**OHA**"), Historic Preservation Committee, the Hawai‘i Island Burial Council ("**HIBC**"), and Royal Order of Kamehameha ("**ROOK**"). Ex. A-11 at ii, 6-1.
- 160. The focus of the NRMP is the protection and preservation of natural resources in the UH Management Areas on Mauna Kea. The NRMP provides detailed information on threats to natural resources and development of a management program to conserve these resources. The NRMP is based on a scientific framework that includes a comprehensive review of existing scientific studies, biological inventories, and historical documentation that identifies the current state of knowledge of resources and management activities as well as the effectiveness of current management actions. Community consultation is part of the process, with consultation done through surveys, email and phone interviews, and meetings held in Hilo and Honolulu to gather input from scientific experts, natural resource managers, and concerned members of the public. Ex. A-10 at i.
- 161. The NRMP examines human uses of Mauna Kea, with particular emphasis on their current and potential impacts on natural resources. The NRMP offers specific management actions to reduce the identified threats to natural resources and to guide adaptive responses to future threats. It also details a process for establishing and implementing a natural resources management program. The overarching goal of the NRMP is to help OMKM achieve its mission by providing natural resource management goals, objectives, and activities that protect, preserve, and enhance the natural resources

- of Mauna Kea. Ex. A-10 at i.
162. One of OMKM's primary areas of concern and one that is addressed in the NRMP is the prevention and control of invasive species. To that end, OMKM developed the MISMP. Ex. A-40. The plan was reviewed by both the Kahu Kū Mauna and MKMB and its implementation is supported by the Hawai'i Ant Lab and Big Island Invasive Species Committee. WDT Klasner at 5; Ex. A-40; Ex. A-10 at 4.2:21-36.
 163. As part of the MISMP, all vehicle operators are asked to inspect their vehicles daily. Tr. 12/6/16 at 17:3-17:8; Ex. A-40 at 20. If a vehicle is observed having mud on the flaps or on the tires, rangers will identify the vehicle operator and, if it is someone operating under a permit, the operator is sent down the mountain immediately, not allowed to return until the vehicle has been cleaned and is banned for that same day. Tr. 12/6/16 at 17:9-17:22.
 164. A DLNR-approved biologist inspects all large vehicles, meaning vehicles with three or more axles. The biologist inspects the undercarriage and wheel wells. The biologist inspects inside the vehicle, underneath the floor mats, under the seats, and behind the seats. The biologist inspects for any sign of biological material, plant, soil, seed, and/or insects. If any is found that cannot be remedied on the spot, the vehicle is rejected and the operator is told to clean the vehicle and reschedule an inspection. Tr. 12/6/16 at 54:18-55:4. These inspections take place below Pu'u Huluhulu in either an observatory baseyard, transportation company baseyard, or at the OMKM office. Ex. 48 at 7-15; Tr. 12/6/16 at 63:11-63:22.
 165. The PAP provides a set of principles and policies to guide OMKM in the development of management actions relating to public and commercial activities and to regulate those activities in the UH Management Area. The PAP provides a summary of current public activities, including cultural, commercial, and public visitation, snow play, hunting and hiking. The recommended policies are based, in large part, on data collected by the OMKM Rangers, information from interviews with community members, and guidance obtained during round table discussions with members of the various constituencies interested in and involved with Mauna Kea. WDT Nagata at 4; Ex. A-12 at i; (Nagata) Tr. 12/8/16 at 29:24-30:2.
 166. The PAP recognizes that native Hawaiians have the right to exercise their customary and traditional practices on Mauna Kea subject to reasonable regulation as provided by law. Ex. A-12 at 5-3; (Nagata) Tr. 12/13/16 at 61:4-61:13.
 167. The Decommissioning Plan establishes a process framework for eventual removal of observatories and the restoration of sites. The Decommissioning Plan can be used by both existing and future observatories on Mauna Kea to ensure that the DLNR as the landowner, the University as the lessee, and the observatories as sublessees have clear expectations of the observatory decommissioning and restoration process. WDT Nagata at 4; WDT Dr. McLaren at 1; Ex. A-13 at i; Tr. 11/15/16 at 66:12-66:22; (Nagata) Tr. 12/8/16 at 30:3- 30:8. The specifics of decommissioning for a facility can vary by location and community input. Tr. 11/15/16 at 137:21-138:2; Ex. A-13.

