FINAL ENVIRONMENTAL ASSESSMENT

for the

REVISED MASTER PLAN FOR

LIMAHULI GARDEN AND PRESERVE

This document prepared pursuant to Chapter 343, HRS

Prepared by
The National Tropical Botanical Garden, Conservation Department

January 2008

Upper Limahuli Valley, TMK Kaua'i: 5-9-1-3

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I. INTRODUCTION: FINAL ENVIRONMENTAL ASSESSMENT

Project Name: Master Plan for Limahuli Garden and Preserve – 2007 Revision

Proposing Agency: **National Tropical Botanical Garden (NTBG)**

Approving Agency: **State Department of Land and Natural Resources (DLNR)**

Project Location: **Upper Limahuli Valley**
TMK Kaua`i: 5-9-1-3
District: Hanalei ; Ahupua`a: Ha`ena

Property Owner: **National Tropical Botanical Garden**

LU Classification: **Conservation, Special Subzone, Limahuli Valley Special Subzone (LVSS)**

Determination of Environmental Assessment:

The Department of Land and Natural Resources has issued a Finding of No Significant Impact (FONSI) for the project (see Appendix D).

Changes to the Draft EA found in the Final EA

No public or agency comments were received by the 2 weeks after the December 10 deadline. No changes were made to the EA except for the adjustments to the project timeline to reflect the timing of the approval of this document. Tasks scheduled for the third quarter of 2007 will now be implemented in the first quarter of 2008.

II. SUMMARY OF PROPOSED ACTIONS

A. Project Purpose and Need

The National Tropical Botanical Garden (NTBG) has prepared a revised Master Plan for Limahuli Garden and Preserve which was approved by the BLNR in 1994 via CDUP KA-2656. At that time the entire Master Plan and the EA that was incorporated into it was reviewed and a Finding of No Significant Impact (FONSI) was determined by the DLNR (the accepting agency).

The primary reason that the NTBG is now submitting a revised Master Plan to the DLNR is the need for a major change in the management strategy for the upper Limahuli valley. The other minor revisions that are part of the Revised Master Plan will not result in any detectable changes to practices or impacts resulting from the operation of Limahuli Garden and Preserve. As a result, this Final EA will focus on the new Master Plan for Upper Limahuli Preserve which is Chapter III of the Revised Master Plan.

Over the past 20 years the Upper Limahuli Preserve has undergone significant change and NTBG now proposes to undertake the active conservation management and ecological restoration of the 400-acre Upper Limahuli Valley in Ha`ena on the north shore of Kaua`i. This area is also referred to as 'Upper Limahuli Preserve', 'Upper Limahuli', and 'Upper Preserve' in this and other documents. Please see Appendix A for a map of the project area. This is an area of high conservation value due to the presence of 12 Federally Listed plant species and 2 Federally Listed bird species, and because it represents a functioning native ecosystem of significant size. A complete list of the Federally Listed species observed in Upper Limahuli is presented in Appendix C.

The project is directed at protecting the one of the best remaining examples of an intact lowland wet forest ecosystem, as well as the rare and endangered plant and animal species it supports. Lowland wet forests occur on all the high Hawaiian Islands except Ni`ihau and Kaho`olawe. These forest ecosystems are among the most threatened of Hawaiian forest types because of historic patterns of use and development of the areas where these forests exist (ie: in areas with ample rainfall for irrigated agriculture and bottomlands with level enough topography for dense settlement, in both the Polynesian and modern period, and areas used for livestock grazing in the modern period). Upper Limahuli is positioned between the wet forests of Koke`e above and the mesic forests of the Na Pali coast below, providing the valley with an exceptional diversity of species that overlap from both forest types. Within the lowland wet forests of Upper Limahuli several different forest communities can be found, depending on slope position, aspect and elevation, including *`ohi`a / `uluhe lowland fern forest, `oh`ia lowland wet forest*, and *`ohi`a / olapa lowland wet forest*. The native flora of Limahuli Valley is impressive, and is nearly unparalleled when compared with other watersheds on Kaua`i. In total, Limahuli contains naturally occurring populations of 254 native plant taxa, 213 of which are Hawaiian endemics **(Wood 2006).**

In addition to endemic plants, wildlife biologists working as part of the Kaua'i Endangered Seabird Recovery Project (KESRP) - a collaborative effort between the University of Hawai'i, the US Fish and Wildlife Service, and the State Department of Forestry and Wildlife - have confirmed the presence of breeding Hawaiian petrels (*Pterodroma sandwichensis,* Endangered) and Newell's Shearwaters (*Puffinus auricularis newellii,* Threatened) in Upper Limahuli Preserve. Unfortunately, they also documented predation on these birds by feral cats in the same area **(Holmes 2006a,b).** Hawaiian forest birds such as `apapane (*Himatione sanguinea*) and `i`iwi (*Vestiaria coccinea*) have also been observed. Other endemic forest birds also occupy nearby Hono o na Pali regions and the presence of these birds in the ULP will be investigated in future

surveys. Because much of the ULP is an intact native ecosystem, it is very likely that populations of native invertebrates also will be found. Protection of these breeding sites from cat predation is a critical link in the conservation of this rapidly declining species. It is crucial that a long-term commitment to active management be made as soon as possible to begin reversing the current trend of biological degradation and population decline.

The Upper Limahuli Preserve (ULP) is a very remote and rugged area that is separated from the Lower Preserve by sheer 1,000 foot cliffs. As a result, a helicopter is required to reach the Upper Preserve safely. This is a costly undertaking that has become a major factor in shaping the management plan for the Upper Preserve.

Upper Limahuli is in a rare category of natural areas in Hawaii – privately owned, pristine, and held by an organization with the ability and desire to protect, conserve, and restore the native species and habitats found there.

Conservation Challenges

The conservation challenges in Upper Limahuli are numerous. As a direct result of the denuding effects of Hurricane Iniki, *Clidemia hirta*, a serious weed in many ecosystems of Oceania **(Smith, *in* Stone, Smith and Tunison 1993),** established itself as a dominate shrub layer cover blanketing much of the area denuded by Iniki's ferocious winds. Other invasive plant species that have since become established and which must be aggressively managed include *Lantana camara, Ageratum conyzoides*, daisy fleabane (*Erigeron karvinskianus*), Australian tree fern (*Sphaeropteris cooperi*), and Kahili ginger (*Hedychium gardnerianum).* Incipient invaders that must not be allowed to gain further ground include African Tulip tree (*Spathodea campanulata*), *Tibouchina herbacea*, paperbark (*Melaleuca quinquenervia*), albizia (*Falcataria moluccana*), strawberry guava (*Psidium cattleianum*), and autograph tree (*Clusea rosea*). These aggressive plants represent a major biological threat to this valuable area**.**

The single most important threat to the native forest ecosystem of Upper Limahuli is introduced feral mammals. Feral ungulates pose perhaps the one of the most severe long-term threats to the biological integrity of native ecosystems throughout Hawai`i (**Hawaii Conservation Alliance 2006, Cuddihy and Stone 1990, Stone and Scott 1985**). Feral pigs (*Sus scrofa*) now inhabit Upper Limahuli Preserve in considerable numbers. Feral pigs have a negative impact on the native elements of this ecosystem through their foraging activities and to the recreational value of the Valley through the contamination of Limahuli Stream. Impacts that can be directly attributed to feral pigs include increased soil disturbance, destruction of native plants, especially seedlings and tree ferns, and contamination of Limahuli Stream with pathogens such *E. coli, Leptospirosis,* and *Giardia* **(Atwill 1997)**. Secondary impacts that arise from soil disturbance include increased sedimentation of Limahuli Stream, which has the potential to inhibit the reproductive cycle of native freshwater organisms found there, including Federally Listed Species of native gobiids (o`opu); increased invasion of the area by alien plants due to the preponderance disturbed soil areas and the transportation of alien plant seeds in pig droppings; and an increase in mosquito populations which breed in the wallows created by pigs. Increased mosquito populations in turn increase the possibility of avian malaria infections in native passerine birds that venture into the area **(Atkinson 1995)**. The loss of native bird pollinators and seed dispersers will greatly diminish native biodiversity and disrupt native ecosystem functions **(Hawaii Conservation Alliance 2005b)**.

Conservation efforts within the Hawaiian Islands have shown that feral ungulates are the most significant threat to many plant communities. When ungulates are removed and the area enclosed with a sufficient barrier to animal ingress, the native ecosystem can then begin to recover. Experience has also shown that the only successful method of completely protecting

an area from feral ungulates is to exclude the animals with a fence or similar physical barrier **(Hawaii Conservation Alliance 2005a).**

Feral goats (*Capra hircus*) are present throughout Kaua`i, including the adjacent valleys of Hanakapi`ai to the west, and Lumahai to the east. It is quite possible that in the next 5-10 years, population pressures will result in goats moving into Upper Limahuli Preserve as well. The threat posed by feral goats is well known. In Hawai`i, native plant species, having evolved in the absence of large herbivores, lack defense mechanisms such as spines or chemicals that are poisonous or foul tasting **(Carlquist 1980)**. Many introduced plant species, on the other hand, do possess these anti-herbivory mechanisms, and are therefore less palatable. As a result, feral ungulates may preferentially browse native plant species in areas where they grow side by side with alien species. Goats browse relentlessly, devouring seedlings, saplings, and low branches **(Cuddihy and Stone 1990)**. Goats also increase the incidence of rockfall, and thus the potential for damage to sensitive cliff-dwelling plant and bird species.

Rats (*Rattus rattus, R. exulans,* and *R. norvegicus)* were introduced to Hawai`i over 200 years ago, and pose a serious threat to native plant, bird, and insect species. Rats eat native plant fruits, seeds, and seedlings **(Cuddihy and Stone 1990)**. Rats are also known to opportunistically predate upon insects, and are believed to have contributed to the decline of many native Hawaiian snail species. Rats are also known to predate upon the eggs and chicks of native birds that are currently found in Limahuli Valley, including white-tailed tropic birds (*Phaethon lepturus*), Hawaiian short-eared owls (*Asio flammeus sandwichensis*), Hawaiian petrels, and Newell's shearwaters **(Amarasekare 1993)**.

Feral cats (*Felis catus*), have recently established a growing population in the Upper Limahuli Preserve. These cats probably made their way into Limahuli via neighboring Wainiha Valley, or possibly Hanakapiai Valley. Well-established populations of feral cats are known to exist in both of these neighboring valleys, posing a grave threat to nesting Newell's Shearwaters, Hawaiian petrels, and other native birds. Feral cats threaten native bird species due to their predatory behavior. It is well known the feral cats predate upon the ground nesting birds listed above **(Smith 2002)** and this phenomenon has been confirmed in Upper Limahuli Preserve in relation to adult Newell's shearwaters. Additionally, in the spring of 2006, scientists from the Kauai Endangered Seabird Recovery Project (KESRP) discovered active nesting sites for the rare Hawaiian Petrel. These are the only documented nesting sites on the island of Kaua`i and are thus extremely significant. KESRP biologists also documented dead shearwaters and petrels in Upper Limahuli that appeared to have been predated upon by feral cats living in the area **(Holmes 2006a,b).** This discovery further underscores the urgency and importance of the NTBG implementing an active management plan for this remote area.

B. Project Description and Location

The project will be located on the north shore of Kaua`i, District of Hanalei, Ahupua`a of Ha`ena, in the upper watershed of Limahuli Valley. The proposed activities will be carried out within the 400 acre Upper Limahuli Preserve. This is a perched valley, approximately 800 feet above the floor of the Limahuli lower valley, above the Limahuli Falls. This rugged area is trisected by the East and West forks of Limahuli Stream. Three main ridgelines (east, west, central) dominate the topography, each of which dissects into numerous steep sub-drainages. See Appendix A for a map of the project area.

The Master Plan for Upper Limahuli Preserve – 2007 Revision, serves as the Management Plan as required under HAR 13-5, and outlines the following conservation management activities : 1) feral ungulate fencing, 2) feral ungulate control, 3) rodent control,

4) feral cat control, 5) alien plant species control, 6) native plant restoration, and 7) native seabird monitoring. The plan also identifies the following essential infrastructure needed to actively manage this remote area: 1) small tool storage/weather shelters to accommodate equipment and staff who have to camp in this often wet area, and 2) several (five to eight) remote helicopter landing zones (LZ), and 3) three to five computerized weather stations.

Feral Animal Control Program

Feral animal control is an essential element in the long term Habitat Improvement Program for Upper Limahuli Preserve. This program will oversee the control of feral animals in the preserve, and the installation of physical barriers, such as fences, to prevent animal ingress.

Fencing. Ungulate-proof fences will be a necessary element in the long-term management of Upper Limahuli Preserve. Fences will be used to create small exclosures and to close off topographical features that provide access points, and to completely enclose watershed areas or conservation units. These fences will be constructed by NTBG or qualified contractors as necessitated by increased feral ungulate presence, and as funding for such projects allows. It is firmly established that the conservation and restoration of native Hawaiian ecosystems is unsuccessful in the presence of feral ungulates (**Hawaii Conservation Alliance 2005a, Cuddihy and Stone 1990, Loope 1998, Scott *et al.* 1986, Stone and Scott 1985**).

The most crucial component of the project is the construction of a protective woven wire fence around the perimeter of the Preserve, and the removal of feral pigs from within this 400-acre fenced exclosure. The fence will be constructed along the ridgeline watershed boundary. See Appendix B for a map of the proposed fence alignment.

Preparation of the fence corridor will involve trimming of vegetation with hand operated tools (i.e., handsaw, machete, weed eater, chainsaw) from a 6 foot (ft) wide corridor along the ridge that forms the watershed boundary for Limahuli Stream. A 60 inch high fence will be constructed using hog wire fence supported by wooden and steel fence posts. Where needed, the outside of the fence will be skirted along the base with a woven wire apron and a band of bezinal-coated barbwire, except within 100 feet of seabird colonies, where the fence design will omit the use of top and bottom barbed wires in order to reduce the chance that the fence will be injurious to birds in the event of collision or when moving through the fence at ground level.

Feral ungulate control. The protection of the area from feral ungulate disturbance will require systematic monitoring and hunting to control feral ungulates (pigs currently, perhaps goats and deer in the future). This activity will be performed by NTBG staff, and possibly in conjunction with hunters from the local community. Bow and rifle hunting will be permitted only under the direct supervision of NTBG staff, and only after permission has been given to specific individuals for hunts on specific dates. All hunters will have State of Hawaii certification and current valid hunting licenses. Hunting periods will be restricted geographically and/or temporally to avoid nesting seabirds. However, it is probable that given the remoteness, size, terrain, and access limitations of the area, public hunting programs alone will be inadequate for removing the required percentage of the population on a yearly basis needed to achieve the goal of eradication. Commonly used methods and techniques will be used in order to control feral pigs that are not accessible to hunters. Research conducted by Hess (2006) in Hawaii in a remote ecosystem comparable to Upper Limahuli showed that >41–43% of the population must be removed each year to cause a decline. Using the same regression equation, 70–71% of the population must be removed to reduce the population by 50% in each successive year. Finally, Hess concluded that reducing densities in unenclosed areas is not as effective at achieving this goal as removals from enclosed areas. **(Hess, *et al.***

2006).

Feral cat control. Efforts will be conducted by NTBG staff to trap and remove feral cats to control their populations. Feral cat trapping will be focused on access routes in the vicinity of seabird colonies. Cat monitoring in the Upper Limahuli Preserve will aim to detect and remove any newly arrived cats through regularly scheduled trapping efforts.

Rat control. To benefit native flora and fauna populations, control of rats will be performed by NTBG staff and will include activities such as mechanical traps and banding of trees to exclude rats. Due to the ecology of rodent populations, control efforts for them will initially be episodic and local in scope, but might be valley-wide at a future date. Future efforts may involve poisoning of rats with bait stations once funding and any additional regulatory clearances are obtained for this activity.

Alien Plant Control Program

Alien trees and shrubs will be selectively removed from strategic locations within Upper Limahuli Preserve. Incipient invaders (ie: those that still exist in small numbers and have yet to become well established) will be an important focus of our alien plant control program. The basic methodology for this will be the use of a chain saw and/or the use of translocated herbicide that is either painted on the stump, or injected into the trees or shrubs. This will primarily accomplish three things:

a. Existing native vegetation will be encouraged to grow and flourish.

b. A break in the alien canopy will allow newly planted native species a chance to compete with the existing alien vegetation and become established as the replacement vegetation for that specific site.

c. Incipient plant invaders can be selectively targeted and prioritized for control before they become further established.