168. The decommissioning process begins with the submission of a Notice of Intent ("NOI"), followed by review and comment at several stages by OMKM, Kahu Kū Mauna, MKMB and the Environment Committee. Ex. A-38. The Decommissioning Plan recognizes the need for cultural sensitivity and calls for cultural considerations to be included as part of the deconstruction and restoration activities. Ultimate approval of the individual observatory's decommissioning plan rests with the University President and BOR. Review at the MKMB level provides an opportunity for community involvement and comment. WDT Dr. McLaren at 1; Ex. A-13 at 1-2, 18-33; Ex. A-38.

169. The Decommissioning Plan includes the Master Plan's general criteria for the siting of observatory facilities, including:

- (1) minimizing the impact on wēkiu bug habitat;
- (2) minimizing the visual impact from towns and significant cultural resources;
- (3) avoidance of archaeological sites, and
- (4) proximity to roads so as to minimize disturbance to the natural terrain.

Ex. A-13 at D-2; A-48 at 129-130.

The Decommissioning Plan also cites factors for limiting observatory development including technical factors such as wind direction and view obscuration, and physical factors such as avoidance of biological, archaeological and geological features. Ex. A-13 at D-1.

The Decommissioning Plan also summarizes the Master Plan's five types of observatory development that could be considered for development including Type IV, the next generation large telescope such as the TMT Observatory. Ex. A-48 at IX-37 to IX-39; A-13 at 31-33.

The Decommissioning Plan also addresses the future of astronomy on Mauna Kea, including the University's expectation that by the end of the current lease there will be fewer telescopes than existed at the time the plan was developed.

Section 5 of the Decommissioning Plan states the University's long-term goal of having fewer observatories in the summit region, while maintaining a world-leading observatory complex for education and research in ground-based astronomy.

WDT Dr. McLaren at 2; Ex. A-13 at i, 28-33; (Dr. McLaren) Tr. 11/02/16 at 161:5, 18, 24.

170. The Decommissioning Plan is consistent with Governor Ige's directive that the TMT Project site should be the last new site developed on the mountain and that any future development occur on already existing sites. The University confirmed that the TMT Project site is the last new area on the mountain where a telescope will be built. Ex. A-39; WDT Dr. McLaren at 3; Tr. 11/2/2017 at 164:13-164:22; (Dr. McLaren) Tr. 11/02/16 at 205:9-13, 206:9-13.

171. The Decommissioning Plan calls for all new telescopes and existing telescopes that

renegotiate their subleases to develop a decommissioning funding plan. The purpose of the funding plan is to provide assurances that there will be sufficient funds available to finance the removal of a facility and restore the site when the time to decommission arises. Included in the funding plan is a cost estimate, and financial assurances mechanisms. A funding plan should be established prior to the commencement of permitted activities, incorporated into sublease terms and maintained until the sublease expires. (Dr. Sanders) Tr. 1/3/17 at 32:13-32:21; Ex. A-13 at 13-17.

172. While none of the subleases executed before the completion of the CMP and Decommissioning Plan are bound by the Decommissioning Plan, the sublessees are bound to any decommissioning and restoration terms set forth in their subleases or operating and site development agreements (*e.g.*, restore to even grade, remove all structures and visible improvements). Tr. 11/15/16 at 108:22-109:12; Exs. B.03k & B.03l; Tr. 11/15/16 at 123:11-14. While partial restoration could be contemplated, when the CMP was completed in 2009, the University asked for and received a commitment and understanding from the observatory sublessees to achieve decommissioning (including information indicating how the respective observatory would fund the decommissioning). Tr. 11/15/16 at 107:19-108:17; (Dr. McLaren) Tr. 11/02/16 at 232:15-233:3; *see, e.g.*, Ex. A-9 at App. A-9.
173. Whether or not a CDUP will be required to decommission a given telescope is to be determined by DLNR. (Dr. McLaren) Tr. 11/02/16 at 212:19-213:9. The University, as the applicant, along with each facility, would prepare a project-specific environmental assessment to identify concerns and develop mitigation for decommissioning. Tr. 11/15/16 at 146:6-13.
174. Under the Decommissioning Plan, planning for decommissioning begins about 5 years prior to anticipated decommissioning. Tr. 11/15/16 at 158:22-159:22.