Alien herbaceous species will be controlled in order to prepare sites for replanting with native species and as needed to maintain selected areas in the future. Herbicides may also be used to prevent the spread of localized incipient invasions of herbaceous species, and then only when this technique has a high probability of controlling the target species. Mechanical control methods will be used preferentially over herbicides. When herbicides are necessary, they will applied in accordance with label instructions. Herbicides will be applied at the minimum volume and concentration required for control of the target species and will be applied only during periods of dry weather and never when heavy rains are expected. This will virtually eliminate the chance that any harmful chemicals will be transported into Limahuli Stream via runoff from the treated site.

The maintenance of Upper Limahuli Preserve will require the continual removal of young alien trees before they reach a mature size. This should become less of a problem as more and more seed-producing alien trees are removed over the years.

The change that we expect will occur in Upper Limahuli by halting the degradation of this native dominant ecosystem by feral pigs is the increased likelihood of a forest 50 years from now that contains more native species diversity and has had fewer species extinctions when compared with nearby unmanaged areas. It is significant to note, that because of the sheer size of this area (approximately 400 acres) and the aggressive nature of many alien plant species, some of the elements of this restoration program may never be completed.

Planting Program

Our planting program will use both common and rare species of native plants. Only

species native to this remote area will be used in this program. The common species will be used en masse to restore habitat (canopy and understory). There will also be a special focus on rare species that would benefit from augmentation of their existing small populations. The seed source for this project will be collected from within Limahuli whenever possible. However, because it will be one of just a few areas on Kauai that are protected from feral ungulates, Upper Limahuli Preserve will be in the unique position to offer protection for other native plant species as well. As such, the Upper Preserve can augment existing populations of T&E species whose habitat ranges overlap and provide for mitigation in areas where these species are threatened.

Physical Facilities

The following physical facilities are planned for the Upper Limahuli Preserve: trails, work camp shelters, ungulate-proof boundary fence, low-impact helicopter landing zones, and small weather stations.

Trails. A network of minor trails will be established to connect and facilitate access to restoration and monitoring areas as they are developed.

Storage / weather shelters. Construction of up to four small (approximately 10x20 feet) tool storage/shelter structures for NTBG staff and/or research scientists are proposed. Strategically and inconspicuously placed, these structures will allow ready access to necessary research and/or maintenance equipment and protect such equipment from weather or theft. The shelter element of the structure will provide a primitive camping facility for staff and volunteers who spend extended periods working in this remote area. It will also house first aide kits and other emergency equipment for safety reasons. The exact size and location of these facilities will be determined when the NTBG is prepared to construct them, but each facility will not exceed 400 square feet.

Feral ungulate fence. An ungulate-proof fence will be constructed to enclose the Upper Valley. The fence will be 60 inches in height and constructed from high-grade galvanized t-posts and woven wire. Any fences will be constructed in a manner that reduces any short term adverse impacts caused by the fence construction, such as soil erosion, damage to native plant species, disruption of seabird breeding or nesting activities, and helicopter noise associated with the delivery of fencing materials to remote project sites. Plans for avoiding or mitigating these possible impacts are detailed in section V. Proposed Mitigation Measures.

Helicopter landing sites. Low-impact helicopter landing zones (LZ) will be developed in order to deliver fencing materials, tools, and workers to Upper Valley project sites. These landing sites require the trimming of woody vegetation in a 15 foot diameter area for loading and unloading. Any tall trees must also be trimmed in a 30 foot diameter in order to provide clearance for the helicopter rotors. Level ridge top areas with low shrub canopy will be selected for landing zone development to reduce or eliminate the need to clear large trees or perform manual grading of these sites. surrounding them.

Weather Stations. The installation of several small weather stations within the Upper Limahuli Preserve will facilitate the long-term ecological monitoring of the area. Data collected via these stations will be shared with scientists and utilized as components of various research activities taking place in the Upper Limahuli Preserve, and as part of larger scale ecological monitoring occurring across the state. These weather stations are not massive structures, and do not stand greater than 15 feet in height. They will be located in areas where they are not visible to the public.

Temporary Camps. During the fence construction and pig removal phase of this project, small low-impact temporary camp sites will be established along the fence corridor that

will be occupied for several days at a time before work crews move to the next camp location.

C. Schedule

The anticipated start date for this project is the first quarter of the 2008 calendar year.

1. Fence Corridor and Landing Zone Clearing :

The establishment of trails and helicopter landing areas will begin in the first quarter of 2008, and will take approximately 3 months to complete. Fence corridor clearing will be executed in 2 or more phases. The first phase will be a light clearing in conjunction with further surveys for evidence of ground nesting seabird colonies in March 2008. During this process, the fence will be re-routed around sensitive habitats as needed to protect seabird colonies. The corridor final preparation period will last approximately 6 to 8 months, if weather conditions are favorable, and will begin in the second quarter of 2008. For all of the activities described above, work will be episodic and will be performed simultaneously with other management tasks.

2. Fence Installation:

The fence installation period will last approximately 6 to 8 months, if weather conditions are favorable, and will occur in 2008.

3. Shelter Installation:

The installation of at least one of the shelters will occur in 2008. Construction of the shelters will be dependent on funding.

4. Feral Animal Control

Feral pig removal, cat trapping, and small scale rat control will begin in 2008 and continue thereafter. Removal of feral pigs within the 400-acre fenced exclosure could take from 1 to 3 years, with the expectation that intensive hunting and trapping efforts will remove 75% of the population the first year after the fence is completed.

5. Alien plant control.

Alien plant control activities will begin in 2008 and be continuous thereafter. Initial control of incipient plant invaders throughout Upper Limahuli may take 3 to 5 years to complete.

6. Planting Program.

The planting program activities will begin in 2008 and be continuous thereafter.

D. Funding Sources

This project is funded, in part, by grants from the U.S. Fish & Wildlife Service, the Kauai Watershed Alliance, the Department of Forestry and Wildlife, the Hawaii Community Foundation, Natural Resource Conservation Service, and other private grantors.

III. SUMMARY DESCRIPTION OF THE AFFECTED ENVIRONMENT

A. General

Limahuli Valley is a 1,000 acre watershed bordered on the east by Wainiha Valley and on the west by Hanakapiai Valley. The Upper Limahuli Preserve encompasses approximately 400 acres of land above Limahuli Falls and extends from about 1,600 feet elevation at the top of the falls to 3,330 feet elevation at the summit of Hono O Napali. This Upper Limahuli Preserve is wedge shaped with Hono O Napali being at the apex. Limahuli is divided into an upper and lower valley by the 800 foot Limahuli Falls. The ecosystems of Limahuli include native diverse mesic forest, montane and lowland wet forest, and the perennial Limahuli Stream.

B. Flora

Our understanding of the flora of Limahuli Valley is based on 30 years of botanical expeditions into the area between 1976 and 2006. The Lower Valley of Limahuli is largely dominated by alien plant communities or mixed communities of native and alien species. The Upper Valley is largely undisturbed lowland wet forest. Limahuli Upper Valley contains forest ecosystems classified as *Ohia/ Olapa Forest* and *Ohia / Uluhe Fern Forest* **(Wagner 1999)**. A 1978 survey of Upper Limahuli estimated that plant cover in areas just above Limahuli Falls to be 99% native **(Wichman 1978).** In 1990, the area still had few plant invaders and native cover was estimated at 95% percent by NTBG botanists **(Flynn 1990).** Since then, the impact of Hurricane Iniki, the invasion of the area by an increasing number of alien plants, and drastic influx of feral pigs has resulted in significant additional degradation of the bottom one-third (approximately 120 acres) of the Upper Limahuli Preserve. Much of this hurricane devastated area is now heavily invaded by alien species. Thankfully, the top two-thirds of the Preserve were spared the worst hurricane damage, and are still considered mostly pristine. They are, however, rapidly deteriorating due to the impacts described.

In total, 169 native flowering plant species have been observed in 116 genera; and 35 species of native ferns have also been documented. Populations of 12 Federally Listed species and 8 Candidate species occur naturally in Limahuli Valley **(Wood 2006).** Approximately 80 – 100 naturalized alien plant species have been documented in Limahuli Valley. Only about 10 alien plant species that could be considered to be of ecological consequence have become established in Upper Limahuli.

C. Fauna

Wildlife biologists working in the Upper Preserve have observed the presence of `apapane, `i`iwi, Hawaiian short-eared owl, white-tailed tropicbird, Endangered Hawaiian petrel, and Threatened Newell's shearwater. The Endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) has also been observed in Upper Limahuli Valley. Non-native animals observed in the project area include feral pigs (*Sus scrofa*), rats (*Rattus spp.*), barn owls (*Tyto alba*) and feral cats (*Felis domesticus*).

No comprehensive surveys of the invertebrate community have been done within the upper Limahuli system, but given the diversity and relatively intact condition of the native forest, it is suspected this site supports high densities of native arthropods and other native invertebrates.

D. Cultural Resources:

Archaeological sites. No archaeological sites are known in Upper Limahuli Preserve. Due to the inaccessibility of this perched upper valley, it is believed that no permanent habitation occurred, nor did any agricultural practices occur here. If any archaeological sites are subsequently discovered, they will be managed according to the guidelines spelled out in the Management Plan for Limahuli Valley Archaeological Sites, Chapter V (on file with DLNR, also available through NTBG by request).

The following steps have been/are currently being taken to determine the cultural and historical significance of the project area:

1. An extensive and revealing oral history of the area was recorded by Kumu Pono Associates in 2003. "Hana ka lima, `ai ka waha" A Collection of Historical Accounts and Oral History Interviews with Kama`aina Residents and Fisher-people of Lands in the Halele`a-Na Pali Region on the Island of Kaua`i. K. Maly, 2003.

2. Archaeological Sites of Limahuli Lower Valley were surveyed and described in 1990 in Patolo, T and P.L. Cleghorn, 1990. Archaeological mapping and reconnaissance survey in Lower Limahuli Valley, Ha`ena, Kaua`i. Public Archaeology Section, Applied Research Group, Bishop Museum, Honolulu. (unpublished).

3. Earlier investigation of Limahuli Valley include 2 reports by Joseph Kennedy. Kennedy, J. 1987. "Archaeological Investigations at Limahuli, Island of Kaua`i (TMK 5-9-03:8)", and Kennedy, J. 1988. Report Concerning Archaeological Survey and Testing at Limahuli, Kaua`i". Both are on file with the State Historic Preservation Office, Honolulu.

4. "Inventory of Limahuli Valley" 2000. Scientific Consultant Services, Inc. 711 Kapi`olani Boulevard, Suite 975 Honolulu, Hawaii 96813

5. Numerous foot surveys of the area have been made by NTBG staff, and no obvious archaeological sites have ever been observed in the ULP.

Hunting and Gathering Rights. The fence will not be a barrier to a person intrepid enough to hike into Upper Limahuli. If a person has the physical strength and agility to make it to the Upper Limahuli Valley ridge line, they certainly would find the fence easily climbed. However, the area is private property and since there is no trespassing without the permission from NTBG, the fence itself represents no change in the entrance policy to the area, or the NTBG's policy on gathering rights in Limahuli Preserve.

Note: Should any human remains or Native Hawaiian (or otherwise historically significant) cultural deposits or traditional structures be found during the proposed management activities, work will cease, and the appropriate agencies will be contacted pursuant to applicable law.

E. Sensitive Habitat

Seabird Colonies

Areas within the proposed fence corridor have been identified as breeding sites for the Hawaiian petrel and possibly Newell's shearwater. Impact concerns for these species are both short term (destruction of burrows during fence construction), and long term (possibility of birds colliding with the fence). Because of the location of the fencing within the corridor used by petrels and shearwaters commuting from the ocean to their nests, the possibility exists for these birds to become injured by striking the fencing on the way to nests or activity areas. To avoid this risk, the fence will be routed around nesting areas and constructed to maximize the visibility of the fence to the birds. If nesting sites or other evidence of bird activity is found during preparation of the fence corridor, more intensive surveys will be conducted to determine the extent to which the fence line needs re-alignment.

Native Plant Communities

The ridgeline plant community is resilient native vegetation that will recover in large part in the first 6-12 months after fence construction. Limahuli Valley contains designated Critical Habitat for 12 Federally listed plant species. However, none of these species occur within the proposed fence corridor.

Native Aquatic Communities

There are no o`opu (native gobiid fish species) or other Federal Listed aquatic species that live in the reaches of Limahuli Stream above Limahuli Falls. Native odonates and crustaceans (opae) have been observed in Limahuli Stream, and the increased sedimentation caused by feral pig activity near the stream may have an adverse impact on the habitat of these creatures. Unfortunately little has been documented regarding these particular impacts.

F. Other Uses

The project area, located on private property, is not open for general public use at this time. Access to the area is severely limited by the steep terrain. No person has been known to gain access into this area by foot in the past 10 years, perhaps much longer. NTBG access to the area is always by helicopter. With climbing equipment and skills, it is possible to approach Upper Limahuli in several ways, however this is dangerous and not feasible for large groups or supplies. Upper Limahuli is one of the least accessible areas of Kaua`i due to the surrounding topography. Hunters do not use this area, and a fact confirmed by multiple interviews with area hunters **(Bender, D *pers. comm.*)**.

IV. SUMMARY OF MAJOR IMPACTS

A. Positive Impacts

The most significant impact of this project will be the protection and recovery of the Upper Limahuli Valley ecosystem and its native species, including 12 Federally Listed plant species, and 2 Federally listed bird species. In the future, it may also increase the level of public awareness of and support for environmental education and conservation programs from an increase in conservation management, monitoring, and observational activities inherent to

the project.

More specific positive impacts include the following:

An increased percentage of native vegetation. This is an entirely positive impact that will result from the removal of the alien plant species. A reduction in the vegetative cover of alien species and a corresponding increase in the cover of native species will result in higher quality habitat for the native species found in the Upper Preserve. A high percentage of native plant species will create a more desirable habitat for other native organisms such as native birds and insects by increasing breeding habitat and food sources. These native organisms have often developed mutually beneficial pollinator/food source relationships with the native plant species over thousands or millions of years, and thus they will directly benefit from an increase in native plant species.

Protection of habitat for 12 Federally Listed plant species. See the list in Appendix C of the 12 Listed species that occur naturally in Limahuli Valley. Habitat modification by feral pigs is a primary threat to most of these plant populations. If goats begin accessing Limahuli, they will be a primary threat as well. Control of incipient plant invasions will help prevent the conversion of the habitat that these and other native plant and animal species depend on for survival.

Protection of habitat for 2 Federally Listed bird species, in addition to other native bird species. This impact is positive because it will protect nesting habitat and reduce predation of Federally Listed Newell's shearwaters, Hawaiian petrels, and other native bird species. Feral cats will be trapped and removed from the Preserve in an ongoing effort to keep the area cat-free. The protection and restoration of this area will increase the amount of protected habitat for nesting seabirds and reduce the probability of nest trampling by feral ungulates.

A reduced production of alien seeds. This positive impact will be a direct result of the removal of the naturalized alien species growing in this area. Every alien plant that is removed from this area will reduce the number of potential alien progeny that particular species could otherwise produce. Although the area will undoubtedly continue to experience a "rain" of alien seeds from plants located in surrounding areas, over time, the reduction in the number of alien seeds produced within this area could have a noticeable effect on the maintenance of the Upper Limahuli Preserve. This is especially true with regard to incipient invaders that have yet to establish large populations in Upper Limahuli.

Reduction of the number of feral ungulates in Upper Limahuli Preserve. This is a positive impact that is expected to reduce soil erosion and stream sedimentation; reduce the contamination of Limahuli Stream with fecal coliform bacteria; and stop the continuing destruction of the native species and habitats through the foraging and trampling activities of goats and pigs. In addition, the creation of pig wallows will cease, and existing wallows will become inactive and fill in over time. Because these wallows are major sources of mosquito reproduction, and mosquitos are the primary vector of diseases that harm native birds, a decrease in these wallows is expected to have a beneficial effect for native bird species.