E. CURRENT AND FUTURE DECOMMISSIONING

175. TIO has committed to performing under the Decommissioning Plan. TIO formation documents include commitments by each of the members to be responsible for decommissioning. Tr. 1/3/2017 at 32:13-32:21, 55:1-55:6. The TMT Initial Decommissioning Funding Plan (Ex. C-39) is a commitment by the members of TIO to its decommissioning obligations. The plan calls for a sinking fund of a million dollars per year with adjustments for inflation commencing upon observatory operation to fund eventual decommissioning. The sinking fund will be fully funded and sufficient up to the end of the 50-year useful life of the TMT Project. (Dr. Sanders) Tr. 1/3/17 at 40:14-41:16, 147:20- 148:1; Ex. C-39.
176. The University is responsible for funding and executing the decommissioning of its own facilities. The University owns four telescopes on Mauna Kea: UKIRT, JCMT, Hoku Ke‘a, and the University 2.2-meter Telescope. The University operates the University 2.2-meter Telescope and Hoku Ke‘a; UKIRT and JCMT are operated by other organizations. Tr. 11/15/16 at 112:11-114:16. Prior to transferring ownership of the UKIRT and JCMT facilities to the University, the University secured \$2.5 million for

each telescope from the United Kingdom to defray the anticipated costs of decommissioning those telescopes. (Dr. McLaren) Tr. 11/02/16 at 227:15-228:16; Tr. 11/15/16 at 65:21- 66:16, 158:4-21. The IRTF is owned by NASA and operated by the University. The other 8 telescopes are both owned and operated by non-University entities. (Dr. McLaren) Tr. 11/02/16 at 161:25-162:6.

177. The University has committed to reducing the number of telescopes on Mauna Kea. Tr. 2/28/17 at 70:12-70:22. The University plans to decommission three (3) telescopes before the TMT Project is operational. WDT Dr. McLaren at 3; Ex. A-39; (Dr. McLaren) Tr. 11/02/16 at 164:13-165:5, 205:20-22; Tr. 11/15/16 at 118:25-119:14, 171:22-175:6. Two of these telescopes are confirmed: CSO and Hoku Ke‘a both submitted their NOI to decommission. (Dr. McLaren) Tr. 11/02/16 at 164:23-165:5. The University also committed to decommission UKIRT by the time TMT Project becomes operational. WDT Dr. McLaren at 3-4; (Dr. McLaren) Tr. 11/02/16 at 162:7-10; (Dr. McLaren) Tr. 11/02/16 at 164:23-165:5; Tr. 11/15/16 at 119:6-14.
178. In addition, VLBA and either JCMT or the SMA will likely be decommissioned by the end of 2033. Ex. A-13 at 34; (Dr. McLaren) Tr. 11/02/16 at 225:19-25; Tr. 11/15/16 at 121:14-122:7, 169:6-170:23.
179. The decommissioning of CSO, UKIRT and Hoku Ke‘a could be achieved by the time the TMT Project becomes operational. Tr. 11/15/16 at 119:25-120:11.
180. The decommissioning of CSO, UKIRT and Hoku Ke‘a will help to offset the impact created by the TMT Project. Tr. 11/15/16 at 142:16-143:11.
181. The CSO decommissioning will be done on Mauna Kea under the auspices of the Decommissioning Plan. Exact estimates on how long a facility will take to be decommissioned and what the exact process will be are not yet developed, but are expected to be reasonable and occur as promised. (Dr. McLaren) Tr. 11/02/16 at 216:19-217:7.
182. It is unlikely that the CSO site could be recycled as the site for the TMT project. (Dr. McLaren) Tr. 11/02/16 at 189:24-190:1. The TMT Project is not being proposed to be built on the UKIRT site because UKIRT is on the summit ridge, a more sensitive cultural area, and due to height restrictions. (Dr. McLaren) Tr. 11/02/16 at 193:13-194:3. For the same reasons, and although it could theoretically be built at these locations with extensive grading, the TMT Project is not being proposed to be built on any other existing site on the Kūkahau‘ula Ridge. Instead, the TMT Project is being proposed to be built off the summit ridge area. (Dr. McLaren) Tr. 11/02/16 at 194:19-195:4.

F. ASTRONOMY DEVELOPMENT UNDER THE MASTER PLAN

183. The Master Plan delineates and identifies an area within the MKSR referred to as the Astronomy Precinct where astronomy-related development will be consolidated to maintain a close grouping of astronomy facilities, roads, and support structure, to minimize the potential impacts to natural and cultural resources in the summit region. Ex. A- 48 at IX-20 to IX-26; Tr. 12/12/16 at 168:15-169:14.