Reduction in soil erosion in Limahuli Preserve. Feral pig trails, wallows, and foraging activities are major sources of soil erosion and loss of ground level plant cover in Upper Limahuli. Alien plant species such as *Clidemia hirta*, common guava, octopus tree,

Australian tree fern, and paperbark cast dense shade and may contain allelopathic substances which result in bare soil conditions under these species. In contrast, native trees such as *ohia* and *olapa* allow for dense cover of ferns and herbs which hold soil in place. Although some soil erosion will occur as a result of fence construction, it is expected that the removal of feral ungulates and control of invasive plant species will result in a net decrease of soil erosion in Upper Limahuli.

B. Negative Impacts

The implementation of these programs and the construction of the physical facilities in the Upper Limahuli Preserve could result in several possible short-term small-scale impacts as described below. The only long-term impact that was identified was the potential for seabird collisions with the fence or weather stations. The potential impacts are associated with the following three general classes of action: Habitat Improvement; Feral Animal Control; and Construction of Physical Facilities. Measures to avoid or mitigate each potential impact are described in the next section, Proposed itigation Measures.

Impacts Associated with the Habitat Improvement
The improvement of the habitat in the Upper Limahuli Preserve as described in the Habitat Improvement Program could result in the following impacts.

Soil erosion. Removal of the existing alien vegetation could cause soil erosion if considerable areas are to be cleared for construction or planting.

Translocated herbicide. The use of translocated herbicides could have an adverse effect on the environment if not applied in a legal, careful, and judicious manner.

Herbicidal control of herbaceous vegetation. The use of such herbicides could have an adverse effect on the environment if not applied in a legal, careful, and judicious manner.

Limahuli Stream. The NTBG recognizes that the improvement of the existing habitat could affect the present pristine condition of Limahuli Stream. The main concerns are over herbicide use and soil erosion, if activities are not properly planned and implemented.

Noise. The increased use of chainsaws and maintenance equipment will generate an increase in noise.

Impacts Associated with the Feral Animal Control Element of the Habitat Improvement Program
The control of feral animals in the Upper Limahuli Preserve will involve two basic types of activities. These are fencing operations and animal control. The NTBG anticipates that feral animal control efforts could result in the following possible impacts.

Trampling of burrows or dog attacks on grounded seabirds during pig hunting Upper Limahuli Preserve. Hunters or dogs could trample burrows and dogs might attack birds on the ground if they encounter them.

Non-target effects from the use of rat bait stations in Upper Limahuli Preserve. The possibility of non-target effects could result in poisoning of other Hawaiian birds, such as the Hawaiian owl.

Impacts Associated with the Construction of Physical Facilities

The construction of physical facilities within the Upper Limahuli Preserve will consist of the establishment of minor trails, tool-storage and work shelters for use by the NTBG staff and research scientists; ungulate-proof fencing; low-impact helicopter landing areas; and weather stations. The NTBG anticipates that the construction of these facilities could result in the following possible impacts.

Soil erosion. Construction of physical facilities could contribute to the erosion of soil.

Loss of native vegetation. Some native plants will have to be trimmed or cleared along the fence corridor.

Weed introduction. Increased foot and helicopter traffic could accelerate introduction of alien plant species into the Upper Valley.

Noise. The construction of physical facilities in the Upper Limahuli Preserve will require the use of a helicopter to deliver materials, supplies, and staff into the Upper Limahuli Preserve, resulting in an increase in helicopter noise over the area.

Disturbance of Nesting Seabirds. The recently documented Hawaiian petrel nesting site is located within the original proposed fence corridor. Creation of the fence corridor could disturb nesting activities or burrows along the fence route.

Seabird collisions with the fence or weather stations. Seabirds could be injured by collisions with the fence or weather stations placed along the ridge. The danger is most pronounced around nesting areas and within flyways.

Fences, weather stations, and shelters may be viewed as unsightly or incompatible the surrounding environment.

Fences will be a barrier to cultural access. Native Hawaiians will be deprived of access to cultural sites or important plant species due to the construction of fences.

V. PROPOSED MITIGATION MEASURES

A. Soil erosion

The NTBG will be able to **avoid** this impact because only selected alien vegetation will be removed, large areas will not be cleared, and soil will not be exposed as a result of the proposed activities. Soil will not be exposed in the establishment of low-impact helicopter landing zones, construction of the fence, placement of weather stations, therefore no increase in

soil erosion is expected as a result of the installation of these features. During the construction of the storage/camp shelters a small amount of bare soil may be exposed to erosion. The NTBG will **mitigate** this impact by locating and constructing the shelters in level areas where a lack of slope will reduce the amount of erosion and the potential for sedimentation.

Manipulation of vegetation along the fence corridors prior to construction of fence and for the purposes of maintaining the fence will not result in increased soil erosion because vegetation will not be removed, it will only trimmed in the case of woody plants, and mowed in the case of herbaceous plants. The NTBG will **mitigate** this impact through several measures aimed at limiting the scope and intensity of this impact. These are :

1. **Minimal clearing of vegetation.** Vegetation along fence corridors will only be trimmed in a corridor 6 feet wide. Woody vegetation will be trimmed or avoided as needed along the corridor, and herbaceous vegetation will be trimmed only to the extent required to allow fence construction. This technique will not expose bare soil to increased erosion.

2. **Incremental construction.** The fencing operations will be performed in a linear fashion over a 6-9 month scope of time. This will allow areas to recover from construction impacts as construction proceeds along the fence corridor. Utilizing this strategy, limited areas will exposed to impacts at any given time.

3. **Location of fences.** The location of fences along the watershed boundary, approximately 800-1,000 feet above Limahuli stream, will greatly reduce the amount of sediment that might possibly be transported into Limahuli Stream should any soil erosion occur. In the event that soil erosion does occur, runoff from the fence corridor area will be filtered through 1,000 feet or more of dense vegetation which will tend to sequester any soil moving down slope.

B. Translocated herbicide

By applying translocated herbicide precisely on freshly cut stumps using low volume medical bottle applicators, or by injecting it into living or frilled trees, the NTBG will be able to **avoid** this impact. NTBG has utilized this technique with excellent results in the past, and it is a widely used technique for the control of nonnative woody vegetation in Hawaii. Extremely low volumes of herbicide are used with this technique. Only products labeled for forestry applications will be utilized, and all label directions will be followed.

C. Herbicidal Control of herbaceous vegetation

In order to **mitigate** these impacts, use of this technique will be minimized and performed judiciously by trained NTBG staff. Only products labeled for forestry applications will be utilized, and all label directions will be followed.

D. Limahuli Stream

All potential impacts will be **avoided** or **mitigated** as described above. Herbicides will not be used in close proximity to stream. Degradation of the stream by pigs will be decreased through this project, thereby improving stream quality. Limahuli Stream is also part of a long term ecological monitoring program that measures physical and biological elements of the

stream ecosystems across Hawai`i.

E. Trampling of burrows or dog attacks on grounded seabirds during pig hunting

This impact will be avoided by limiting public hunting and hunting using dogs to the period of seabird breeding inactivity from May through November, and insuring that all public hunts are be attended by an NTBG employee familiar with sensitive areas.

F. Non-target effects from the use of rat bait stations

The NTBG will **avoid** these impacts by utilizing bait stations that have an enclosed design which limits the availability of bait blocks to anything but rodents. Active ingredients that have very low toxicity to birds have also been identified for use. Procedures will be implemented with the advice of Federal and State officials who have successfully implemented rodent control and eradication programs in other locations.

G. Loss of native plant species

Preparation and maintenance of the fence corridor will require the trimming of some native trees and shrubs. Unfortunately, this is an unavoidable consequence of protecting the rest of Limahuli Preserve from the long term destructive effects that will result if feral ungulates are not excluded from our intact native forest areas. The ridgeline is dominated by common trees and shrubs and very few rare species. To **mitigate** this impact, NTBG botanists have surveyed the proposed fence corridor for rare plant species and will be present to monitor clearing activities. Any previously unobserved rare plants found during fence corridor preparation will be marked with flagging tape, workers will be made aware of these occurrences, and the greatest care will be exercised in protecting these plants from damage during fencing operations. Clearing of the fence corridor will be limited to a 6 foot wide strip. No Federally Listed Threatened or Endangered plant species are found along the proposed fence corridor.

H. An increase in non-native plants along the fence corridor

This impact could result from the manipulation of existing vegetation, coupled with increased worker traffic through the area. These impacts will be **mitigated** through the following measures :

1. **Minimal clearing of herbaceous vegetation.** As described above under section A1, the potential for colonization by weed species will be reduced through minimal manipulation of herbaceous vegetation.
2. **Sterile practices for tools, clothing, and materials transported to project sites.** To reduce the probability that weed seeds are brought to the site, tools, clothes, shoes, backpacks, and materials will be inspected and cleaned before transport. Staff and contractors will maintain dedicated personal gear (shoes, packs, gloves, clothing) for fence work in intact forest areas.
3. **Control of non-native species along the fence corridor**. For the first year after fence construction, the fence corridor will be intensively monitored for new weed species or large infestations, which will be controlled using mechanical and chemical means as described under the Habitat Improvement section. By targeting non-native species in

this way, native plants will be encouraged to re-colonize the area, and any increase in alien plant cover will be minimized. The entire fence corridor will be monitored at 6 week intervals for the first 6 months after construction, and then quarterly for the remainder of the first year. After that, regular quarterly monitoring of the fence will involve a weed control element in addition to inspecting the fence for damage and signs of animal ingress.

I. Noise

This impact will be naturally **mitigated** by the remote nature of this area. Thus, the NTBG does not anticipate any negative impact to result from the increased use of chain saws and maintenance equipment. Increased helicopter traffic over remote parts of the Preserve that will be fenced will be episodic during fence construction. The flight path for helicopter operation involved in transporting fence materials and workers only impacts a small number of residences. These individuals will be made aware of helicopter operation plans well in advance so that alternative scheduling of the work can be made if needed.

J. Disturbance of Nesting Seabirds

Ground searches and audible surveys of the proposed fence line will be conducted during Hawaiian petrel and Newell's shearwater breeding season to identify nesting areas and flyways. Wildlife biologists will work ahead of staff clearing the fence corridor, so that they can identify nesting areas that may exist along the fence route. The fence will be re-routed as needed around any nesting areas so that disturbance of these nesting sites will be **avoided** by providing a minimum buffer of 50 feet from construction and clearing activities. Training in the recognition of seabirds, burrows, and other indicators will be provided to fence construction workers and NTBG staff who prepare the fence corridor.

K. Seabird collisions with the fence or weather stations

Bird impacts will be **avoided** by aligning the fence so that it does not present a strike obstacle near breeding colonies. The previously documented Newell's shearwater colony in Upper Limahuli Valley is more than 500 feet from the proposed fence corridor. The recently documented Hawaiian petrel nesting site is located within the original proposed fence corridor. The fence will be re-aligned through this area, and other areas that are subsequently identified through surveys, so that disturbance of these nesting sites will be **avoided**. The ridgeline fence corridor will be surveyed during the spring of 2007 for nesting activity before preparation of the fence corridor. If burrows are located along the fence corridor, the fence will be re-aligned in order to give any burrow a buffering distance of 50 feet from the fence footprint.

Bird impacts with the fence will be **mitigated** by marking of the fence with materials that will make it more visible. This technique is currently in use at other locations for this purpose in Hawaii. Research conducted by Roberta Swift at Hawai‘i Volcanoes National Park during 2003-04 indicates that commuting petrels typically fly higher than than seven feet and that petrels are able to see and take steps to avoid fencing **(Swift 2004).** Additonally, the lethality of bird strikes will be **mitigated** through the omission of top and bottom barbed wires in the fence design within 100 feet of seabird colonies.

Maintenance of the fence line will include monitoring for the presence of injured animals. Because this project is receiving Federal funding, the U.S. Fish and Wildlife Service will conduct a section 7 consultation, and additional mitigation measures may be incorporated

if needed. Finally, after construction, if it appears that birds are being injured or killed through contact with the fence, additional mitigation measures will be developed and implemented.

While the possibility exists that native birds, specifically the Hawaiian petrel and Newell's shearwater may fly into the fencing and become injured or killed, based on the available information and the planned mitigation measures, the overall negative impact on native birds is not anticipated to be significant. On the contrary, the fence will provide a benefit to Hawaiian petrel and Newells' shearwater by protecting nests and areas suitable for nesting from trampling and disturbance by large feral animals.

Bird collisions with the weather stations will be **avoided** by locating weather stations a minimum of 500 feet from seabird nesting areas, and **mitigated** by marking these features to make them more visible. This will aid birds in avoiding collisions with these objects.

L. Compatibility with the surrounding environment

This impact will be **avoided** because all fences, shelters, and weather stations will be located deep within the Preserve, in areas of dense vegetative cover, and out of the publics view. None of the physical facilities will be visible from the Kuhio Highway, coastline, or any residences.

M. Cultural Access

Access to the area is controlled by the landowner. There are no culturally significant plants (e.g. *maile, pālapalai*) that occur within the fence area that do not also occur immediately outside the area. In addition, any person physically capable of hiking up to the fence would not have any problem overcoming the barrier presented by the proposed fence. If cultural sites or activities are identified which might be impacted by the project, then the design, construction, or alignment of the fence may be altered.

VI. ALTERNATIVES CONSIDERED

A. Alternative: No Action

This action effectively accepts the continued degradation of the Upper Limahuli Valley ecosystem and its constituent species by feral pigs and alien plant species. This alternative is not consistent with the landowner's sense of responsible stewardship. The no action alternative will result in far greater and more damaging (potentially irreversible) environmental impacts than the project itself would.

VII. ANTICIPATED DETERMINATION

Note: The Department of Land and Natural Resources Issued a Finding of No Significant Impact on September 26, 2007 (date letter received by NTBG). See Appendix D.

Based on the assessment above we conclude that the active management and restoration of Upper Limahuli Preserve will not have any significant adverse impacts on the environment. Quite the opposite, the protection and active management of the area for native species will have numerous significant positive effects that are in keeping with the goals of the Special Subzone. Therefore, we anticipate a 'Finding of No Significant Impact' (FONSI).

VIII. FINDINGS AND REASONS SUPPORTING THE DETERMINATION

The environmental impacts of the active management and restoration of Upper Limahuli Preserve project have been evaluated in relation to the thirteen significance criteria listed in the Guidebook for the State Environmental Review Process. The criteria and the effects this project will have are listed:

1. **Involves an irrevocable commitment to loss or destruction of any natural or cultural resource.**

   The purpose of this project is to protect the Upper Limahuli Preserve ecosystem and endangered species found therein from destruction and degradation by feral pigs and alien plant species. Rather than destroy natural resources, this project will lead to greater protection and management.

2. **Curtails the range of beneficial uses of the environment.**

   The Upper Limahuli Preserve is a priceless and fragile system. It functions primarily as a watershed catchment and storage area and as habitat for native species. This project will strengthen rather than curtail those functions. Possible educational, cultural, and scientific uses will be enhanced by the completion of the project.

3. **Conflicts with the state's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revision thereof and amendments thereto, court decisions, or executive orders.**

   The project complies with the state's long-term environmental policies and goals that promote understanding and protection of Hawai‘i's natural resources. Therefore, this project does not conflict with the state's long-term environmental policies or goals.

4. **Substantially affects the economic, social welfare, and cultural practices of the community or state.**

   The project will not impact either the economic or the social welfare, nor the cultural practices of the community or state as there is no evidence that Upper Limahuli Valley is currently utilized for such activities nor is there evidence of plans for such use.

5. **Substantially affects public health.**

   This project will not substantially impact public health, as it is located in a remote portion of the mountainous interior of Kaua`i.

6. **Involves substantial secondary impacts, such as population changes or effects on public facilities.**

   The remoteness and rugged terrain of the project area precludes any impact on

population or public facilities.

7. Involves a substantial degradation of environmental quality.

The purpose of this project is to improve the quality of a unique Hawaiian environment. This project requires limited trimming of common native plants and some small-scale short-term soil disturbance. However, this activity is necessary to protect the integrity of the lowland wet forest ecosystem and is intended to result in a net long-term benefit to the habitat.

8. Is individually limited but has considerable effect upon environment or involves a commitment for larger actions.

This project will have a positive effect on the environment and will not involve a commitment to larger actions. It is designed to significantly support ongoing and future management and protection of Upper Limahuli Preserve.

9. Substantially affects a rare, threatened, or endangered species or its habitat.

The proposed project will not adversely impact any endangered species. The project aims to conserve and restore habitat for 12 Federally Listed plant species and 2 Federally Listed bird species. This project will benefit these species by improving the quantity and quality of the habitat available to them, and by decreasing threats to the habitats and individuals of these species in Upper Limahuli Valley. Any potential impacts form the proposed activities will be avoided or mitigated as described herein. Any additional long-term impacts can be identified through monitoring and mitigated through agency consultation if needed. Overall the project represents a vast net benefit for the native species and habitats of Upper Limahuli.