184. The Master Plan identifies five types of astronomy development and their locations (described as Areas A – F) that are allowed within the Astronomy Precinct. These include the redevelopment or expansion of existing observatory facilities or sites, and the development of a next generation large telescope such as the TMT Project. Ex. A-48 at IX-27 to IX-28. Under the Master Plan, new facilities proposed within the Astronomy Precinct are to be designed to:

- (1) avoid disturbing existing habitat areas and archaeological sites;
- (2) limit the extent of visual impacts from existing cultural sites and from downslope communities;
- (3) avoid the scattering of facilities by clustering within the development area, avoid impacts to other facilities including obscuration and wind flow patterns;
- (4) implement design measures to blend with the landscape; and
- (5) minimize development of new infrastructure by locating astronomy facilities near existing roads and utilities.

Ex. A-48 at IX-20 to IX-23; WDT Nagata at 6; (Nagata) Tr. 12/8/16 at 32:7-32:21.

185. As described in the Master Plan, "Area E" within the Astronomy Precinct was identified as the anticipated location for a next generation large telescope such as the TMT. *See* Ex. A-1/R-1 at 1-6 & n.5; Ex. A-48 at IX-37 to IX-39 & Figure IX-15 at IX-25. The 13 North ("13N") site is located on the northwest slope area below the summit ridge in a location known as Area E. Ex. A-1/R-1 at 1-12, Figure 1.7. This site was recommended for a variety of reasons, as it would:

- (1) situate the observatory at a significant distance from historical and cultural sites including Kūkahau‘ula and Lake Waiau;
- (2) minimize visibility of the observatory from significant cultural areas on the summit and from Waimea and Honoka‘a;
- (3) reduce wind shear forces; and
- (4) minimize the potential to obscure the views of existing observatories.

The proposed location for the TMT Project in Area E will take advantage of the northerly extension of the summit ridge and ensure that the TMT Project will not be visible from the Hilo area. Furthermore, Area E is not considered good wēkiu bug habitat and Project-related disturbance will be minimized by using an existing roadway for access and installation of utilities. Tr. 11/15/16 at 41:20- 22, 43:14-16; WDT Nagata at 9-10; (Nagata) Tr. 12/8/16 at 34:18-35:4; Ex. A-48 at IX-25, IX-35, IX-39; Ex. A-68.

186. Although the Master Plan does not discuss the EIS process, it is included in the review of a major project. There are four processes involved in the review and approval of a major project such as the TMT:

- (1) Master Plan Design Review;
- (2) EIS;
- (3) the University's approval process; and
- (4) submittal of a Conservation District Use Application (CDUA) to DLNR.

The MKMB developed a framework for project development in the form of a flowchart. This framework illustrates the integration of the Master Plan's Design Review, EIS, the University's approval of the project, and submittal of the CDUA to DLNR. The MKMB approved the flowchart on October 14, 2009. As a condition of the approval of the CMP the BLNR required the University to submit this framework for approval. This flowchart was approved by the BOR on February 18, 2010, followed by the BLNR on March 25, 2010. WDT Nagata at 6; Exhibit A-48 at XI-4 to XI-12; Ex. A-52; Ex. A-58; Ex. A-59; Ex. A-60; (Nagata) Tr. 12/8/16 at 33:7-33:15; Ex. 111. The BLNR has therefore formally approved the Master Plan's major project review process. Ex. A-60.

187. The Master Plan's Design Review evaluates a project's design to ensure that a project:

- (1) conforms to the Master Plan's goals and objectives;
- (2) is consistent with the Master Plan's design guidelines;
- (3) relates harmoniously with the summit environment;
- (4) promotes resource conservation; and
- (5) does not contribute significantly to cumulative impact.

WDT Nagata at 7; Ex. A-48 at XI-7 and XI-9; (Nagata) Tr. 12/8/16 at 33:16-33:23.

188. The Design Review is also intended to ensure that future projects in the MKSR conform to and implement the concepts, themes, and development standards and guidelines set forth in the Master Plan. The Master Plan contains a set of Design Guidelines to help direct development in a manner which integrates a facility into the summit environment. *See* Ex. A-111. Design Guidelines includes topics relating to facility siting; scale, heights and widths; color, roof (dome), and surface textures and materials; parking, roadway and utility development, and walls and signage. Ex. A-48 at XI-4 to XI-13; WDT Nagata at 6-8.