10. Detrimentally affect air or water quality or ambient noise levels.

Helicopters will transport construction materials to the project site. These flights will occur during normal work hours and will not fly over residences. Thus, noise level will be elevated during the period of fence construction, but it will be minor and short term.

11. Affects or is likely to suffer damage by being located in an environmentally sensitive area such as flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, and estuary, freshwater, or coastal waters.

This project is located in an environmentally sensitive area, however, the intent of the project is environmental protection of this area. The best management practices are in place to prevent and minimize any anticipated short-term impacts and are not anticipated to result in long-term damage to the habitat. This project is located in an upland area and will not detrimentally affect any coastal areas or other bodies of water. The project will not negatively affect an environmentally sensitive area or damage a flood plain, tsunami zone, beach, erosion-prone area, or geologically hazardous land.

12. Substantially affect scenic vistas and view planes in county or state plans or studies.

The project area has not been identified as a scenic vista or view plane. The project will be located more than 1 mile from the coast and is not within line of sight of any point on the coast. Thus, none of the physical facilities can be seen from any publicly accessed viewing site.

13. Requires substantial energy consumption.

The major energy consumption for this project will be the fuel required for helicopter flights to the station sites and the embodied energy of the construction materials which are not anticipated to be substantial.

IX. EA PREPARATION

This Environmental Assessment was prepared by the National Tropical Botanical Garden, Conservation Department.

The EA is being prepared primarily by:

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X. REFERENCES CITED

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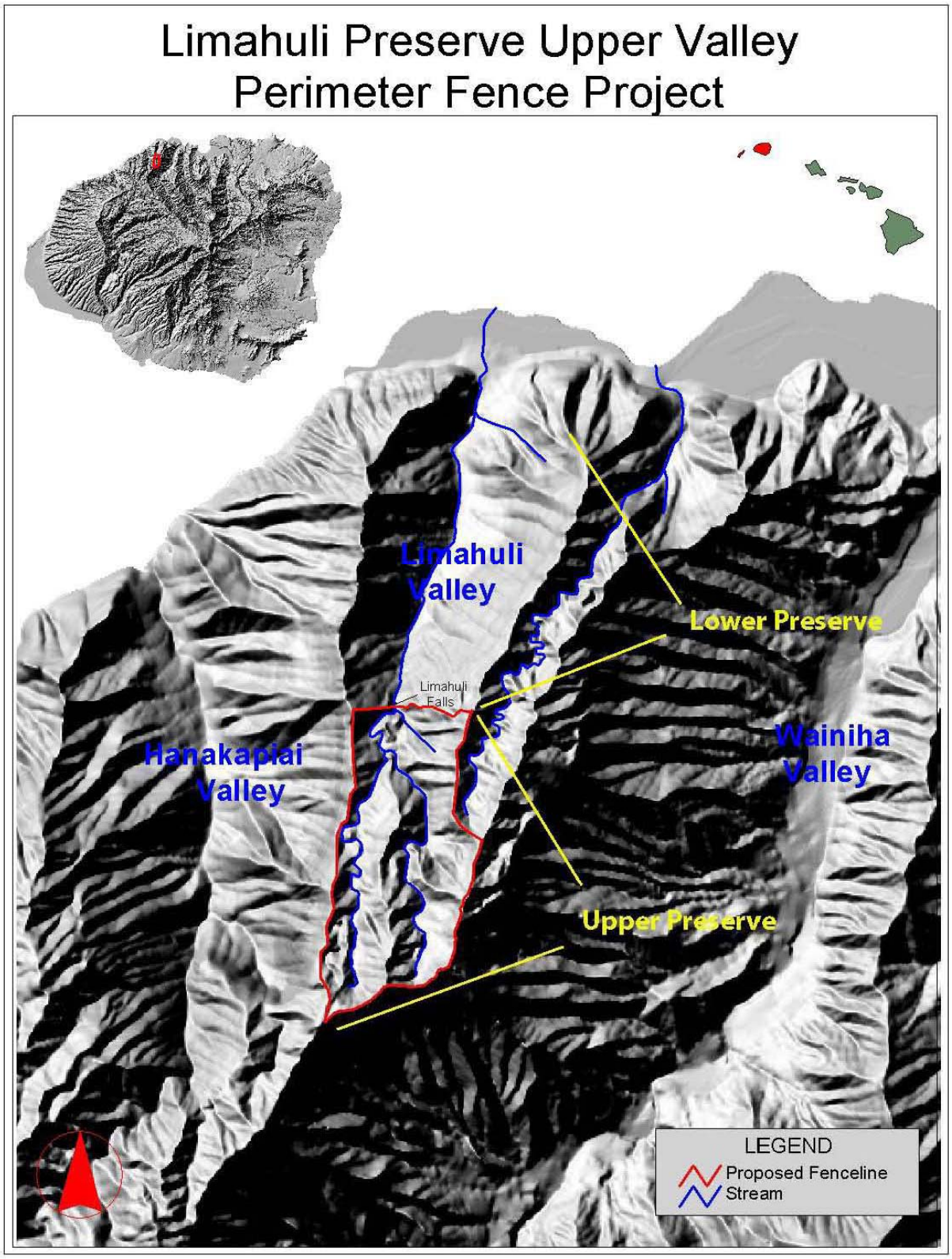
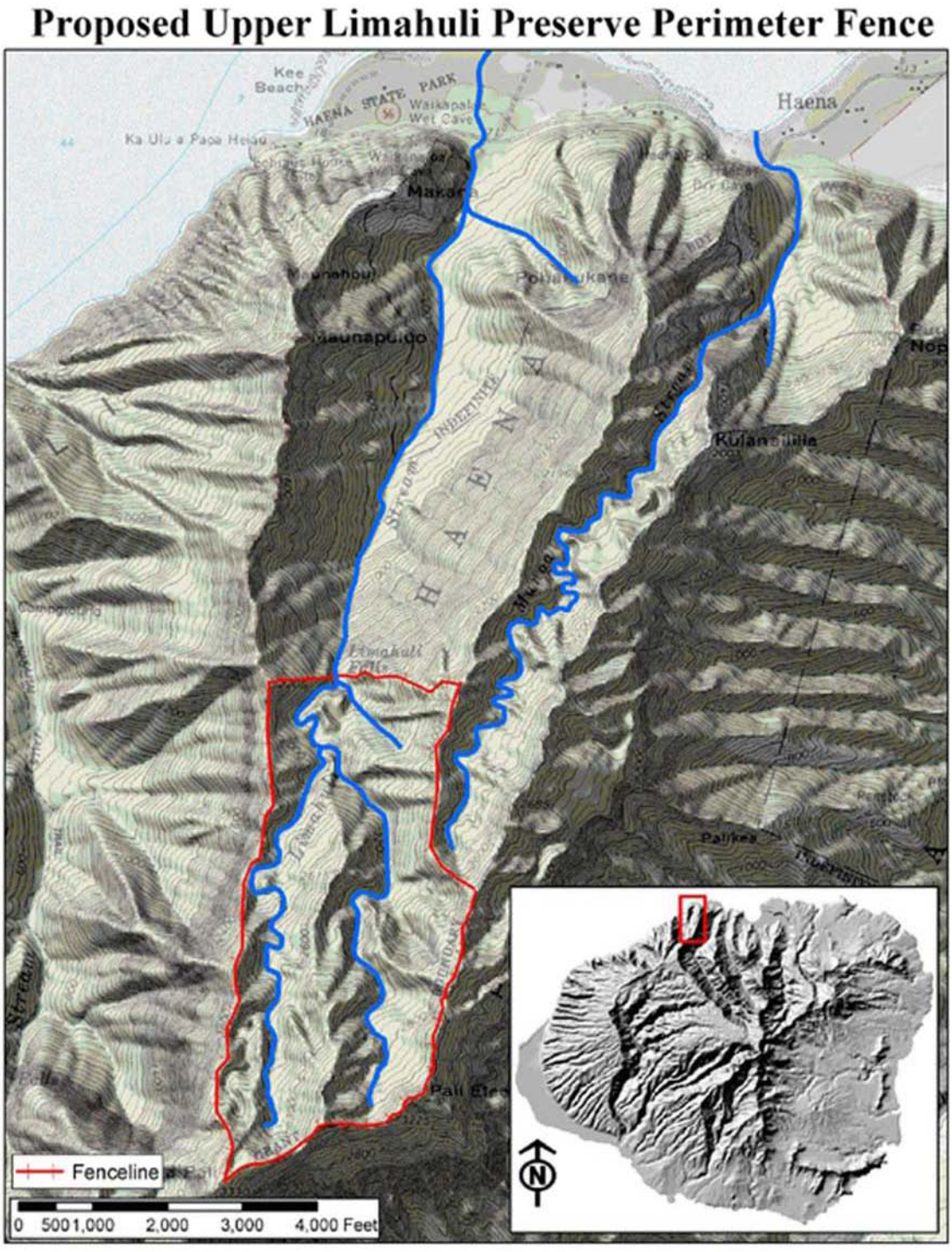
APPENDICES