189. To assist the University with its Design Review, the Master Plan calls for the establishment of a Design Review Committee comprised of, but not limited to, professionals in the fields of architecture, landscape architecture, and engineering. In addition, MKMB and Kahu Kū Mauna, the developer and the Institute for Astronomy all have a representative on the Design Review Committee. WDT Nagata at 7; (Nagata) Tr. 12/8/16 at 33:24-34:2. For major projects such as the TMT Project, the Design Review Committee follows the Master Plan's Design Review process using the Design

Guidelines for guidance in its examination of the overall design of the proposed observatory facility. Ex.t A-48 at XI-4 to XI-13.

190. The Design Review process involves four phases. Under Phase I, the developer is provided an orientation of the Master Plan's goals and objectives, overview of the design review process, and design guidelines. Under Phase II, schematics or conceptual drawings of the proposed project's design are reviewed (Schematic Design). MKMB as a whole reviews the outcome of Phase II, and, if it has no objections, the process is allowed to move to Phase III (Design Development). Under Phase III, a review of detailed drawings is performed, including, site plans, floor plans, and elevation plans. MKMB reviews the design outcome of Phase III. If there are no objections, the developer can move to Phase IV (Construction Documents Review) and begin preparing its construction drawings. WDT Nagata at 7; Exhibit A-48 at XI-10 to XI-39; Exhibit A-52; (Nagata) Tr. 12/8/16 at 34:9-34:17.
191. The second process in the review and approval of a major project is the preparation, review and approval of an EIS under Chapter 343, Hawai'i Revised Statutes. The preparation of an EIS begins with the public scoping process followed by OMKM's review of the Draft EIS, a public comment period, responses to comments received, and preparation of a Final EIS. The MKMB reviews the Final EIS for the project and makes a recommendation to the appropriate University office or to the Governor on whether to accept the Final EIS. WDT Nagata at 8; Ex. A-52.
192. The third process is the University's approval process. In this stage, MKMB, with input from Kahu Kū Mauna, reviews and recommends approval or disapproval of the project to UH Hilo Chancellor, who in turn makes a recommendation to the University President and the BOR. The BOR makes the decision whether or not to proceed with the project. WDT Nagata at 8; Ex. A-52.
193. The fourth process involves the designation of the appropriate University agency to submit a CDUA to the DLNR. Upon approval of the project by the BOR, a CDUA is prepared. The MKMB reviews and approves the CDUA and recommends which agency within the University should submit the CDUA. A CDUA is then submitted to the DLNR. WDT Nagata at 8-9; Ex. A-52.
194. The TMT Project is currently in the fourth phase of the design review process. WDT Nagata at 10.

G. BLNR ONGOING JURISDICTION

195. The Board has jurisdiction over Conservation District lands and regulates and administers land uses in those lands – including the UH Management Area on Mauna Kea. With respect to the UH Management Area, the BLNR has repeatedly exercised its authority by approving the CMP, sub-plans, and the University's project review and approval process. WDT Nagata at 11; Ex. A-50; Ex. A-60.
196. As a condition of the Board's approval of the CMP, it designated the BOR, the highest authority within the University, with the responsibility of implementing the CMP and

sub-plans. The Board requires the University to provide annual reports in writing and in person on the status of implementation of the CMP management actions. Every year since the Board approved the CMP in 2009, OMKM has prepared and submitted annual reports, beginning in 2010, on the status of the implementation of the CMP. WDT Nagata at 11- 12; Ex. A-60; Exs. A-15 to A-22; (Nagata) Tr. 12/8/16 at 35:12-35:17.

197. The Board also retains jurisdiction over Conservation District lands on Mauna Kea through HAR Chapter 13-5, *et seq.* Proposed astronomy development is a land use on Conservation District lands on Mauna Kea and requires a Board-issued permit. Based on this, the Board retains authority over Conservation District lands on Mauna Kea. WDT Nagata at 11-12.
198. For the TMT Project, the Board's authority is further reflected in the BLNR considering the CDUA, directing that this contested case proceeding be held, and retaining responsibility for reviewing and accepting, rejecting, or modifying the Hearing Officer's recommended FOF and COL and accompanying decision and order. WDT Nagata at 12.