Appendix A. Map of Project Area



Appendix B. Map of proposed fence alignment



Appendix C: Federally Listed Species of Upper Limahuli Valley

Federally Listed Species	Listing Category
Plants	
Adenophorus periens	Endangered
Bonamia menziesii	Endangered
Delissea rhytidosperma	Endangered
Flueggea neowawraea	Endangered
Hibiscus waimeae ssp. *hannerae*	Endangered
Lobelia niihauensis	Endangered
Pteralyxia kauaiensis	Endangered
Scheidea kauaiensis	Endangered
Cyrtandra limahuliensis	Threatened
Isodendron longifolium	Threatened
Myrsine linearifolia	Threatened
Peucedanum sandwicense	Threatened
Charpentiera densiflora	Candidate
Cyanea kuhihewa	Candidate
Gardenia remyi	Candidate
Hedyotis elatior	Candidate
Joinvillea ascendens ssp. *ascendens*	Candidate
Melicope paniculata	Candidate
Ochrosia kauaiensis	Candidate
Phyllostegia renovans	Candidate
Pritchardia limahuliensis	Candidate
Hibiscus kokio ssp. *saintjohnianus*	Species of Concern
Ochrosia kauaiensis	Species of Concern
Tetraplasndra kavaiensis	Species of Concern
Zanthoxylum dipetalum var. *dipetalum*	Species of Concern
Animals	
Lasiurus cinereus semotus Bat, Hawaiian hoary	Endangered
Puffinus auricularis newelli Shearwater, Newell's Townsend's	Threatened
Pterodroma phaeopygia sandwichensis Petrel, Hawaiian dark-rumped	Endangered

Appendix D: DLNR Finding of No Significant Impact (FONSI) letter

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

Office of Conservation and Coastal Lands
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

SEP 26 2007

MEMORANDUM

To: Lawrence K. Lau, Acting Director
Office of Environmental Quality Control

From: Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

Subject: Draft Environmental Assessment (EA) and Revised Master Plan for the Limahuli Garden and Preserve

The Department of Land and Natural Resources has reviewed the draft EA for the subject project, and anticipates a Finding of No Significant Impact (FONSI) determination for the proposed revisions to the Limahuli Garden and Preserve Master Plan that was approved by the Board of Land and Natural Resources in 1994. Please publish notice of availability for this action in the next issue of the Environmental Notice. We have enclosed four hard copies of the draft EA document and an electronic copy of the project summary for your office.

Should you wish to provide comments regarding this project, please respond by the suspense date noted above. If no response is received by the suspense date, we will assume there are no comments. Please contact Sam Lemmo of our Office of Conservation and Coastal Lands staff at 587-0377 should you have any questions.

Enclosures

C: Chairperson
Chipper Wichman

Appendix E: Excerpt from OEQC Bulletin with DEA Public Review Notice

Kaua'i Notices

November 8, 2007

Master Plan for Upper Limahuli Preserve – Revision of 2007 (HRS 343 DEA)

District: Hanalei
TMK: 5-9-1:3
Applicant: National Tropical Botanical Garden (NTBG), 3530 Papalina Road, Kalaheo, Hawai'i 96741-9599, Contact - Chipper Wichman, (808 332-7324 ext. 240)
Approving Agency: Department of Land and Natural Resources, Office of Conservation and Coastal Lands, 1151 Punchbowl Street, Room 131, Honolulu, Hawai'i 96813, Contact - Sam Lemmo (808 587-0377)
Consultant: N/A
Public Comment Deadline: December 10, 2007
Status: Draft environmental assessment (DEA) notice pending 30-day public comment. Address comments to the applicant with copies to the approving agency, consultant and OEQC.
Permits Required: N/A

The National Tropical Botanical Garden (NTBG) is updating its Master Plan for Limahuli Garden and Preserve. The original Master Plan was approved by the DLNR when they approved the creation of the Limahuli Valley Special Subzone in 1992. In 1994, the DLNR issued NTBG a Conservation District Use Permit to implement the Master Plan. In the 15 years since the LVSS was created the environmental conditions in the Upper Limahuli Preserve have changed dramatically and the unique native biota that call this area home are being threatened by invasive alien species. The NTBG now proposes, via this updated Master Plan, to undertake the active conservation management and ecological restoration of the 400-acre Upper Limahuli Preserve which is located in the *ahupua'a* of Ha'ena area on the north shore of Kaua'i. This is an area of high conservation value due to the presence of 12 Federally Listed plant species and 2 Federally Listed bird species, and because it represents a functioning native ecosystem of significant size. The revised Master Plan includes an updated Management Plan for the Upper Limahuli Preserve as required under HAR 13-5, and outlines the following conservation management activities: 1) feral ungulate fencing, 2) feral ungulate control, 3) rodent control, 4) feral cat control, 5) alien plant species control, 6) native plant restoration, and 7) native seabird monitoring. The plan also identifies the following essential infrastructure needed to actively manage this remote area: 1) small tool storage/weather shelters to accommodate equipment and staff who have to camp in this often wet area, and 2) several (five to eight) remote helicopter landing zones (LZ), and 3) three to five computerized weather stations.

Hanapepe Public Library Expansion (HRS 343 FEA-FONSI)

District: Koloa
TMK: (4) 1-9-06: 14 and 29
Proposing Agency: Department of Accounting and General Services, Project Management Branch, 1151 Punchbowl Street, Room 427, Honolulu, Hawai'i 96810-0119, Contact - David Chung (808 586-0464)
Determination Agency: Same as above.
Consultant: NKN Project Planning
4849 'I'iwi Road, Kapa'a, Hawai'i 96746
Contact: Nadine Nakamura (822-0388)
Status: Final environmental assessment (FEA) and Finding of No Significant Impact (FONSI).
Permits Required: County Use, Variance, Class IV Zoning Permit
Building Permit

The State of Hawai'i, Department of Accounting and General Services is proposing to expand the Hanapepe Library. The work involves demolition of a portion of the existing building, site improvements, interior renovations to accommodate the expanded library, adding additional parking, and other related work. The work involves: Improvements for staffing and operational efficiencies; Compliance with Americans with Disabilities Accessibility (ADA) Guidelines; Designed as an inviting space with public image and visibility; Sensitivity to the historic nature of the surrounding Hanapepe Town and design guidelines; Expansion of the workroom, program meeting room, public restrooms, and books/reading room areas as follows:

Current library area	4086 square feet
Expanded library area	2853 square feet
New total library area	6939 square feet

In addition to the expanded library facilities, the parking stalls will be increased from 9 to 13 stalls, including one ADA accessible stall. There will be temporary construction, noise, and parking relocation impacts. The finish floor of the library expansion will be approximately 2.5 feet above the existing library floor elevation since the parcel is located in flood zone AE.

'Ele'ele Facility Plan (HRS 343 DEA)

District: Koloa
TMK: Various
Proposing Agency: County of Kaua'i, Department of Public Works, Division of Wastewater Management, 4444 Rice Street, Suite 500, Lihu'e, Kaua'i, Hawai'i 96766, Contact - Mr. Edward Tschupp, (808-241-6610), facsimile (808-241-6589).
Determination Agency: Same as above.
Consultant: Fukunaga & Associates, Inc., 1388 Kapi'olani

Appendix F: Responses to Public and Agency Comments

No public or agency comments were received.