H. DEVELOPMENT OF THE UNIVERSITY MANAGEMENT EFFORTS

199. Gunther Hasinger is an astronomer and the Director of the Institute for Astronomy ("IfA") at the University of Hawai'i. He received his Ph.D. in Astronomy in 1984 from Ludvig Maximillian University specializing in compact objects, the X-ray background and cosmology, and management expertise over a large spectrum of scientific institutions, including instrumentation and telescopes. He is of the opinion that "Hawai'i is one of the best places on Earth to observe the heavens and hosts arguably the premier observatory in the Northern Hemisphere." UHH Witness Statement 6, WDT of Gunther Hasinger.
200. Management efforts have evolved and developed significantly over the last 15 years under OMKM. The most recent Hawai'i State audit report on the Management of Mauna Kea and the MKSR in August 2014 states: "we found that [the University] and DLNR have addressed many of our recommendations, including developing and implementing management plans for Mauna Kea's natural, cultural, and historic resources. The result is an improved and more comprehensive framework that coordinates the agencies' efforts to manage and protect Mauna Kea while balancing the competing interests of culture, conservation, scientific research, and recreation." Ex. A-34 at 36; WDT Dr. Hasinger at 6.
201. Most management actions contained in the CMP have either been implemented by OMKM or are in progress. Many actions are considered "ongoing" as they are long term, continuous land management responsibilities. Mauna Kea's historical sites have been extensively surveyed and identified. The natural resources found in the summit region have been substantially surveyed and identified. OMKM continues implementation of baseline inventories of the natural resources on UH Management Area on Mauna Kea. Ex. A-22.
202. In 2012, OMKM hired Klasner as its first Environmental and Natural Resource Program

Manager as part of its on-going efforts to fulfill its long-term commitment to preserve and protect the natural resources found within the MKSR. He is responsible for all the natural resource programs on the mountain, including developing programs and identifying collaborative partnerships that will help OMKM best achieve its overall goal to manage and protect lands managed by the University. WDT Klasner at 1; (Nagata) Tr. 12/8/16 at 38:1-19.

203. OMKM is continually in the process of removing fireweed and other invasive species from the Hale Pōhaku area road and summit areas. Rangers remove fireweed when they find it along the road and summit areas. In 2012, OMKM created a volunteer program to remove fireweed and other invasive weeds. To date, the program has engaged over 1,000 volunteers, who collectively have worked over 7,000 hours, removed over 1,500 bags of invasive weeds, and planted several hundred Mauna Kea Silversword plants. WDT Klasner at 5.
204. OMKM is working on restoring native vegetation, focusing on common native species, such as māmane, aweoweo, and puakala. OMKM is working with both botanists and entomologists to understand and restore the basic habitat of some of the rarer species. Tr. 12/6/16 at 72:14-73:7.
205. The testimony of Nelson Ho, a witness for Opposing Intervenor Sleightholm, focused on what he believes has been a misplaced emphasis upon astronomy over environmental and cultural resources, as well as past issues relating to the management of the mountain and the politics affecting said management. Ho has been involved in the controversy on the mountain since 1995. He believes the TMT should be built but not on Mauna Kea. *See generally* Ex. J-8 (Amended WDT Ho). Nelson Ho acknowledged that the follow-up to the 1998 State Auditor's Report indicated that most of the auditor's concerns were addressed. Tr. 2/22/17 at 32:12-38:14, 102:21-103:7.
206. The annual reports to the BLNR, beginning in 2010 to the most recent 2016, cite the management accomplishments that OMKM has done over the years. The 2016 report states that most of the CMP management actions have been implemented or are in progress. Many of the actions are described as "ongoing" as they are long term, continuing land management responsibilities. All of the reports provide details on the implementation status with explanations for individual CMP management actions. The 2016 report includes details on the cumulative annual progression of the implementation status from 2010. Ex. A-22. In addition, the U.S. Fish and Wildlife Service references OMKM's efforts and the adoption of the CMP and sub-plans and a procedure for formal review of projects all contribute to the protection and conservation of the wēkiu bug as such were reasons for removing the wēkiu bug from the candidate species list under the Federal Endangered Species Act. Ex. A-134a at 66377.

II. THE PROPOSED PROJECT

A. HISTORY OF THE TMT PROJECT

207. Edward C. Stone ("**Dr. Stone**") is the Executive director of TMT International